

چکیده مقالات

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Conferences

The Fourth International Plant Biology Conference

Scientific Secretary: Dr. Mohsen Sharifi (Tarbiat Modares University)

The Main Topics of the Plant Biology Conference:

- | | |
|-------------------------------|------------------------------------|
| 1. Metabolism and Metabolites | 6. Defense Responses of Plants |
| 2. Plant Systematics | 7. Plant Symbiosis |
| 3. Soil and Plant Relations | 8. Plant Biodiversity |
| 4. Developmental Biology | 9. Biological and Abiotic Stresses |
| 5. Plant Biotechnology | |

The Fourth International Animal Biology Conference

Scientific Secretary: Dr. Alireza Sari (University of Tehran)

The Main Topics of the Animal Biology Conference:

- | | |
|---------------------------------------|-------------------------------|
| 1. Biosystematics | 5. Developmental Cell Biology |
| 2. Animal Biodiversity | 6. Cognitive Neuroscience |
| 3. Marine Zoology | 7. Physiology |
| 4. Stem Cells and Tissue Regeneration | |

The Fourth International Cell and Molecular Biology Conference

Scientific Secretary: Dr. Abaslat Hosseinzadeh Kalagar (Mazandaran University)

The Main Topics of the Cellular and Molecular Biology Conference:

- | | |
|--------------------------------|-----------------------------------------|
| 1. Cell Biology and Stem Cells | 5. Bioinformatics and Systems Biology |
| 2. Molecular Biology | 6. Molecular Medicine and Health |
| 3. Biochemistry and Biophysics | 7. Immunology and Virology |
| 4. Genetics and Cytogenetics | 8. Biotechnology and Microbiotechnology |

The Fourth International Environmental Biology and Conservation Conference

Scientific Secretary: Dr. Mansour Afshar Mohammadian (University of Guilan)

The Main Topics of the Environmental Biology and Conservation Conference:

- | | |
|-------------------------------------------------------------------|----------------------------------------------------|
| 1. Sustainable Development and the Environment | 4. Renewable Energies, Optimal Energy Management |
| 2. Environmental Pollution, Causes and Effects, Biological Safety | 5. Environment, Biotechnology and New Technologies |
| 3. Habitats and Conservation, Population Genetics, Biodiversity | 6. Man and Climate Change, dose and don'ts |

The First International Microbial Biology Conference

Scientific Secretary: Dr. Farshad Darvishi (Al-Zahra University)

The Main Topics of the Microbial Biology Conference:

- | | |
|--------------------------------------------------------|---------------------------------|
| 1. Microbial Biodiversity and Systematics | 5. Virology |
| 2. Industrial Microbiology and Microbial Biotechnology | 6. Agricultural Microbiology |
| 3. Food Microbiology and Pharmaceutical Products | 7. Geomicrobiology |
| 4. Health Microbiology and Immunology | 8. Water Microbiology |
| | 9. Biology of Microbial Systems |
| | 10. Microbial Synthetic Biology |

The Second Biology Teaching Conference

Scientific Secretary: Dr. Zainab Dehghan (Head of the Union of Biology Teachers' Associations of the Country)

The Main Topics of Biology Teaching Conference:

- | | |
|-----------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| 1. Innovation in Biology Education (Storytelling, Reverse Teaching, Artificial Intelligence, Multimedia Classes, Interactive Education) | 3. Analysis of Biology Books (Content, Shortcomings, Vocabulary) |
| 2. Quality Education, Measurement and Evaluation | 4. Past Experiences in Teaching Biology, Comparative Studies, New Generation Schools |
| | 5. Environmental Hazards in Biology Education |

The President's Message

In the name God

The main questions of ontology have a great connection with biology, and as we look at the various aspects of this important branch of human knowledge, the answers given to ontological questions such as where did I come from, sounds more meaningful and understandable.

For years, the efforts of Iranian biologists within the framework of the Iranian Biology Society to hold biennial congresses has a great impact on promotion of biology; Especially from the point of view of promoting the gathering of younger generations and veterans of this field with all its major and minor trends and branches in the form of this Congress and accompanying conferences. It has now become a great event, where a group of Iranian and non-Iranian researchers and scientists gather every two years in one of Iran's universities and share their latest scientific and research achievements. It is an honor for Tehran University to host the 23rd National Congress and the 11th International Congress of Biology of Iran in September 2024, and the welcome of young students to this important biological event makes the hopes for a better tomorrow even brighter.



Dr. Mohammad Nabiuni
(Professor at Kharazmi University)

The Scientific Secretary's message

In the name of God

The Iranian Biology Association, once again with its 23rd congress in September 2024, invites you to watch the magnificent world of biology.

Living beings, directly and indirectly, have had a wide and great impact in all areas of our lives. A deeper understanding of biological mechanisms in the spectacular range of life today has unprecedented lessons for all biological, ecological, medical and health issues and beyond these for establishing a healthy, coherent and efficient social life.

I hope with the aid of all attendants in the 2024 congress, be able to exhibit some corners of the wonders of biology, lessons and solutions taken from the beautiful patterns full of integration, cooperation and coexistence of the living world. Get ready to set up a glorious congress with the participation of Iranian biologists' community and scientists from other countries!



Dr. Ali Farazmand
(Professor at University of Tehran)

The Executive Secretary's message

Biology: "the way of life, the knowledge of living!"

The 23rd National Congress and the 11th International Congress of Biology of Iran ended with all its ups and downs. The unprecedented reception at the opening ceremony of this congress promised glorious and exciting days, which happened! Six simultaneous conferences, in six separate halls, were held in total, very excellent and popular, and during three days, professors, researchers, students and teachers presented their scientific achievements. The holding of this congress in "University of Tehran" was another turning point to demonstrate the coexistence and cooperation of the Iranian Biology Society with universities all over the country at its highest level. The presence of the great biologists of the country in this huge three-day congress was another strong point that both satisfied their lovers desire to meet them and had a double impact on the scientific richness of the congress. The bright and enthusiastic presence of students from all over the country was a source of great pleasure and pride. The reception of the students, despite the many problems that existed due to the symmetry of the trips in late Shahrivar and the return of the Arbāeen ceremony, was very impressive and worthy of reflection! If it is possible to solve the issue of students' accommodation and commuting in the upcoming congresses, we will see many times the reception. Taking a quick look at the speakers of various conferences, we saw the support, companionship and presence of the country's top biology leaders in the 23rd Congress. The presence of great professors from prominent universities in Tehran and other cities shows the organization, information and successful holding of this event. In the international section, useful, popular and attractive speeches were presented, both in the keynote speeches and in the speeches of the six conferences. The microbial biology conference, which was held for the first time as an independent conference in the Congress of Biology, was especially well received. An interesting and enviable record was recorded in this congress in the skills workshop section; Holding nearly 60 workshops with different titles and in different fields shows the new approach of the Iranian Biology Society in creating a suitable and attractive environment for students to acquire important and practical skills.

But the most outstanding event was the biennial conference of biology teachers of the country! The presence and welcome of biology teachers from most provinces of the country was truly a unique achievement! What motive brought together almost all the elders in this field of biology education is worthy of reflection and expert work! More interestingly, some of these loved ones had also participated in the research works of their students in this congress.

How this huge congress was completed with the round-the-clock efforts of the honorable scientific secretaries of the six conferences and the executive officers of the specialized committees has a detailed story and is worthy of a separate article, but what I learned during the past six months and especially during these three days of holding the congress. It was the way of life" and "the knowledge of living"! We humans have many similarities, but we have many differences. What causes our beautiful coexistence together is "biology" itself. Accordingly, one of the best slogans of recent years' congresses was chosen in the 23rd Congress; [Biology: way of life, knowledge of living]. It seems that this sentence is more than a slogan for all of us who live in the world of biology and is actually a kind of "lifestyle"! I very much hope that all of us, reflecting on this slogan, will show a beautiful coexistence in the country's biology community and be a model for the great scientific community in the country.



Mostafa Pooyan

The Plant Biology Conference Scientific Secretary's message

Plants are always known as a main component and essential resource of the life in Earth. Currently, it is estimated that the number of vascular plant species is about 400,000. Other than cultivated species used by humans for food, medicine and various industries, there are many wild plants with great economic and cultural importance/potential facing the emerging challenges of environmental and climate disasters. Plants play a key role in preserving the environmental balance and stability of the earth's ecosystem and are considered an irreplaceable part of natural habitats for all living things. One of today's concerns and challenges is the fact that many plant species, communities and their ecological relations, including the mutual interactions between plants themselves and the plant's place in human societies are at the risk of extinction. On the other hand, the risk of plant habitats loss due to over-exploitation, the dominance of alien invasive species, pollution, land clearance for the development of industry and even for agriculture demands is another threat affecting the green ring of the food chain and hence disparity of life for many years. Current situation has endangered the whole planet. If the risks and damages are not resolved timely and carefully, the opportunities to unravel economic, social, health and industrial issues will be lost. Unquestionably, along with the exploitation of plants, taking versatile scientific effort to preserve and preserve plants is very essential; only by resolving respective issues, human societies around the world would be able meet, sustainably, their needs, regarding food, medicine, and water resources. Meanwhile, keeping air quality, maintaining rich and fruitful tourism landscapes, energy resources and healthy atmosphere rely mostly on vegetation. On the other hand, knowing the important role of plant diversity in protecting ecosystems against climate change, mankind need to try lessen the risk of plant extinctions due to human activities and preserve the genetic diversity of plants. Paying attention to cultural dimensions of profiting from plants and emphasizing the place of plants in human life, especially in native and local communities, will lay the groundwork for promoting the holiness and respect of plants as a God blessing, and therefore required challenges for preservation and maintenance of the invaluable resources. We hope this Conference of Plant Biology, along with introducing the capacities, methods and fields of food, medicinal and industrial exploitation of plants, would be able to explore its dominant message of protection and presenting methods and plans for development of vegetation and culture, and promoting respect to plants/green nature becomes true and help to understand the importance of preservation of this priceless heritage for human generations to come and better future for all living beings.



Dr. Mohsen Sharifi
(Professor at Tarbiat Modares University)

The Animal Biology Conference Scientific Secretary's message

We are pleased to host the lecturers, researchers and students of the country's biological sciences in the 23rd National Congress of Biology and the 11th International Animal Biology Conference in September 2024. The development of biological sciences owes to the careful and enduring efforts of dear Sirs in solving problems and the appropriate approach of every basic science researcher in the country. Presenting research achievements in conferences is a suitable space and platform for exchanging opinions, presenting proposals in the country's strategic development program in related fields and specialties. Also, gaining experience from many years' accumulation of researchers is a road map for the young and dynamic generation, and promoting the culture of knowledge transfer in an atmosphere full of love for cooperation, providing empathy and cooperation.

The national and global development of biological sciences, especially in the branch of animal biology, in the direction of ensuring health, food security, protection of the environment and biodiversity, and economic and sustainable productivity of animal resources is one of the goals of this congress. We honor to welcome your invaluable presence and look forward to see you all in this greeting occasion.



Dr. Alireza Sari
(Professor at University of Tehran)

The Cell and Molecular Biology Conference Scientific Secretary's message

Dear colleagues and guests

With pride and pleasure, I welcome the presence of all valuable researchers, students and professors in the field of cell and molecular biology. As you know the scope of the knowledge of cell and molecular biology is multifaceted and covers a wide range of topics, from the study of the cell and its microscopic components to the nature, interaction, stability and biological roles of macromolecules in structural-motor formations, inheritance and transmission of traits, resistance to/or causing disease. Consequently, the main goal of this conference, like similar ones is to promote the knowledge and scientific communication in respective fields and their application in diverse industries. Emerging fields such as machine learning, bioinformatics, systems biology, and Nano-biotechnology, the employment of big data analysis and computational modeling provide new approaches to study and manipulate living systems to explore their complexities. The vision of this conference is to share new findings and the corresponding knowledge and technical capabilities in various fields of cell and molecular biology. We hope that the Forth Cell and Molecular Biology Conference, being held during the 23rd National Congress and the 11th International Congress of Biology of Iran (IBC2024), provide an appropriate opening and platform for establishing scientific communication, publishing research results, and the exchange of technical achievements among contributors. In this conference, the current knowledge and new achievements of experts' research in various fields, such as cell biology, Stem Cell studies; Molecular Biology, biochemistry and biophysics, Genetics, Bioinformatics, System biology, Molecular medicine, Immunology, Virology, Biotechnology and micro-biotechnology will be shared through lectures, posters, workshops and discussion sessions. We sincerely, invite all interested scientists and students to participate in the event to present their valuable knowledge and research to enable us celebrating this great national and international occasion as finest as possible.

Thank you for your warm and lively presence!



Dr. Abaslat Hosseinzadeh Kalagar
(Professor at University of Mazandaran)

The Environmental Biology and Conservation Conference Scientific Secretary's message

Unquestionably, research, by expanding the boundaries of knowledge and opening new horizons, is the underwriter of any and every society's progress and represents one of the main indicators of development in various scopes. In order to help expanding the frontiers of knowledge in the field of biological sciences, the Iranian Society of Biology (IBS), along with the cooperation of universities and higher education institutions of the country, holds its 23rd National Congress and the 11th International Congress of Iranian Biology in September 2024.

As previous ones, holding this conference is to present the latest scientific and applied achievements and provide an opportunity to exchange the views of national and international scholars. Therefore, IBS sincerely invites all respected researchers, university professors, and their graduate students to participate in conference's themes, hoping that this great event becomes a valuable and desired way of communication among all who present their work, and eager to see the conference brings mutual satisfaction between IBS and respected participants.

Welcome to all of you and hope you enjoy the event!



Dr. Mansour Afshar Mohammadian
(Associate Professorat at University of Guilan)

The Microbial Biology Conference Scientific Secretary's message

The presence of microorganisms on earth dates back to about 4 billion years ago, and microbial life (as the first form of life) played a crucial role in the creation and survival of the biosphere and other living organisms. In the past three hundred years, the science of microbiology has been formed and has helped us to understand many basic biological principles, including the chemistry of life, the nature of genes and hereditary systems, the formation and function of proteins and enzymes, the mechanism of infectious diseases, and the biological cycles mineral elements and organic matters. Microbiology is one of the most amazing branches of biological sciences, providing our victory in the challenge with pathogenic agents such as bacteria and viruses. Today, microbial cell factories have grown beyond the production of new drugs and functional foods and promise the production of transportation fuels, building materials, and human clothing. While the crisis of population increase and climate change is coming, microbial farms are being developed instead of traditional farms to produce agricultural products.

Microbiology has always been one of the scientific areas of the Congress or its conferences in all past 22 congresses of the Iranian Biology Society. We will celebrate the first independent Microbial Biology Conference in the 23rd National and the 11th International Congress of Biology in September 2024.

We are pleased to have the opportunity to get acquainted with the presence of experts, researchers, and students of microbiology, microbial biotechnology and other related fields to the latest developments and new achievements of microbiology through organizing lectures, poster sessions, and workshops at the 1st International Microbial Biology Conference. We are looking forward to presenting your new achievements at this conference and your presence at Tehran University and the beautiful city of Tehran.



Dr. Farshad Darvishi
(Professor at Alzahra University)

The Second Biology Teaching Conference Scientific Secretary's message

Dear colleagues, dear biology teachers, and young scholars

Sincerely, on behalf of the scientific committee, I am honored to welcome you to the Second Biology teaching Conference of the country. This conference, with the aim of exchanging knowledge and experiences in the field of biology education and the application of new technologies, is an exceptional opportunity to think together and synergize our knowledge and experiences. In this course, various topics, including innovations in education methods, the use of artificial intelligence in biology teaching, and future resolutions in the development of modern education will be examined. We seek to take effective steps to improve the level of biology education in the country by using your experiences, dear teachers, by taking advantage of new scientific achievements.

I hope that this conference, as a bridge between teachers, researchers, and students, will play an important role in the development and excellence of biology education and will help us attain higher goals as well!



Dr. Zainab Dehghan
(The President of the Association of Biology Teachers of Iran)

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The Fourth International Conference on Plant Biology

Oral presentation

1. Risk Assessment of Genetically Modified RNAi Plants

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The cultivated area of genetically modified plants (GMPs) has increased from 1.7 million hectares in 1996 to about 206 million hectares in 2023. The commercialization of transgenic events requires the assessment of possible risks on these products and the approval of its documentation by the competent authorities. Traits created through gene transfer mainly include tolerance to herbicides, resistance to pests, and some include resistance to viral diseases and improvement of product quality. In the meantime, RNA interference (RNAi) offers opportunities to produce new properties in these products. GM plants based on RNAi reduce the expression of the target gene instead of expressing new proteins. The steps of assessing possible risks in RNAi-based products are often similar to the approach of other genetically modified products; At the same time, there are some specific criteria for assessing the risks of plants containing RNAi constructs. Here, we discuss some of these features identified and addressed by the EFSA (European Food Safety Authority) GMO panel for molecular characterization, food/feed safety assessment and environmental risk assessment of RNAi-based GMPs. Silencing off-target genes may cause unwanted effects, and of course, identifying these genes facilitates the assessment of possible risks. However, the use of bioinformatics tools alone is not sufficient, because the lack of sufficient genomic data from non-target organisms and insufficient knowledge of the mechanisms governing mRNA-siRNA interaction.

2. Evolutionary History within the Inverted Repeat Lacking Clade (IRLC) of Papilionoid Legumes in Iran

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The angiosperm flora of Iran contains over 8,000 species in >1230 genera and 132 families in 39 orders. Fabaceae is the largest family in the flora of Iran comprising mainly members of subfamily Papilionoideae. The subfamily includes a large clade of over 1300 species, 27 genera and nine tribes known as IRLC (Inverted Repeat Lacking Clade), which are distinguished by the absence of a single copy of the IR region. *Astragalus* is the largest genus of this clade with more than 900 species in Iran, almost half of them are endemic. The second largest genus is *Onobrychis* including over 75 species, many of which are endemic. The evolutionary history of the IRLC with a main focus on the genera *Astragalus*, *Oxytropis*, *Onobrychis*, *Hedysarum*, *Lathyrus* and *Colutea* as well as their allies was investigated using several DNA fragments of the nuclear and plastid genomes. The evolution of the *ycf4* plastid gene was investigated across the IR-loss clade. Accordingly, this gene which plays a role in regulating and assembly of photosystem I, is more variable in the tribe Fabeae than in other tribes. Moreover, in this clade, the complete chloroplast genome (plastome) has been sequenced in several endemic species of Iran (including *Onobrychis gaubae*, a couple of *Astragalus* species as well as *Colutea triphylla*). Our results confirm that the plastomes of the IRLC have undergone many rearrangements including gene/intron losses, inversions, gene transfers to the nucleus and the second independent IR gain. Also, in these studies, some plastid genes/spacers (such as *ycf1*, *ycf2*, *clpP*, *trnQ*_(UUG)-*accD*, *rps7*-*trnV*_(GAC)) were introduced, which can be used as appropriate molecular markers in future studies.

3. Zireh: botanical characteristics and the use of laboratory and field techniques for the cultivation and economy of Black zireh (*Elwendia persica*)

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The Iran country is considered as an important biodiversity center for Apiaceae family with 360 species in 121 genera (Ajani and Mozaffarian, 2019; Ajani and Claßen–Bockhoff, 2021). The genus *Elwendia* (Apiaceae–Apioideae), was originally described by Boissier (1844) from Northwest Iran. Its only species, *E. caroides* Boiss., was later assigned to *Carum Linnaeus* or *Bunium Linnaeus*. Since that, *Elwendia* was not accepted by taxonomists until the molecular evidence became available (Kljuykov et al., 2023). Recent studies based on molecular and morphological characters showed that *Bunium* species are divided into two main Clade including Bunium-I (*Elwendia*) and Bunium-II (*Bunium*) Clade. However, in Iran, both clads have been introduced as *Bunium* with 14 species, two of which, including *Bunium lurestanicum* and *B. wolffi*, have been known as endemic species (Rechinger, 1987; Mozaffarian, 2007; Jaimand et al., 2021). *Elwendia persicum* is one of the most medically and economically important species. Thus, commercial cultivation and promotions are required to stop its relentless collection from wild. However, this crop has vast genetic diversity and offers a genetically broad diversity for further improvement through selection and to initiate other breeding programs (Faravani et al., 2017). Unfortunately, studies on development of appropriate agrotechnologies and cultivation practices are very scanty in this crop. Several studies have reported its hard germination and seed dormancy in *Elwendia persica* but there is no study on other species. There are no published reports about its fruit development in field (farm) cultivation. The low germination and long-life cycle have led to its major harvesting from natural habitats. The aim of this study was to investigate morphological and cellular characteristics of different species as well as embryo growth, dormancy break, seed germination and flower and fruit development. In harvesting time, the embryos were underdeveloped, monocotyledonous in *Bunium* and dicotyledonous in *Elwendia*. Corolla shape was erect (vertical) in *Bunium* while flat in *Elwendia*. Pollen grains were prolate and rhomboidal in *Elwendia* and prolate and perprolate and cylindrical in *Bunium*. The pericarps and seed coats of species were water-permeable, and the embryos were small and differentiated but underdeveloped. Cold treatment induced the critical length of embryo that is required for seed germination indicating showing morphological dormancy (MPD). Seed germination was ≥ 90 in all species in both Petri dishes and field condition. Both genera showed the same germination requirements, suggesting a common ecological strategy in their seed germination process. The seedlings flowered and produced fruit (seed) in third year of cultivation. Breeding programs for successful plant cultivation are underway.

4. Delaying senescence in cut roses by genetic engineering

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Rose is one of the most important ornamental flowers in economy and trade, and it is the most important flower that is considered as a cut-flower. The appearance, quality and lifespan of cut roses depends on the storage conditions, harvest time, distance to the consumer, etc. On the other hand, one of the most important limitations of the trade of ornamental plants, especially cut flowers, is their short shelf-life. For this reason, in 2015, research on the possibility of delaying aging in rose cut flowers was started at the National Institute of Genetic Engineering and Biotechnology. At first, investigation and identification of genes expressed in senescence in two cut rose cultivars "Black magic" with lifespan of 5.6 days and "Marroussia" with 14.3 days were performed by cDNA-AFLP method and thirty four cDNA fragments with different expression was

identified and the expression level of senescence-related genes was investigated by Real-time RT-PCR to analyze the expression pattern the genes. In the next step, the role of two selected gene fragments, RhAA and RhCG, in rose senescence was investigated by isolating and completing the length of them, and it was found that they are expressed in different flower tissues and in response to ethylene. In this regard, the method of gene transfer to Cool water rose was optimized. According to the results of the *Rosa chinensis* genome project, the RhAC gene fragment showed a high similarity with disulfide isomerase protein. Although reports have been published about the role of PDI in tolerance and control of various stress factors such as antibiotics, cold, and abiotic stresses, it was not clear whether the PDI family has a role in plant senescence or not. In this regard, the first goal was to investigate the presence of PDI gene family in *Rosa Chinensis* and structural comparison between them and their homologues in other plants. In the next step, the presence and possible role of PDI in aging was investigated in different tissues of two *Rosa hybrida* cultivars with different shelf-life, and finally, the responsiveness of genes to exogenous ethylene was investigated. This study provided the first comprehensive description of the presence of PDI genes in rose by bioinformatic identification and genome expression analysis in different fluorescent organs under ethylene treatment. Also, the structure and expression level of rose PDI genes were regulated differently by exposure to ethylene and at different times. Therefore, PDI is effective on the response of rose cut flowers to ethylene and senescence with a possible effect on the protection of protein folding, especially in cultivars with a short lifespan. This research is continued with gene transfer to the tobacco model plant and the second generation of transgenic plants with PDI is under investigation.

5. A palynological study of the tribe Cardueae (Cardoideae, Asteraceae) in Iran

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The tribe Cardueae with about 73 genera and 2400 species is one of the largest in Asteraceae. It is also one of the most complicated because of great morphological diversity and because it comprises some of the largest genera of the family. All molecular analyses have concluded that Cardueae are monophyletic. In present study, pollen morphology of 43 species (129 specimens) of the tribe Cardueae in Iran is investigated using scanning electron microscopy (SEM). The pollen grains were identified and described based on seven palynological traits (including shape of the pollen grain, exine sculpture, length of polar axis, equatorial diameter, ratio of polar axis to equatorial diameter (P/E), spine length, pore diameter). Based on the exine sculpture, two types of pollen grains were distinguished: echinate-perforate and spinulose-perforate. Principal component analysis (PCA) was used to identify the most variable pollen grain characters among the studied species. Palynological characters such as shape of the pollen grain, ratio of length of polar axis to equatorial diameter (P/E), and the exine sculpturing were the most variable features among the studied specimens. The present study shows that palynomorphological characters determined using SEM are useful for correct studied species identification and their delimitation. Also, both quantitative and qualitative pollen micromorphological characteristics are important and suitable for the identification of species within Cardueae.

6. Investigating the gene network and interaction network of the JAZ protein family in the hormonal response of tomato (*Lycopersicon esculentum*) to methyl jasmonate

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Methyl jasmonate, as an endogenous regulator in plants, is capable of altering numerous physiological processes and consequently inducing tolerance against biotic and abiotic stresses in plants, such as salinity, drought, and pest resistance. Members of the JASMONATE ZIM-DOMAIN (JAZ) protein family are crucial regulators of the jasmonate (JA) hormonal response. This family comprises 12 members, each characterized by three conserved domains: an N-terminal domain, a TIFY domain that contains a zinc finger motif expressed in the inflorescence meristem, and a C-terminal Jas domain. JAZ proteins regulate the transcription of JA-responsive genes by inhibiting DNA-binding transcription factors in the absence of JA. They interact in a hormone-dependent manner with CORONATINE INSENSITIVE 1 (COI1), which serves as the recognition component of the E3 ubiquitin ligase SCFCOI1. This interaction leads to the ubiquitination and subsequent degradation of JAZ proteins via the 26S proteasome pathway. Considering the function of methyl jasmonate in activating defensive responses, this study applied methyl jasmonate treatment at three concentrations (0, 0.5, and 1 mM) on tomato. The levels of peroxidase activity and reactive oxygen species (ROS) accumulation in leaf tissue were assessed after 24 and 48 hours. Additionally, bioassays conducted with the treated leaves resulted in mortality in the larvae of the *Helicoverpa armigera*. Plant tissues treated with 1 mM methyl jasmonate (MeJA) exhibited the highest levels of reactive oxygen species (ROS) accumulation, peroxidase activity, and larval mortality. Notably, the level of ROS in leaf tissue increased with higher concentrations of MeJA. Following a significant positive correlation among methyl jasmonate treatment, ROS levels, peroxidase activity in leaf tissue, and the mortality rate of cotton bollworm larvae fed on leaf tissue with high ROS levels, a supplementary study was conducted to investigate the role of JASMONATE ZIM-DOMAIN (JAZ) protein family members in the jasmonic acid signaling pathway. This study involved constructing a gene interaction network involving several members of this gene family (JAZ1, JAZ7) in tomato using Cytoscape software, resulting in a visual representation of the gene interactions. The analysis of the gene interaction network revealed that JAZ7 and JAZ2 are respectively associated with three transcription factors active in the jasmonic acid (JA) pathway. Two key transcription factors iden

7. The taxonomic value of petal epidermal cell ornamentation in the classification of *Cleome* L. species in Iran

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The genus *Cleome* L., belonging to the family Cleomaceae, comprises more than 200 species worldwide and about twelve species in Iran. The beautiful flowers of this genus have medicinal properties in addition to ornamental features. Spider flower species are annual or perennials, and are distributed in tropical areas. Various researchers have studied this genus and have stated that although many of the traits used in taxonomic studies are homoplastic, all distinguishing characters should be studied to determine the taxonomic circumscription of taxa. Molecular studies have also been useful in delimiting this taxon and have led to the segregation of *Cleome* into different genera, such as *Rorida* J.F. Gmel. The objective of this research was to investigate the ornamentation of adaxial and abaxial surfaces of petals in *Cleome* species in Iran, and evaluate the taxonomic value of this trait in specific delimitation. Initially, the intact petals were separated from the herbarium samples and their surface were cleaned using distilled water and alcohol. Then, samples were

transferred to the laboratory for imaging. After preparing the images, statistical estimations were made to determine the size and area of epidermal cells in all studied specimens using digimizer V6.4. Based on scanning electron microscope (SEM) photographs, the microsculpturing of petal upper and lower surfaces can be categorized into two main groups: the first group exhibits a distinctive areolate striate pattern, while the second group displays a papilose striate ornamentation. The first type of ornamentation is observed in *C. heratensis* Bunge & Bien. ex Boiss., *C. foliolosa* DC., and *C. turkmena* Bobrov, while the second type has been identified in other studied species. According to the results of this research, petal surface microsculpturing can delimit species; however, only a few researchers have paid attention to this trait. To confirm its taxonomic significance, a wide study should be conducted on all species worldwide.

8. Identification of beta-carotene biosynthesis pathway genes, determination of lycopene beta cyclase (LCY) gene expression and beta-carotene content under drought stress in thistle plant (*Silybum marianum*).

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Carotenoids play a vital role as antioxidants and precursors for vitamin A production in both the pharmaceutical and food industries. Among the numerous carotenoids, only about 50 are recognized as precursors of vitamin A, with beta-carotene being the most significant. Beta-carotene is synthesized from linear lycopene through the addition of two beta rings at both ends of its molecular structure, a process facilitated by the enzyme lycopene beta-cyclase. In addition to genetic factors, environmental conditions significantly influence the production of secondary metabolites, including essential oils in medicinal and aromatic plants. Notably, abiotic stresses, particularly drought stress, can substantially affect carotenoid content. Therefore, it is essential to clarify the genetic pathway of beta-carotene synthesis, investigate the potential for extracting beta-carotene as a by-product, and evaluate the expression of the key gene lycopene beta-cyclase in response to drought stress, along with its correlation to beta-carotene levels in the plant. To achieve this, first, the relevant genes involved in the beta-carotene synthesis pathway were identified and recorded in the NCBI database. The expression analysis of the lycopene beta-cyclase gene was conducted using a completely randomized experimental design at intervals of 1, 2, and 4 days following the cessation of irrigation. The experiment included two repetitions, with simultaneous beta-carotene measurements. HPLC results indicated that the amount of beta-carotene increases significantly in severe drought stress. According to the LCY-B gene expression data, it can be seen that this gene has the highest expression in moderate stress. Consequently, beta-carotene can be utilized as a valuable byproduct of the primary metabolite found in *Silybum marianum*. Notably, the concentration of silymarin increases in response to heightened drought stress.

9. Chemodiversity in essential oil composition of the species naming “Ostokhodus” in herbal markets of Iran

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The genus *Lavandula*, belonging to the family Lamiaceae, commonly known as lavender, encompasses 39 species, numerous hybrids, and about 400 registered cultivars, distributed across the world, with significant diversity in the Mediterranean region, North Africa, and Southwest Asia. They are either annual or herbaceous, sometimes appearing as small shrubs, characterized by aromatic foliage and flowers that vary in morphology, habitat, and chemical composition. Due

to the presence of various chemical constituents in the essential oils of *Lavandula* and its usage in folk remedies, pharmaceutical, food, and cosmetic industries, the economic trade of its products has increased over the past decades. In Iran, the widespread presence of different genera naming “*Ostokhodus*” (e.g. *Lavandula*, *Nepeta*, *Stachys*, and *Ziziphora*), has led to different mistakes, have been generated as a result of the misuse of these genera in herbal markets. Consequently, the accurate identification and scientific descriptions of medicinal plants are critical. In this study, the chemical compositions of the hydrodistilled essential oil of 11 samples naming *Ostokhodus*, purchased from different herbal markets in Iran were evaluated and investigated using GC-FID and GC-MS analyses. Results indicated differences among the various species of *Lavandula* and *Nepeta*. The major components of the essential oils from various species of *Lavandula* were Linalool (2.8–38.1%), Linalyl acetate (1.5–21.2%), 1,8-cineole (3.8–29.3%), and camphor (1.1–64.4%). Whereas, *Nepetalactone* (0.1–63.3%) is predominant in the examined *Nepeta* species. Multidisciplinary collaborative approaches including phytochemical techniques, will help in the accurate and exact identification of medicinal taxa and also can be a promising perspective for standardization of them.

10. A review of new genera based on molecular studies in Caryophyllaceae for the flora of Iran

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Caryophyllaceae has about 90 genera and 2630 species on the planet. This family with about 40 genera and 380 species is the fifth largest family of plants in Iran. Out of 11 tribes of this family, 10 tribes have representatives in Iran. Caryophyllaceae is almost cosmopolitan, but it has the greatest distribution and diversity in the temperate and warm temperate regions of the Northern Hemisphere. They grow in different habitats such as deserts, mountains, sea coasts and river banks, salty and chalky soils, thin forests and degraded places. This family is of considerable economic importance by having important ornamental species such as carnations and baby's-breath and with about 20 weed species (including species of *Cerastium*, *Holosteum*, *Lepyrodiclis*, *Stellaria* and *Vaccaria*). In the collection of *Flora-Iranica*, 38 genera of this family are mentioned and in the collection of *Flora of Iran* 40 genera are mentioned for Iran. Delimitation of genera by means of molecular phylogeny investigations has led to the identification of 43 genera of Caryophyllaceae in the flora of Iran, which morphological and micromorphological investigations are sometimes not compatible with the results of the aforementioned studies. Here, an attempt has been made, relying on the author's ten-year study by examining more than 2000 plant samples, to find out the reason for this inconsistency, which is actually caused by the selection of inappropriate taxa for molecular studies and, after that, achieving not very accurate results, by mentioning the discussed examples to be placed and finally the accepted genera of Caryophyllaceae for Iran will be determined.

11. *Ferula assa-foetida* and its intraspecific variation in Iran

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Ferula as one of the most promising genera of Apiaceae with many species, is sources of aromatic oleo-gum-resins that have been valued since antiquity as remedies, condiments and incense. *F. assa-foetida* (asafoetida) as an important medicinal species is useful in treatment of asthma, bronchitis and gastrointestinal disorders that recently represented biological activities such as cancer chemoprevention, antimicrobial and antioxidant properties. This species is distributed in the mountainous areas of Central, South (west to east) and Northeast of Iran, also it has been

recorded from Afghanistan, Turkmenistan and Tajikistan countries. 14 species of *Ferula* sect. Merwia (including 7 accessions of *F. assa-foetida*), were investigated using two nrDNA (ITS and ETS) and two cpDNA (rpL32—trnL and rps16—trnK) markers to determine the phylogenetic relationships among species and intraspecific taxa. The results revealed the differentiation of *F. assa-foetida* as two geographic ecotypes in Iran; one group contains the populations distributed in higher altitudes from Zagros Mt. in the south of Iran that closely allied with *F. pseudalliacea*, *F. behboudiana* and *F. persica* var. *latisecta* species and the other includes the populations from lower altitudes in the Centre of Iran which grouped with the eastern species (such as *F. flabelliloba*). It is suggested that these ecotypes should be considered as two subspecies respect to variability in the morphology of leaves (from small to large leaf lobes). Central ecotypes from lower altitudes with longer leaf lobes and more trichomes in both side of leaves differ from the southern ecotypes (Zagrossian) of higher altitudes with shorter leaf lobes. After checking the nrDNA sequences of these specimens, the genetic differences were observed as nucleotide substitutions.

12. Unveiling the complex ecology of gypsum soils in Iran: reclassification of edaphic endemic plants calls for holistic ecological studies

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Soils play a crucial role in plant distribution. The Irano-Turanian region has a wide range of soil types. However, few ecological and floristic studies have been conducted on edaphic endemic species. One of the latest comprehensive efforts to classify edaphic endemic species in Iran is the study by Pérez-García et al. (2018) on gypsum soils worldwide using floristic data. In this study, we revisited some species's classification in the 2018 checklist using field and soil chemistry data from northeastern Iran. Our findings indicate a new classification for some edaphic endemic species. The endemic species *Anabasis firouzii*, *Atraphaxis intricata*, *Colutea gifana*, and *Psephellus galactochrous*, previously classified as gypsoclines or gypsophytes, were not found in gypsum soils but are entirely calciphites. Additionally, several species have been classified as gypsovags based on their distribution patterns, such as *Krascheninnikovia ceratoides*, *Matthiola farinosa*, *Astragalus verus*, *Dendrostellera lessertii*, and *Euphorbia bungei*, previously identified as gypsoclines. Species like *Sclerorhachis platyrachis*, *Hedysarum monophyllum*, and *Cleome turkmena*, introduced as gypsophytes, are also present in non-gypsum soils, including serpentine or calcareous soils, with high frequency and are therefore considered bi-edaphic plants. Given the high diversity of plant species and their habitats in Iran, broader and more precise studies on edaphic endemic plants are essential. It is important to note that most of these species are native and endemic to specific regions. Therefore, it is crucial to revisit the classification of edaphic endemic plants in Iran through comprehensive ecological studies and to gain a deep understanding of their complex nature, along with efforts to conserve these unique ecosystems.

13. Genetic diversity of *Palamocladium euchloron* Moss in North of Iran based on ISSR

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Mosses are an important and influential element of ecosystems, with the most biodiversity in forests. Considering the remarkable presence of mosses in Hyrcanian forests, research on their classification is very important. *Palamocladium euchloron* is an exclusive and native species of

Hyrceanian forests belonging to the Brachytheciaceae family. This moss has rounded leaves and is serrulate, but not coarsely serrate at the apex. Angular cells are not auriculate, capsules as curved or erect, endostome segments with perforations and spores 15-28 μm . This study aims to evaluate the genetic diversity of *P. euchloron* populations using ISSR markers. For this purpose, sampling from Hyrcanian forests (Guilan, Mazandaran and Golestan province) was done in the 2023 spring season. This study used two microsatellite loci in 18 populations from Hyrcanian forests, where the genetic diversity in UBC1 with a value of 0.935 is higher than UBC 825 with a value of 0.760. Also, the molecular variance analysis (AMOVA) was investigated to estimate the genetic diversity within and between populations using GenAlEx v6.5 software. The analysis of molecular variance, revealed that 11% of total variation was found within populations, while only 89% among populations. The obtained results indicate that the populations of Derazno (Golestan) and Razekeh (Mazandaran) with the percentage of polymorphic loci, expected heterozygosity (H_e) and Shannon's information index (H') are equal to 13.33%, 0.67 and 0.45% respectively, which has highest genetic diversity with compared to other populations.

14. Climatic differentiation: Responses of leaf morpho-anatomical traits in four different woody species in Zagros forests

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Structural traits of leaves are important for understanding plant ecological strategies. The aim of this study was to investigate the leaf morpho-anatomical features of four dominant woody species as *Quercus brantii* (QB), *Crataegus aronia* (CA), *Acer monspessulanum*, and *Pistacia atlantica* (PA), in sub-humid vs. semi-arid of the Zagros forests in west of Iran. The effects of climate on dry matter content (DMC), stomatal length (SL), stomatal width (SW) and stomatal pore index (SPI) were significant. The climate \times species interaction was significant for all leaf traits assessed. Leaf length (LL), specific leaf area (SLA), stomatal density (SD) and SPI were higher in *P. atlantica* growing in the semi-arid climate. In *A. monspessulanum*, SLA was higher in the sub-humid climate. The three other tree species had highest DMC in the sub-humid climate. SL and SW were higher in *C. aronia* and *A. monspessulanum* in the sub-humid climate. SD in *C. aronia* was also higher in the sub-humid climate. In the sub-humid climate, SPI was higher in *Q. brantii* and *C. aronia*. In general, DMC, SLA, SL, SW, SD and SPI traits were higher in the trees growing in a sub-humid climate. These results show the response of leaf functional traits to climate changes as trees in humid climates demonstrate more morpho-anatomical adaptations than the drier climates. The woody species co-habiting in the same environment employ different leaf traits adaptive strategies, i.e. conservative and acquisitive. These findings will assist in determining the most important adaptive parameters of trees to the climate changes, to provide inputs to global environmental models.

15. Allelopathic effects of *Thuja orientalis* leaf extract on germination and growth components of five weed species

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Today, the global human effort in agriculture is directed towards less use of chemical pesticides and the introduction of new biological methods for weed control. One of the proposed solutions for weed management is the isolation of allelochemicals from plants and their use as natural herbicides. This study aimed to investigate some germination and biochemical characteristics of weeds such as *Taraxacum officinale*, *Achillea millefolium*, *Rumex acetosa*, *Althaea officinalis*, *Amaranthus retroflexus* under the influence of different concentrations of aqueous extract of *Thuja orientalis* leaves. The experiment was conducted based on a completely randomized design with

three replications. Aqueous extracts of *Thuja orientalis* leaves at concentrations of 0, 5, 10, 20, and 30% were used. The results showed that the aqueous extract of *Thuja orientalis* leaves had a significant effect on all the studied traits, and the highest inhibitory effect was related to the 30% extract concentration. In the weeds of *Taraxacum officinale*, *Achillea millefolium*, *Rumex acetosa*, *Althaea officinalis*, *Amaranthus retroflexus* the germination percentage, germination rate, germination coefficient, germination index, maximum germination percentage, germination value, daily germination rate, seed vigor index, and relative water content decreased compared to the control, while the mean germination time and ion leakage increased compared to the control. The results of this study showed that the seed of the *Taraxacum officinale* weed is more sensitive to the inhibitory effects of the aqueous extract of *Thuja orientalis* leaves compared to the seeds of other studied weeds. Given the presence of monoterpene compounds such as alpha-pinene, sabinene, beta-phellandrene, and delta-3-carene, as well as phenolic compounds in the *Thuja orientalis* plant, it seems that the allelopathic effects of this plant are mainly due to the presence of these secondary metabolites.

16. Does the *Silene* calyx carry a phylogenetic signal?

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The genus *Silene*, comprising over 800 recognized species, is one of the largest genera. It is predominantly distributed in the northern hemisphere, spanning from temperate to arctic regions. The calyx of the genus exhibits a range of shapes, from lanceolate to narrowly elliptical. Phylogenetic studies on the genus have revealed that similarities in calyx characters between species are not always indicative of deeper evolutionary relationships. Our aim is to evaluate *Silene* phylomorphospace to reveal new insights into the history of morphological diversification. Landmark geometric morphometrics (GM) was employed to analyze the calyx shapes of 432 herbarium specimens representing 160 species from three subgenera and 30 sections, sampled from across the globe. A phylomorphological analysis was conducted to test for phylogenetic signal in calyx shape. This analysis integrated a two-marker phylogeny of *Silene* (nrDNA ITS, cpDNA rps16) with calyx morphology, using comprehensive morphometric software (MorphoJ). The principal components of calyx shape variation were mapped onto the terminal nodes of the phylogeny to reveal the magnitude and direction of calyx shape change along branches of the phylogeny. A phylomorphological analysis revealed a significant phylogenetic signal in calyx shape, with obelliptic shape identified as the ancestral form. Our findings indicate a shift from the obelliptic ancestral calyx shape to narrower calyx shapes in the subgenus *Silene*, in contrast to the shift to wider calyx shapes in the subgenus *Behenantha*. Despite the significant phylogenetic signal in *Silene* calyx shape, morphological convergence of more distant lineages (homoplasy) may also be present. Our investigation of *Silene* calyx phylomorphospace revealed that calyx shape reflects phylogenetic history. While environmental factors also play an important role in shaping calyx morphology, the genus phylogeny must be taken into account to reveal the complete picture. Our study supports the necessity of an integrated approach for understanding species morphological diversification, and underlines the importance of herbarium collections for evolutionary studies on plants.

Posters

17. Comparative evaluation of nano and bulk ZnO particles effects on chlorophylls content and expression of CHL I (Magnesium protophyrin chelatase subunit I) gene in *Nicotiana tobacum* L.

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Zinc oxide nanoparticles are the third highest in terms of global production among the various inorganic nanoparticles, and there are concerns because of their worldwide availability and accumulation in the environment. In contrast, zinc is an essential element in plant growth and metabolism, and nanoparticles of this element may have unknown interactions with plants due to their small sizes as well as their particular physicochemical characteristics. The aim of this study was to examine and comparison the effects of nano (30 nm) and bulk ZnO (<1000 nm) on chlorophylls content and expression of CHL I (Magnesium protophyrin chelatase subunit I) gene in tobacco plants. Experiments were performed under controlled greenhouse conditions, and designed completely randomly with three incidents. The plants were exposed to various concentrations (0, 25, 50, 100, and 200 mg/L) of these particles for 21 days. The results indicated that the treatment of plants with nano and bulk ZnO increased the concentration of chlorophylls and expression of CHL I gene in 25 mg/L compared to the other treatments. In addition, nanoparticles had more effects rather than the bulk form on the mentioned parameters, it seems that nanoparticle are more bioactive agents than the bulk metal because of their unique physicochemical properties, suggesting that ZnO in low concentration can enhance the growth of plants by increasing the chlorophylls content and the expression of related genes.

18. Investigation of a chemotype of *Hymenocrater incanus* Bunge used in traditional medicine from Kashan: an exclusive species of Iran

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The species *Hymenocrater incanus* Bunge is one of the exclusive species of mint family in Iran, which is found in the west, south and central parts. The species of this genus are called "Arwaneh flower" in Persian language and they are traditionally used to treat respiratory diseases, heart diseases, skin allergies, wounds, soothing and strengthening the nerves and also It is used as an anti-inflammatory, home freshener and mosquito repellent. This study was designed and carried out for the first time in Iran with the aim of identifying the chemical composition of the essential oil of this species. For this purpose, the flowering branches of *H. incanus* were collected in May from Kamo village, Kashan, Isfahan province, Iran. The essential oils of these plants were extracted and separated by distillation with water using a Clevenger machine. The analysis of essential oil compounds was performed by a gas chromatography device connected to a mass spectrometer (GC-MS). In the content of *H. incanus* essential oil, sesquiterpenes hydrocarbons were the dominant group of compounds and (-)-Spathulenol, caryophyllene linolenic acid 1,8-cineole and α -cadinol were the dominant compounds. In previous studies, (-)-spathulenol has been reported as a stereoisomer of spathulenol with an amount of 2.7%. For this reason, the presence and predominance of this compound in the essential oil of this species in the present study is a special feature that has not been reported so far. It can be seen that these species are new chemotypes with special and different chemical compounds, which can be a potential for use in different industries

19. Melatonin preserves photosynthetic pigments and stabilizes cell membranes of saffron plants under drought stress conditions.

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The role of melatonin as an effective bioregulator of plant growth, which has been increasingly studied in recent years for its ability to enhance plant resistance to stress and reduce the associated effects, is the focus of this study. The aim was to investigate the effect of melatonin, as a novel plant growth regulator, on the content of photosynthetic parameters and cell membrane stability of saffron plants under drought stress conditions. Drought stress was applied using 20% polyethylene glycol 6000, and root treatment with 100 μ M melatonin was implemented. The results showed that drought stress significantly reduced the levels of chlorophyll a, chlorophyll b, and carotenoids compared to the control group. In the presence of melatonin, this decreasing effect was reversed, with increases of 36.13%, 10.31%, and 28.29%, respectively, compared to the stress-treated group. Drought stress also led to an increase in ion leakage and H₂O₂ production in the cells. The presence of melatonin stabilized and maintained the plant's cell membrane integrity, with the melatonin-treated control group showing a 3.69% and 47.37% decrease in ion leakage and H₂O₂ levels, respectively, compared to the control group. Under stress conditions, melatonin can enhance the activity of the H⁺-ATPase pump. Melatonin is converted to 5-methoxytryptamine under stress, and this compound stimulates the activity of the H⁺-ATPase pump in plants, which can contribute to the stability of the plasma membrane. Melatonin also protects chlorophyll against stress by regulating the expression of chlorophyll-degrading genes (pheophytinase and chlorophyllase).

20. Quantification of some polyphenolic compounds in tobacco plants under pot culture conditions by HPLC method

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The study of polyphenolic compounds has shown that these secondary metabolites are found in different plant species. The tobacco plant, *Nicotiana tabacum*, is a model plant of the potato family with abundant amounts of polyphenolic compounds. Previous research has shown that *Agrobacterium rolC* gene can increase the production of secondary metabolites such as polyphenolic compounds. Therefore, in this research, this gene was transferred from *Agrobacterium rhizogenes* to the first group of tobacco plants, and on the other hand, the homologue of this gene exists naturally in tobacco plant with weaker function called *trnC*. For this reason, *trnC* gene promoter was strengthened in the second group of tobacco plants. The phenotypic effects of transgenic plants under the influence of dexamethasone induce included leaf chlorosis, leaf twisting and internode length reduction. The third group of plants was considered as controls. In order to investigate changes in the polyphenolic compounds from the leaves of tobacco plants of all three groups, methanolic extracts were prepared and 3 compounds of caffeic acid, chlorogenic acid and rosmarinic acid were analyzed using HPLC method. The examination of polyphenolic compounds showed that in the transgenic plants, the amount of chlorogenic acid was higher than the control, and rosmarinic acid was observed only in transgenic ones. Caffeic acid was not observed in any of the plants. This study showed that *rolC* and *trnC* genes have a positive role in increasing the production of polyphenolic compounds and also these genes lead to the production of new compounds in transgenic plants.

21. Quantification of bioactive compounds and antioxidant ability of peel, leaf and seed from forty seven Iranian pomegranate cultivars

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Pomegranate is known as a distinctive fruit with exceptionally high antioxidant properties and health-enhancing compounds. The widespread introduction of new cultivars necessitates comprehensive information about all plant characteristics to meet market demands. This study aimed to identify the bioactive compounds and antioxidant capacities in the peel, leaf, and seed of 47 pomegranate cultivars grown in Iran. The peel samples exhibited higher levels of total phenols, flavonoids, flavonols, soluble sugars, ascorbate, and antioxidant activity compared to the leaf and seed samples. Among the peel samples, the highest levels of total phenols, flavonols, flavonoids, anthocyanins, soluble sugars, ascorbate, and antioxidant activity were found in White Sweet Tochal, Shirin Shahsavari Sar Yazd, Zard Baghmalek, Atabaki Nayriz, Nabati Shahreza, Hasebe Sar Yazd, and Baghmalek, respectively. For the leaf samples, Germeze Baghmalek, Shirin Ajan, Pust Sefede Korak, Alake Saveh, Robab Neyriz, Syahe Dane Gome, and Shirin Neyriz exhibited the highest levels of these compounds and activities. In seed samples, the strongest levels were observed in Nabati Shahreza, Alake Gharegae, Aarosak Korak, Sabz Baghmalek, Pust Sorkh Sar Yazd, Pust Nazok Saveh, and Shirin Taft, respectively. The correlation between bioactive compounds (phenols, flavonols, flavonoids, soluble sugars, and ascorbate) and antioxidant capacity in the peel, leaf, and seed indicates that these metabolites significantly contribute to the pomegranate's antioxidant properties. The findings of this research can assist in selecting pomegranate cultivars for commercial cultivation.

22. Revealing genetic diversity of *Erodium cicutarium* in Iran using ISSR markers

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Erodium L'Hér. ex Aiton (Geraniaceae) comprises 121 species in the world and 16 species in Iran. *Erodium* is an important medicinal plant and different species are effective for treating diseases such as colds, coughs, diarrhea, and wounds. Despite the importance and distribution of the genus *Erodium* in Iran, the genetic diversity of this genus has not been completely investigated. The present study shows the genetic diversity and population structure of *E. cicutarium* species in Iran. A total of 38 individuals from 10 populations of this species were sampled from different regions of Iran. Total genomic DNA was isolated using the modified CTAB method. Inter- simple sequence repeat markers (ISSR) were selected. Assessment of 14 primers resulted in selection of 9 primers. After performing PCR and transferring the products on agarose gel, reproducible amplified bands were scored as present (1) or absent (0) in a binary format. Data analyses were done using GenAlex, PopGene, and DARwin software. The AMOVA test showed that the greatest genetic diversity was within the population. Mantel test showed a significant correlation between genetic and geographical distances. Very high genetic diversity was observed in different populations of *E. cicutarium*. The findings of this research are consistent with the results of previous morphological studies.

23. Preparation of drought resistance genes in *Ziziphus jujuba* plant for transfer to *Citrus sinensis* by bioinformatic method

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Orange trees (*Citrus sinensis*) have a high water requirement and drought stress can affect their growth and performance. There are some trees, such as the juniper family, which are highly resistant to drought stress. This research was conducted with the aim of investigating the drought resistance mechanisms of jujube plant (*Ziziphus jujuba*), in order to provide the necessary ground for the transfer of valuable genes to *C. sinensis*. In this research, zjWRKY30, zjDREB04, zjNAC47 genes were investigated due to their possible involvement in the drought resistance process of *Z. jujuba* plant. Finally, zjNAC47 gene was selected because it is part of ABA-dependent pathways. With the activation of ABA receptors during stress, they cause ABA synthesis and, as a result, increase ROS free radicals and strengthen the antioxidant defense system. The primer design related to this gene was done using sequences extracted from the NCBI database. pKDH plasmid information was extracted from Addgene website and XhoI and SacI cutting enzymes were selected. Since the optimal performance of a gene depends on the codes used in its expression level, using the Vectorbuilder website, zjNAC47 gene codes were optimized based on the use of different codons in the orange plant. The vector related to this gene was designed through the Benchling website. In the following, research was conducted on the transfer of this gene to oranges in order to produce drought-resistant oranges. The results of this research showed that if zjNAC47 gene is transferred to *C. sinensis* plant, this gene can create the trait of drought resistance in this plant.

24. Ethnobotany of *Avicennia marina* in southern Iran

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The use of plants by the people of Iran dates back to the distant past, and over time, the learned have been passed down from generation to generation. Ethnobotany is the science that examines this transmitted knowledge. Due to its high climatic diversity, Iran is a favorable environment for the growth of a wide range of plant species. Usually, the medicinal use of plants is more important in ethnobotanical studies, but in this science, all the uses of plants are considered. The life of some natives of southern Iran has a lot to do with mangroves. Mangroves are trees or shrubs that grow in the area affected by the sea tide. In Iran, there are two species of mangroves in the provinces of Khuzestan, Bushehr, Hormozgan and Sistan and Baluchestan, either hand-planted or wild flower. *Avicennia marina* (Forssk.) Vierh. Is the dominant part of mangroves in Iran and is most widely distributed in Hormozgan province. Results were obtained during the field studies that were conducted in 2022-2023 focusing on the mangroves of Qeshm Island. At this time, in addition to taking samples of mangrove trees, interviews were conducted with local people, and some of the uses of mangroves were observed by the authors. *A. marina* is used as fodder for livestock, and according to people, it is good for livestock because of the salt on the leaves. With the increase in the prosperity of the tourism industry, visiting the mangrove forests has become one of the main tourist attractions in the south of Iran and the islands of the Persian Gulf, and there is good prosperity in the villages near these forests, especially in the northern villages of Qeshm Island. These forests create a unique ecosystem and all kinds of birds, insects, fish, mammals and crustaceans live among the leaves of mangrove trees and mud in the area. Among these, bees have a special distinction due to the production of mangrove honey. Local people use this honey, which was observed in Qeshm market with low abundance and high price. It is suggested that due

to the weather conditions in the south of Iran and the special characteristics of the mangrove tree, a special look should be given to this honey for a deeper investigation to find out its therapeutic properties.

25. Introducing the basic formula for walls as vegetation cover in cities

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The relationship between the structural characteristics of urban walls and the plant species that grow on them was investigated. 50 walls were randomly selected in the city of Hamadan and the plant species present in each were recorded. In this study, a total of 71 plant species belonging to 20 different genera were observed. In this study, 71 plant species belonging to 20 different genera were observed. The highest number of species was related to the families of Asteraceae (13%), Fabaceae (11%), Chenopodiaceae (10%), Poaceae and Brassicaceae (each with 8%), and other families were less abundant. SK plant species indicator for wall substrate is a function of wall height (H), wall material (M), and wall slope (S). This formula integrates the inverse relationship between plant growth and wall height, material-dependent growth potential, and the effect of slope angle on the wall. The ability of the wall as a suitable substrate for vegetation is mathematically expressed as follows:

$$SK(H, M, S) = \sum_{i=1}^n \left(\frac{1}{H_i} \times M \times \frac{1}{S} \right)$$

The height of the wall (H) is divided into n sections, and H_i represents the height of each wall section from bottom to top. It is assumed that plant growth decreases with height, so the inverse of height $1/H_i$ is used to give more weight to lower portions of the wall with (higher growth potential). Wall constituents (M) significantly affect plant growth. For example, a mud wall, which is most conducive to plant growth, has the highest value, while a wall made of stone or covered with cement, which is the least conducive, is given a value of zero. The slope of the wall (S) is also a critical factor. It is assumed that the walls with a greater angle of inclination are a more suitable substrate for the growth of plants. In this formula, the inverse of S is used, which means that with higher S value, the contribution to plant growth increases. The model predicts that plant growth is greater in the lower parts of the wall, on mud-based materials, and on sloping surfaces, which provides a quantitative basis for evaluating vegetation on vertical structures in cities.

26. The effect of plasma-activated water on increasing shelf life and post-harvest quality of peach fruit

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A cost-effective and environmentally friendly method for preserving fruits is using plasma-activated water (PAW). A research study looked into the impact of PAW on extending the shelf life of harvested peach fruit. The experiment included four control treatments: 3-minute, 5-minute, and 7-minute PAW, each with five containers as 5 replications. In each container, 5 peaches were placed for a total of 100 peaches being examined. The experiment involved treating peach fruits with different solutions, such as distilled water and plasma-activated water. After 15 min the fruits were then dried and transferred to the refrigerator. Sampling was conducted over 15 days (at the beginning, 5th, 10th, and 15th days). If any fruit showed signs of mold, it was recorded and removed from the batch. After 15 days, the control and fruits which were treated with plasma-activated water for 3 minutes were found to be completely unusable. On the 21st day, the fruits

subjected to the 5-minute treatment lost their freshness, while the peaches treated with 7 minutes PAW showed reduced marketability after one month. Various characteristics such as weight loss percentage, fruit firmness, pH level, soluble solids, titratable acidity, color index, browning, microbial presence, and polyphenol oxidase enzyme activity were assessed over the initial 15 days. The findings indicated that treating peach fruits with plasma-activated water of 5 and 7 -minutes can help maintain both the quantity and quality of the fruits better compared to the control.

27. The Allelopathic effects of *Eucalyptus globulus* on germination, cell division and metabolic activity of *Allium cepa*

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1-10% aqueous extract of *Eucalyptus globulus* leaves was prepared, the effect of the extract on seed germination, cell division, root respiration and photosynthesis of onion was investigated. The results showed that amount of germination decreased with the increase in the concentration of aqueous extract. In the study of cell divisions, the results showed that in the control group, 10.5% of the onion root meristem cells were undergoing mitosis, and with the increase in the concentration, the number of cells decreased significantly. The effect of different concentrations of the extract on the respiration of onion root pieces showed that with the increase in the concentration of the extract, there was a significant decrease in oxygen consumption, so that in the control group it was 5.4 and in the 10% concentration, it was 3.5 μ l. The effect of concentrations of 1-10% of the extract on the Hill reaction in the chloroplasts extracted from onion leaves showed that in the control group, light absorption decreased to 0.031, which indicated the high speed of DCPIP regeneration in the Hill reaction, and with increasing the concentration of the extract decreased the speed of this reaction. Cineol, one of the inhibitory compounds of *E. globulus*, constitutes the major part of the essential oil of this plant and has an inhibitory effect on the replication of genetic material and metabolic activity of other plants, so it is recommended to grow this plant near fields and as much as possible in other areas because avoid other harmful effects.

28. Effect of different concentrations of salicylic acid and nitric oxide on antioxidative enzymes in hairy root culture of fenugreek (*Trigonella foenum-graecum* L.).

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Fenugreek is a medicinal plant from the Fabaceae family and contains active medicinal compounds including steroidal sapogenins, alkaloids, flavonoids, amino acids and some nutrients. The induction of hairy roots by *Agrobacterium rhizogenes* and using Elicitors is a key step to achieve mass production of secondary metabolites in plants. In this research, five strains of *A. rhizogenes* (ATCC15834, A4, A13, 1724 and MSU) were used to induce hairy roots explants of leaf, leaf cotyledone and hypocotyle of 12-day-old fenugreek seedlings. The best growth and the percentage of hairy root induction were obtained in the leaf isolates of ATCC 15834 strain. The transformation of hairy roots was proved and confirmed by PCR. After that, two elicitors of salicylic acid (0.1 and 0.5 mM) and nitric oxide (10 and 50 μ M) were used. The use of pesticides induces reactive species (ROS) and regulates defense responses through the activities of enzymatic and non-enzymatic antioxidants, which are increased by salicylic acid at 0.1 mM and nitric oxide in both. The contents of SOD and POX were observed in the capillary roots. It also shows that these two stimuli in both concentrations lead to a decrease in MDA and H₂O₂, which indicates a decrease in lipid peroxidation and an increase in membrane stability. As a result, increasing the activities of

antioxidant nutrients and reducing MDA and H₂O₂ can improve the physiological condition and plant growth and possibly increase valuable metabolites.

29. Effect of different concentrations of copper nanoparticles and copper complex on physiological properties of tomato

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Copper is an essential micronutrient for proper plant growth, the deficiency of which affects plant metabolism. The effect of copper on plants depends on concentration, duration of exposure to copper, the copper form used, growth stages and physiological state of the plant. Therefore, in this study, the effect of different concentrations of CuO NPs and Cu Complex on growth and physiological properties of tomato plants was evaluated. The experiments were conducted in a factorial manner based on a completely randomized design with 10 treatments and 3 repetitions in laboratory conditions. In their four-leaf stage, the plants were sprayed with different concentrations (10, 25 and 50 mg/l) every other day. The results showed that the 10 mg/l treatment of CuO NPs had the greatest effect in increasing the fresh weight of aerial parts, photosynthetic pigments, protein and polyphenol oxidase enzyme. However, the 50 mg/l concentration was stressful and had a negative effect on the abovementioned parameters. The findings of this research showed that CuO NPs improved tomato growth parameters compared to Cu Complex solution and control. Therefore, copper nanoparticles can be used at 10 mg/l concentration to improve plant growth.

30. Phylogenetic and Geographic Analysis of Iranian *Pyrus* Species

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Wild pear trees are native to both eastern and western regions of the Old World, flora of Iran situated at their intersection. This geographic position has resulted in a diverse pear flora comprising both Mesophytes and Xerophytes from both Occidental and Oriental groups. The genus *Pyrus* taxonomically classified within the Rosaceae family, subfamily Amygdaloideae, and tribe Malinae. It has been extensively studied in Iran based on morphological and microscopic characteristics and 25 *Pyrus* species have been identified. Phylogenetic analyses consistently categorize *Pyrus* as monophyletic. The genus further comprises four sections: *Pyrus*, *Xeropyrenia* Fed., *Argyromalon* Fed. and *Pashia* Koehne. In Iran, wild pear distribution extends from the northeastern Hyrcanian forests through the northwestern Azerbaijan province, and forms a band across the Zagros Mountains to the southwestern Fars province. In our thesis, we investigate the influence of climatic factors (19 bioclimatic variables from WorldClim data website and by help of “R” software) on the distribution of 24 Iranian *Pyrus* species. On the other hand, we employed a novel genetic analysis technique, double digest restriction site associated DNA sequencing (ddRADseq) which will be used to construct a phylogenetic tree of these species, and to assure newly described taxa. By elucidating the complex relationships within the *Pyrus* genus, this study could address longstanding taxonomic challenges and provide valuable insights into the evolution and distribution of wild pear in Iran.

31. The effect of different concentrations of cadmium on seed germination factors and early growth of Sunflower seedling (*Helianthus annuus* L.)

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Sunflower (*Helianthus annuus*) is an annual herbaceous plant belonging to the family of Astraceae which has a high biomass, then it is recommended for phytoremediation. Cadmium (Cd) is the toxic non-essential heavy metals that its contamination level is increasing due to industrial activities, phosphate fertilizers, and atmospheric. We evaluated different concentrations of cadmium (6 levels) on germination factors, root and hypocotyl length in Sunflower seedlings. The results showed that the germination percentage of *H. annuus* seeds was not affected by different levels of Cd. However, the mean germination time (MGT) significantly increased in high levels of Cd (200 and 250 ppm) by 40% compared to the control, but the germination index reduced with increasing stress levels. Hypocotyl length was significantly decreased by Cd, at 50 ppm and higher exposure levels and the highest reduction was observed at higher levels of stress (200, 250 ppm). Root length was significantly decreased by Cd, dependent of its concentration. The Cd-restricted root elongation is almost certainly caused by Cd accumulation in the root itself, which eventually causes inhibition of cell division and cell elongation. Seedling growth is much more sensitive to Cd than seed germination which It may be due to the increased permeability of the seed coat to Cd in during seed germination.

32. The effect of phenanthrene on physiological indicators and induction of oxidative stress in maize (*Zea mays*)

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Currently, one of the environmental problems is the presence of stable organic pollutant compounds like polycyclic aromatic compounds such as phenanthrene into the environment. These compounds can reduce the growth of plants and affect different aspects of their physiology. In this experiment, maize plant was cultivated in hydroponic environment under the treatment of 0, 25, 50, 75, and 100 ppm concentrations of phenanthrene, and then the effect of phenanthrene on the growth and biochemical indicators of maize plant was investigated. The results showed that increasing the concentration of phenanthrene decreased all the growth parameters studied. Also, phenanthrene at the level of 100 ppm caused a 2.28 times increase in malondialdehyde compared to the control plants. In addition, a significant increase of 2.6 times was observed in the treatment of 100 ppm phenanthrene compared to the control plants. In general, it seems that phenanthrene toxicity led to the induction of oxidative stress in the maize plant and by damaging the cell membranes in the root, it leads to the weakening of the root system and causes disturbances in the absorption of water and nutrients and ultimately causes the growth indicators of the corn plant decrease.

33. Effect of endophytic fungus *Serendipita indica* on some growth characteristics of *Mentha piperita* under lead toxicity in soil

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The endophytic fungus *Serendipita indica* is considered as one of the beneficial soil microorganisms, which by creating physiological changes in the host plants, affects their

performance in relation to growth and tolerance to plant stresses. In this study, the effects of *Serendipita indica* (four levels of fungus including without fungus treatment, and 1, 2 and 3 pieces of fungus solid medium with dimensions of 0.2×1×1 cm) on growth parameters of peppermint were evaluated under without stress condition and lead stress (800 mg/kg soil). The results showed that lead reduced growth parameters including leaf number in plant, shoot height and root length. The use of endophyte fungus had positive effects on the parameters studied so that by increasing the amount of fungus in the soil, leaf number in plant, shoot height and root length were significantly increased. The highest amount of each growth index, both in plants under lead stress and in plants without lead stress, was observed at the highest level of the fungus in the soil. Using these results, it can be said that *S. indica* has increased growth indicators and significantly reduced the harmful effects of lead in medicinal plant peppermint.

34. Effect of mycorrhizal fungi and iron oxide nanoparticles on salinity stress tolerance of *Lepidus sativum*

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Salinity is one of the most common and important environmental stresses, which is considered a serious threat to the growth of plants. Iron is an essential micronutrient contributing to plant growth and increasing stress tolerance in plants. Symbiosis of mycorrhizal fungi with plant roots through the absorption of nutrients can cause a positive reaction of plants, especially in the conditions of salinity stress. In the present study, a factorial experiment was conducted in the form of a completely randomized design with 13 treatments in 3 replications. The treatments included iron nanoparticles (20 mg/l), three levels of salinity (0, 40, and 80 mg/l sodium chloride), and mycorrhizal fungi (*Glomus mosseae* and *G. intraradices*). The results showed that with the increase of salt concentration in plant fresh weight, the amount of chlorophyll a and b, total chlorophyll and carotenoid decreased significantly, but the content of malondialdehyde and the activity of GPX antioxidant enzyme increased. By increasing proline level and stimulating the antioxidant system, iron nanoparticles protected the plant against osmotic and oxidative stress caused by salinity stress. Foliar spraying of iron nanoparticles with mycorrhizal fungus *Mosseae* improved plant growth compared to the control, increased the level of photosynthetic pigments and antioxidant enzyme activity and reduced the peroxidation of membranes. According the results, iron nanoparticle and mycorrhizal fungi suggested as effective treatments for mitigating the harmful effects of salt stress.

35. The effect of arbuscular mycorrhizal and *Trichoderma* fungi on the morphological characteristics of marigold (*Calendula officinalis* L.) under salinity stress

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The use of biological fertilizers such as fungi to reduce damages caused by environmental stress is one of the new sustainable agricultural solutions in dry and salty areas. Accordingly, this research was conducted to evaluate the effect of *Trichoderma harizanium* (Th) and *Funneliformis mosseae* (Fm) fungi isolates on marigold growth parameters under different salinity levels in a factorial completely randomized design with four replications. In this research, marigold inoculated with Th and Fm and without inoculation exposed to different salinity stress levels (1 (control), 7 and 15 dS m⁻¹). The results indicated that salt stress significantly decreased shoot and

root fresh and dry weights, plant dry weight, shoot and root lengths, root/shoot dry weights ratio (R/S) and leaf relative water content (RWC) at level of 15 dS m⁻¹ and inoculation with Fm and Th fungi improved the growth parameters at such level. The positive effect of Fm fungus on shoot and root fresh and dry weights, plant dry weight, shoot and root length at the severe stress level was higher than that of Th fungus. But R/S, RWC and leaf area in plants inoculated with Th fungus were higher compared to plants inoculated with Fm fungus at severe stress level. According on the results of this research, the application of Th and Fm isolates can be suggested as a beneficial approach in reducing the adverse effects of salt stress and improve marigold growth.

36. The interaction effect of mycorrhizal fungi and Fe₃O₄ nanoparticles on reducing the harmful effects of salinity stress in tomato (*Solanum lycopersicum* L.)

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Salinity is one of the environmental stresses that have adverse effects on tomato plant growth and is a major threat to agriculture. There are many reports that mycorrhizal fungi can improve salinity stress conditions. Also, the role of iron nanoparticles in mitigating salinity stress has been confirmed. Therefore, in this study, the interaction effect of mycorrhizal fungus and iron oxide nanoparticles on reducing the harmful effects of salinity stress in tomato plants was evaluated. Experiments were carried out factorially based on completely randomized design with 13 treatment levels and in three replications in laboratory conditions. After the plant entered the four-leaf stage, the treatment of iron oxide nanoparticles at a concentration of 25 mg/liter was done as a foliar spray three times with an interval of one day. The results showed that salinity stress decreased the fresh weight of shoots and roots, soluble protein and the amount of chlorophyll a, chlorophyll b, total chlorophyll and carotenoid and increased the activity of guaiacol peroxidase enzyme compared to the control. The combined treatment of iron nanoparticles and *Mossea* fungus improved the stress conditions so that the plant fresh weight, soluble protein, photosynthetic pigments and guaiacol peroxidase enzyme activity increased compared to salt stress alone. Also, our results showed that the use of mycorrhizal fungus and iron oxide nanoparticles at a concentration of 25 mg/liter increases tomato plant growth in non-salt stress conditions. According the results, iron nanoparticle and mycorrhizal fungi suggested as effective treatments for mitigating the harmful effects of salt stress.

37. The effect of nitric oxide (NO) stimulant on the activity of antioxidant enzymes superoxide dismutase (SOD) and peroxidase (POX) in hairy roots of *Mentha spicata* L. under drought stress

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Mentha spicata L. is a medicinal and aromatic plant known for its antioxidant, antidiabetic, anti-inflammatory, and anticancer properties. It is a source of natural medicines to combat cellular oxidative stress and is rich in secondary metabolites such as Flavonoids and Glycosides. In this study, hairy root formation was induced using *Agrobacterium rhizogenes* strains A4, A13, 1724, ATTC15834, and MSU, cultured in solid and liquid LB medium from leaf explants of *M. spicata* in half-strength MS solid medium culture. The transgenic nature of the A4 strain hairy roots was confirmed using the PCR technique. The hairy roots were weekly cultured in half-strength B5 liquid medium under drought stress by Polyethylene Glycol (PEG6000) (5% and 10%) and Nitric Oxide stimulant (100 μ M Sodium Nitroprusside (SNP)) to investigate their effects on the activity

of antioxidant enzymes SOD and POX. Nitric Oxide stimulant and drought stress resulted in an increased activity of SOD and POX. 5% and 10% PEG with 100 μ M SNP increased POX activity compared to the control hairy roots. 5% PEG and 100 μ M SNP showed a high level of SOD activity in the hairy roots. Drought stress caused destructive effects in *M. spicata* and produced Reactive Oxygen Species (ROS), including H₂O₂. Nitric Oxide stimulants mitigated the adverse effects of drought stress by enhancing the activity of antioxidant enzymes, reducing membrane lipid peroxidation, and improving cellular metabolism. Further research will investigate the signaling pathways in the response of hairy roots of *M. spicata* to Nitric Oxide under drought stress.

38. Effect of sodium nitroprusside foliar application on growth parameters, carbohydrate and proline content in Iranian spinach under drought stress

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In recent years water scarcity, exacerbated by climate change, have had a destructive impact on plant production in arid and semi-arid regions. Most regions of Iran are characterized by arid or semi-arid climate. In that regard, it is necessary to improve drought-resistant ability of native plants such as spinach. Spinach (*Spinacia oleracea* L.) belongs to the Chenopodiaceae family. It is native to East and Southwest Asia that thought to have originated from Iran. The aim of present research was to examine the effect of different concentrations of sodium nitroprusside (0, 25 and 50 μ M) on growth parameters, relative water content, total carbohydrate and proline in total plant (shoot and root) induced by drought stress (0, 5 and 10% PEG 6000). The 3-leaf stage plants were treated with sodium nitroprusside, after 48 h and 96 h the plants were exposed to the second and third drought treatment and after seven days, the plants were again sprayed with the sodium nitroprusside. The plants were then harvested after 21 days to measure some growth and physiological parameters. The drought stress decreased dry and fresh weight, relative water content and total carbohydrate, whereas the proline content were increased in shoot and root of spinach. The sodium nitroprusside treatment improved the rate of growth parameters and total carbohydrate, and reduced proline content. The experimental results showed that sodium nitroprusside could alleviate the resistance of spinach by reducing the drought-induced oxidative stress.

39. Effect of nanoparticles (zinc oxide- and titanium dioxide) on some growth parameters of grape cv. sultana under cadmium toxicity

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In recent years, along with the development of nanotechnology, this technology has been used to promote environmental goals. In this research, in order to evaluate the effect of zinc oxide- and titanium dioxide-nanoparticles on white grape (cv. Sultana) seedlings under Cd stress, a factorial experiment was conducted based a completely randomized design with three replicates. The first treatment was cadmium stress at three levels (0, 50 and 100 mg/kg soil) and the second treatment was the spraying of the nanoparticles of zinc oxide and titanium dioxide at 3 levels (0, 50 and 100 mg L⁻¹). The results showed that cadmium stress significantly reduced the leaf and root fresh weights, and shoot height. Foliar application of zinc oxide- and titanium dioxide-nanoparticles elevated growth characteristics, including the leaf and root fresh weights, and shoot length under cadmium stress. The maximum fresh weight of leaves and roots was recorded at the level 100 mg titanium nanoparticles and the maximum height of the shoot was at the level 100 mg zinc

nanoparticles. Based on the results of this research, it seems that foliar spraying the nanoparticles of zinc oxide and titanium dioxide (especially at the concentration of 100 mg L⁻¹), can improves the growth parameters under cadmium stress, and increases plant tolerance to harmful effect of this toxic metal in grape cv. sultana.

40. Characterization of total phenol and flavonoid and percent of investigating of DDPH under effect if nano chitosan particles and salinity stress in *Zea mays* L.

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Generally chitosan limited negative effect of salinity steress in medical and agricultural plants. But due to nano chitosan particles,s highest surface to volum ratio and therefore hight permeability and hight ability for interaction, are able to have significant effect on plant produses. Use of nano chitosan is important for balancing destractive effects of salinity. Ththerefore our goal of this research is to obtain of the best concentration of nano chitosan for improving biochemical indicators in *Zea mays* L. under salinity stress. In this research effect of nano chitosan 50 nm whith 0, 0/05, 0/1 g/l concentrations in spery form on plant and three stages of salinity stress s (0, 0/05, 0/1 molar) checked out. Statistical analyses that used in this research was one wey anova. Total phenol and flavonoid and percent of investigating of DDPH was determind with specterophotometry. The highest of total phenol and flavonoid was observed in non salinity condition with 0/1 g/l of nano chitosan concentration and with increase of CSNPs and salinity stress stages respectively significant increase and decrease was observed in investigating of DDPH. In this research treatment with 0/1 g/l of CSNPs and 0 stage of salinity stress with highest amount of total phenol than two other antioxidant can be useful in function of plants and in agricultural industry.

41. The effect of mycorrhizal symbiosis and drought stress on some physiological characteristics of barley seedlings (Khorram cultivar)

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Today, drought stress is one of the most important environmental stresses in agriculture. Barley cultivation ranks second in Iran and fourth in the world, and is therefore strategic. Mycorrhiza symbiosis can help plants cope with stress. For this purpose, the current research was carried out in the form of a completely randomized block design with three replications. In this study, the effect of three fungi *Funneliformis mosseae*, *Rhizophagus intraradices* and *Glomus mosseae* at four levels of drought stress ((control), 80%, 60% and 40% 100% crop capacity) in the research greenhouse of Damghan University on one-month-old seedlings planted. It was examined in the pot. Symbiotic fungi were used during seed planting. After 5 weeks, leaves were sampled. In this research, the amount of photosynthetic pigments, sugar protein, proline, hydrogen peroxide, catalase and peroxidase enzyme activity were measured. The results show that during drought stress and with the increase of its intensity, the amount of proline production increased up to 29% and hydrogen peroxide up to 17%. Due to the drought stress, the amount of photosynthetic pigments, proteins and sugar decreased by 4 to 15% and the activity of antioxidant enzymes catalase and peroxidase increased by 10%. The use of symbiotic fungi reduces the negative effects of drought stress and strengthens seedlings. *Glomus mosseae* mushroom has had the most positive effect in reducing the negative effects of stress, *Funneliformis mosseae* and *Rhizophagus intraradices* are in the next ranks.

42. The effect of mycorrhizal symbiosis and drought stress on some physiological characteristics of wheat seedlings (Alvand cultivar)

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Mycorrhiza symbiosis can help plants cope with stress. For this purpose, the current research was conducted in the form of a completely randomized block design with three replications. In this study, the effect of three fungi *Funneliformis mosseae*, *Rhizophagus intraradices* and *Glomus mosseae* on four levels of drought stress (watering 3 (control), 5, 7 and 9 days) in the research greenhouse of Damghan University on one-month-old seedlings planted in pots was investigated. Symbiotic fungi were used when planting wheat seeds. After 36 days, leaves were sampled. In this research, the amount of photosynthetic pigments, sugar protein, proline, hydrogen peroxide, catalase and peroxidase activity were measured. The results show that during drought stress and with the increase of its intensity, the amount of proline production increased up to 37% and hydrogen peroxide up to 22%. Due to the drought stress, the amount of photosynthetic pigments, proteins and sugar decreased by 5 to 19% and the activity of antioxidant enzymes catalase and peroxidase increased by 12%. The use of symbiotic fungi reduces the negative effects of drought stress and strengthens seedlings. *Rhizophagus intraradices* has the most positive effect in reducing the negative effects of stress, *Funneliformis mosseae* and *G. mosseae* are in the next ranks.

43. Effect of cardenolides on hair removal of goat skin

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The present study investigates the effects of cardenolides of *Pergularia tomentosa* on the goat skin. *Pergularia tomentosa* L. is a member of the Asclepiadaceae family and is a medicinal plant. Metabolite profiling of the extract was done using liquid chromatography connected to a high-resolution mass spectrometer (LC-ESI-Orbitrap-MS/MS). Aqueous extract of *P. tomentosa* was applied on goat skin after scarifying the animal. Tissue sections were fixed in 10% formalin. The tissues were embedded in a paraffin block and then sectioned (5 μ m) were made using a rotary microtome. Slides were stained in hematoxylin, eosin (H&E), and mason trichrome staining were examined under the light microscope. The results from hematoxylin-eosin staining showed that the goat skin sections of the control group preserved healthy skin including normal hair follicles. The results of the mason trichrome staining, revealed collagen strands in the papillary and reticular layers of the dermis. In the treated group, the epidermis and follicles were destroyed. The collagen of the dermis, especially the reticular layer, was well preserved. The results of LC-MS/MS showed that the main component of the extract was related to cardenolide compounds. Aqueous extract causes hair removal from the skin. Moreover, regardless of the presence of some quercetin and kaempferol in the extract, it can be said that the extract of *P. tomentosa* is a combination of many cardenolide glycosides. So, cardenolides from *P. tomentosa* can be used for hair removal from animals' skin for leather manufacturing.

44. The effect of chemical fertilizer and silicon on antioxidant properties and some physiological factors of peppermint under irrigation with water and wastewater

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Toxicity of heavy metals is very harmful for medicinal plants, one of the major issues that must be considered when using wastewater in agricultural lands is the possibility of heavy metals accumulation in plant. Silicon has a useful role in the detoxification of heavy metals, also the

excessive use of chemical fertilizers has increased environmental concerns. The purpose of present research is to study the effect of chemical fertilizer and silicon on some physiological factors, phenolic compounds, antioxidant properties and essential oil of peppermint under irrigation with water and wastewater. Treatments include urea, triple superphosphate and interaction with or without silicon. Analysis of variance results showed that the difference between different treatments in terms of growth factors and photosynthetic pigments was significant at 5% level. The use of fertilizers increased length, dry weight and chlorophyll content, the effect of silicon was greater in the condition of irrigation with wastewater. Also, chemical fertilizer increased soluble sugar content and antioxidant property (phenol, flavonoid and anthocyanin) in conditions of irrigation with water and wastewater, silicon treatment caused a greater increase. Essential oil analysis results by GC/MS showed that the main components of the essential oil are menthol and menthone, that irrigation with wastewater reduced these compounds, but the use of silicon increased the main compound contents in both irrigation with water and wastewater. It seems that the treatment of silicon in the conditions of irrigation with wastewater and the use of chemical fertilizers improves the growth, antioxidant property and essential oil content.

45. Physicochemical effects of gamma irradiated sodium alginate on *Dracocephalum kotschi* Boiss

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Dracocephalum kotschyi Boiss is an endangered herbaceous plant endemic to Iran and known as “Zarrin-giah”. It is believed that *D. kotschyi* species have many pharmaceutical properties such as anticancer, anti-tumor, antihyperlipidemic, antimicrobial and.... Foliar application of different chemicals has the main function of enhancing plant growth and yield. Natural bioactive agents, such as polysaccharides, can be beneficially to improve the existing methodologies used to impart value addition in agriculture by converting the bioactive agents into more useful form. Such type of biologically active oligosaccharides, derived from sodium alginate, have been known to act as signal molecules that govern plant growth and development, SA is a polysaccharide, derived from brown algae and is available in large quantities. Application of ionizing radiation Such as Cobalt60 to degrade this natural bioactive agent and then using as growth promoting substances is an emerging technology to exploit full genetic potential of crops in terms of growth, and quality. In this study, *D. kotschyi* Boiss seedlings foliar were sprayed 4 times, 15 days after the first harvesting time with 15-day intervals by 50, 100, 150 and 200 ppm of Oligoalginate. It was found that treated plants with different concentrations showed better growth and development as compared to untreated plants. It was revealed that the highest leaf area, plant height, plant dry weight, total phenol content, and total flavonoid. Furthermore, 150 and 200 ppm of Oligoalginate were the most effective concentrations. Overall, the foliar application of plants with Oligoalginate (especially at 150 ppm) could be recommended.

46. The evaluation of chemical composition, antioxidant and antimicrobial activities in the fractions obtained from leaves of *Conocarpus erectus*

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In this study, to evaluate the chemical composition (glucose, cellulose, hemicellulose, lignin, pectin, some ions and ash), the antioxidant and antimicrobial activities promoted by hexanic, ethanolic and ethyl acetate fractions obtained from leaves of *Conocarpus erectus*. Extracts were characterized through UPLC-MS and GC-MS. Antioxidant potential was performed through DPPH and molybdenum phosphate techniques. Antibacterial (*Pseudomonas aeruginosa*,

Staphylococcus aureus, *Escherichia coli*) and antifungal (*Candida krusei*, *Candida tropicalis*, *Candida albicans*) performance tests were performed according to clinical and laboratory standards institute protocols. The obtained biomass of *Conocarpus erectus* leaves showed the high presence of glucose (0.55 g/L), cellulose (32.19%), Na (65.236 µg/L) and K (41.103 µg/L). Antioxidant results showed a high potential in ethyl acetate fraction (61.12 ± 6.07)% and (20.89 ± 0.25)% in DPPH and molybdenum phosphate techniques, respectively. The ethanolic fraction showed moderate bacteriostatic and bactericidal activity against *Staphylococcus aureus* and presented a high fungistatic potential for all *Candida* species tested. Organic fractions obtained from leaves of *Conocarpus erectus* present antimicrobial and antioxidant properties, and these findings contribute to scientific information for the effectiveness on use of this plant in the development of a phytotherapeutic compound in the future.

47. Investigating of phenylalanine treatment on edible mushroom

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The button mushroom, renowned as the most widely consumed edible mushroom globally, is abundant in beneficial components. On the other hand, the shelf life of a white button mushroom, which typically lasts for about 3-4 days when stored at room temperature, is quite short. Phenylalanine plays a significant role in the post-harvest stage of fruits. This study aimed to evaluate the effectiveness of phenylalanine in preventing browning during the post-harvest stage of white button mushrooms. Fresh *Agaricus bisporus* mushrooms were divided into two groups. One group was dipped in a solution containing 5 mM phenylalanine for 5 minutes, while the other group was immersed in sterile water for the same duration as the control group. The physiological characteristics of the button mushrooms were assessed at different storage intervals (0, 5, 10, and 15 days). These characteristics included changes in weight percentage, cap browning percentage, electrolyte leakage and malondialdehyde content. The results of the study revealed that treating the mushrooms with 5 mM of phenylalanine compared to the control group had a significant effect on reducing browning. Also, mushrooms treated with 5 mM Phenylalanine exhibited significant reductions in weight loss, electrolyte leakage, and malondialdehyde content. In general, the phenylalanine treatment helped maintain the freshness, quality and reducing browning of the mushrooms by minimizing moisture loss during storage.

48. Evaluation of seed dormancy in some native species and the effect of cold and heat treatment on breaking the dormancy of dormant seeds

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Seed dormancy for delaying germination is a way to survive in difficult situations. For evaluating seed dormancy in some native species including *Kochia scoparia*, *Portulaca oleracea*, *Celosia cristata*, *Seidlitzia rosmarinus*, *Haloxylon aphyllum*, *Artemisia absinthium*, *Peganum harmala*, *Salsola tomentosa*, *Zygophyllum atriplicoides*, *Citrullus colocynthis*, *Atriplex leucoclada* and *Artemisia sieberi* the seeds were cultured in sterilized 90 mm Petri dishes. Standard seeds were cultured in Petri dishes in three replicates for one week at 25 °C. then, the germination percentage was measured. The results showed that five species including *S. tomentosa*, *Z. atriplicoides*, *C. colocynthis*, *A. leucoclada*, and *A. sieberi* were fully dormant. In other species, germination percentage was more than 50% in which *P. harmala* with 52.22% showed the lowest germination percentage, and *P. oleracea* and *K. scoparia* with 100 and 91%, respectively, showed the highest germination percentage. In order to break the seed dormancy, medium-term (7 weeks) and long-

term (4 months) chilling (4 °C), and heat treatment (boiling water 95 °C for 15 minutes) were used. However, the results showed that after applying 7 weeks of cold treatment, none of the seeds were germinated. Seeds of *S. tomentosa* and *A. sieberi* showed a low seed germination percentage under the long-term treatment of cold but the dormant seeds of other species did not show the germination. Boiling water treatment did not also result in breaking seed dormancy in any mentioned species.

49. Evaluation of Secondary Metabolites Present in the Seeds of *Heracleum persicum*

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The use of medicinal plants has significantly expanded in many countries today. The medicinal plant *Heracleum persicum* Desf. Ex Fischer, commonly known as Golpar, is widely used in traditional medicine as a spice and for its carminative properties. It contains high levels of antioxidants and exhibits strong antioxidant activity. Considering the high antioxidant content, four wild genotypes of Golpar were collected from Urmia County in West Azerbaijan Province. The antioxidant capacity was measured using the DPPH and FRAP methods with a spectrophotometer, and polyphenols were analyzed using liquid chromatography (HPLC) to evaluate their antioxidant properties and secondary metabolites. According to the results of the variance analysis, the measured traits were significant at the 1% level, and a high diversity was observed among the traits. In this study, the highest antioxidant capacity measured by the FRAP method was 77.34 mmol Trolox per liter, and the lowest was 43.47 mmol Trolox per liter. Additionally, in our study, the antioxidant capacity measured by the DPPH method ranged between 46.23% and 70.18%. Furthermore, six polyphenolic compounds were extracted from Golpar seeds in this research, including gallic acid, caffeic acid, chlorogenic acid, rutin, coumaric acid, rosmarinic acid, and quercetin.

50. Evaluation of phenylethanoide glycosides content in response to iron oxide nanoparticle in *Scrophularia striata* Boiss.

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Scrophularia striata Boiss. is one of the native species of Iran and belongs to the Scrophulariaceae family. This plant is rich in phenylethanoid glycoside compounds (PhGs) including ectoside and echinacoside. The antioxidant, anti-tumor, antimicrobial, antifungal and anti-inflammatory properties of phenylethanoid glycosides have been proven, therefore they have attracted more attention in the pharmaceutical industry for production of chemical drugs. Because the chemical synthesis of these compounds is difficult due to the complexity of the structure, the use of tissue and cell culture methods as alternative sources for the production of phenylethanoid glycosides has been considered. The aim of this study is to evaluate the content of phenylethanoide glycosides in suspension culture of *S. striata* in response to iron oxide nanoparticle treatment. HPLC analysis was performed to identify PhGs in untreated and treated cells with iron oxide nanoparticles at different concentrations (5, 20, 75 and 100 ppm). According to the results, the use of iron oxide nanoparticles treatment, especially at a concentration of 5 ppm as an elicitor, increased the biosynthesis of PhGs. Iron oxide nanoparticles stimulates the production of reactive oxygen species and the production of precursors of phenolic compounds, which results in the accumulation of phenylethanoide glycoside compounds. In general, the results showed that the increase in

specific secondary metabolite content has a positive relationship with the activity of enzymes related to oxidative defense.

51. Assessment the inhibition of harmful algal blooms (HABs) of *Spirulina* via seaweed's (*Gracilaria corticata*) allelopathy

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Eutrophication and ocean acidification with global warming, leads to an increase in density of marine algae and severely impacting some regions. In recent years, eutrophication has become a serious issue in the world. Eutrophication may cause explosive growth of phytoplankton including harmful algal blooms (HABs). Nowadays, utilization of allelopathic compounds for controlling explosive growth of algae is much discussed. Recent studies also provided evidence for the inhibitory effects of macroalga on microalga. Macroalga could produce allelochemicals to inhibit the phytoplankton growth such *Spirulina*. Accordingly, in this research in order to combat with HABs of *Spirulina* via seaweed's (*Gracilaria corticata*) allelopathy, an experiment was conducted as factorial based on completely randomized design with three replications. *Spirulina* microalgae was cultivated in laboratory conditions in BG11 medium and treated with different concentrations of seaweed leachate. According to the obtained results, seaweed allelopathy decreased the performance of photosystem II through decline the content of photosynthetic pigments and induction of oxidative stress in *Spirulina* cells, in a dose-dependent manner. Ultimately these treatment leads to an excessive reduction in growth and cell viability of *Spirulina*, resulting controlling HBAs of *Spirulina*. So that in the last days of the treatment, the number of cells decreased from 512 cells per milliliter of the control to 41 in the highest concentration of treatment, which means a 91.99% decrease. this study revealed that, allelopathic compounds that produced by seaweed can be used to control reproduction and explosive growth of *Spirulina* in an eco-friendly manner.

52. Extraction and Determination of the Number of Fatty acids *Sargassum swartzii* C. Agardh and its Importance in Nutraceutical and Pharmaceutical Industries

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Seaweeds are rich sources of beneficial bioactive compounds such as carotenoids, n-3 fatty acids, and polyunsaturated fatty acids (PUFA) which are unique features of the lipids from marine organisms. *Sargassum* seaweeds produce abundant biomass in southern coast of Iran can represent a source of new natural compounds for human nutrition. This study aimed to evaluate the fatty acid profiles of *S. swartzii*, collected from the Chabahar Bay in the north of Oman sea. The GC-MS analyses identified 19 fatty acid types, the most important of which are respectively meristic acid, palmitoleic acid, oleic acid, linoleic acid. Poly-and mono-unsaturated fatty acid were higher than the saturated fatty acids. The major SFA were merisitic acid, palmitic acid, stearic acid and MUFA were palmitoleic acid, oleic acid and the major PUFA were, linoleic acid, docosahexaenoic acid, arachidonic acid, docosapentaenoic acid, eicosapentaenoic acid, γ -linolenic acid, α -linolenic acid. FA profiles have the potential to be used as a chemotaxonomic tool in seaweeds, providing a simple method to check authenticity of seaweed used in nutraceutical and pharmaceutical industries.

53. Different chemical forms of cadmium, subcellular distribution, accumulation of cadmium, and its effect on the absorption of Cu and Zn elements in *Nicotiana tabacum* L.

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Today, soil contamination with heavy metals is one of the environmental concerns. Heavy metal cadmium is a dangerous pollutant due to its effect on human health and the environment. *Nicotiana tabacum* L. is one of the most important industrial plants in the world. In this study, the cultivation of tobacco plants was subjected to different concentrations of cadmium (20, 40 and 60 mg/kg) during 21 days. Increasing the concentration of cadmium caused a decrease in the dry and fresh weight and the length of roots and aerial organs. An increase in the accumulation of cadmium was observed in the tobacco plants under cadmium treatment. The values of the bioaccumulation factor and the transport factor decreased significantly with increasing cadmium concentration. In the study of different chemical forms of cadmium, the highest amount of cadmium extracted from roots and aerial organs was in the form of pectate and protein of 1 M sodium chloride solvent. In the research of subcellular distribution, cadmium was accumulated in the cell wall of the root. As the concentration of cadmium increased, the amount of Zn (zinc) and Cu (copper) in the roots and aerial organs increased. As a model plant, it seems that the tobacco plant takes special strategies to prevent cell damage in conditions of high cadmium stress. The presence of higher amounts of cadmium in the roots than in the aerial parts indicates the absence of cadmium transfer to the aerial parts of the tobacco plant.

54. Increasing the biological productivity of *Haematococcus pluvialis* microalgae by optimizing photoluminescence in the presence of carbon quantum dots

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Haematococcus pluvialis is used as a commercial astaxanthin producing species and a model to explore the biosynthesis of astaxanthin in photosynthetic organisms, which due to its limited growth, its commercial production is not cost-effective. Light management is an essential strategy that can be applied to increase nutrient output and algal biomass. From the point of view of biotechnology, the goal in the photosynthesis research community is to increase the absorption capacity of chlorophyll molecules and more effective use of sunlight in order to increase productivity. One of the emerging approaches in dealing with the reduction of photosynthesis potential is the use of carbon quantum dots nanoparticles (CQD), which modulates photosynthetic electron transfer. In this work, CQD was synthesized using microwave method. The synthesized carbon dots showed strong antioxidant properties in CQD (93.7%). The results of the MTT test determined the non-toxicity and high biocompatibility of nanoparticles. The results showed that CQDs can improve growth productivity compared to the control. In particular, the culture of *H. pluvialis* treated with CQD at concentrations of 50 and 100 mgL⁻¹ achieved the highest biomass concentration (1.64 and 1.73 gL⁻¹). The results showed that CQD is effective in enhancing the photosynthetic system. Due to photoluminescent properties, CQD absorb light in the wavelength range of 360–420 nm and convert it into an emission spectrum at 680–720 nm, which makes chlorophyll more efficiently excited. This is the first study that focuses on the effect of CQD on the photosynthetic response of *H. pluvialis* and suggests it as a tool to increase the productivity of *H. pluvialis* algae growth on a large industrial scale.

55. Enhancing phenolic compounds accumulation in medicinal and aromatic plants structures through cyanobacterial inoculation

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Phenolic compounds and flavonoids are secondary metabolites with a high free radical scavenging capacity, which are considered the main active ingredients in a wide range of medicinal plants. These compounds possess antioxidant, antimicrobial, and anti-inflammatory properties, and used in the treatment of a wide range of disorders, such as cardiovascular diseases, immune system disorders, and cancer. Given the economic value of medicinal plants, the optimization of their production has always been a focus of researchers. Increasing plant biomass and the content of metabolites per unit of plant dry weight are among the main approaches for optimizing the production of medicinal and aromatic plants. In some studies, the effect of nitrogen-fixing cyanobacteria on the phenolic and flavonoid content of various medicinal plants, such as Plantago, Echinacea, and Thymus, has been evaluated. In these studies, the effect of cyanobacterial suspensions on the target medicinal plants was evaluated under controlled greenhouse conditions. During the plant cultivation period until flowering, the plants were irrigated every 20 days with 0.2% cyanobacterial suspensions. To determine the quantity and quality of phenolic and flavonoid compounds in the studied plants, the plant samples were evaluated using an HPLC device after preparation. The results of the evaluations showed a significant increase in the content of total phenols and flavonoids in the aerial parts of the plants after inoculation with cyanobacteria. A two-fold or more increase in the total phenol content per unit of dry weight in some treatments indicates the effectiveness of the cyanobacterial inoculation in improving the quantitative and qualitative yield of these medicinal plants. Nitrogen fixation ability, increased nutrient absorption, phytohormone biosynthesis, and activation of antioxidant enzymes are among the factors mentioned as reasons for the improved quantitative and qualitative yield of the active metabolites of medicinal plants.

56. Enhancement of diosmin production in *Scrophularia striata* Boiss. cell culture in bioreactor by biotic elicitor

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Diosmin is a flavone glycoside belonging to the class of flavonoids, which is present in some plant species. Some studies have shown that diosmin has a wide range of biological activities including antioxidant, anti-hypertensive, anti-inflammatory, anti-cancer, etc. Recently, this compound is notable because of its potential role in human health. Plant cell culture methods using bioreactors are used for the commercial production of some metabolites. One of the conventional methods to increase the production of secondary metabolites is the use of fungal elicitors. In this study, the effect of *Piriformospora indica* mycelium on the growth and accumulation of phenolic compounds in *S. striata* cell culture in shake and bioreactor was investigated. Firstly, *P. indica* mycelium extract was prepared at a concentration of 250 mg/ml and added in final concentrations of 0, 0.5, 1 and 2% to 10-day cell culture in shake. Then, growth parameters and diosmin accumulation were measured 5 days after elicitation. Finally, optimum concentration was selected for elicitation in bioreactor. The result showed that although there was no any different in growth rate treated cells in compared with control but diosmin content of treated cells in bioreactor was produced 77 folds higher than in shake.

57. Increase of secondary of metabolite production and antioxidant activity in *Rosa damascena* mill. using elicitors

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Damask rose (*Rosa damascene* Mill.) is one of the most important rose species that use in the pharmaceutical, food, and cosmetic industries. To investigate the effect of elicitors on improving of secondary metabolites and antioxidant activity in the petals of the Damask rose, an experiment was conducted as a randomized complete block design with 9 treatments and three replications on seven-year-old Damask rose bushes in Firouzkouh. Treatments of methyl jasmonate (0, 0.1, 0.2 mM) and magnesium oxide nanoparticles (0, 100, 1000 mg/l) were sprayed on the leaves in two stages (at the budding stage and ten days after the first treatment), and 25 days after the first treatments, the total phenol and flavonoid contents were measured by the Folin-Ciocalteu and Aluminum chloride method, respectively. Antioxidant activity was measured by the DPPH method, and the content of phenolic acids were measured by HPLC. In the 0.1 mM methyl jasmonate treatment, the highest amount of total phenolic and flavonoid compounds was observed, which were 1.06 and 3.32 times higher than the control plants, respectively. The highest antioxidant activity was also obtained in this treatment. Gallic, ferulic, cinnamic, and salicylic acids identified in the petals, and their highest amounts (5.69, 1.09, 79.67, and 258.29 µg/ml, respectively) were observed under the lowest concentration of methyl jasmonate. In general the exogenous application of methyl jasmonate at low concentration has a better effect on improving the antioxidant responses and secondary metabolite content of Damask rose.

58. Enhancing *Trigonella persica* growth under different light spectrums with LED technology

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Trigonella persica has medical and therapeutic characteristics such as being anti-cancer, anti-diabetic, an antioxidant, an appetite suppressant, and inhibiting the production of bladder stones. It is characterized by substantial levels of fiber, vitamins, minerals, and bioactive compounds such as phenolic acids, alkaloids, and essential oils. Nowadays, the progression of light-emitting diodes (LEDs) has opened up a wide range of research opportunities, with a focus on changing the amount and quality of plant products by utilizing different light spectrums. This study investigated how blue, red, and blue-red (1:1) LED lighting (BRL) influenced *T. persica* development, with pink fluorescent light serving as a control. The study's findings revealed that blue light radiation inhibited *T. persica* plant development, whereas red light and BRL boosted it. Plants exposed to blue light for 40 days exhibited the least amount of growth and development. In contrast, plants exposed to red light or a BRL exhibited much better growth and development in a comparable experimental scenario. According to the research, blue light suppresses stem and root development. In contrast, red light and a BRL promote stem and root development. More importantly, all treatments reduce the shoot-to-root ratio compared to the control group. Essentially, the LED lights used in the treatments favor root growth over shoot growth. Consequently, it appears that reaching the most favorable growth rate for *T. persica* as a medicinal herb through light reactions triggered by LED artificial light radiation is a viable option.

59. Enhancement of secondary metabolites synthesis in *Mentha aquatica* by high Mn concentrations

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Mentha aquatica, a species rich in secondary metabolites, is naturally distributed on acid soils with high availability of free Mn (Mn²⁺). In order to investigate the effect of heavy metals on the enhancement of secondary metabolites synthesis, this species was treated with three levels of Mn (0, 200 and 800 μ M) (pH 5.8) for four weeks. The results showed that the biomass, leaf pigments, leaf photochemistry and nitrogen metabolism were higher in plants treated with 200 μ M Mn compared with control plants. Under higher Mn concentrations (800 μ M), flavonoids, anthocyanins, and total phenolic compounds were accumulated in the leaves associated with elevated activities of phenylalanine ammonia lyase, peroxidases and polyphenol oxidase. In addition, the activity of antioxidant enzymes (superoxide dismutase, catalase and ascorbate peroxidase) increased with increasing Mn treatment levels. Since phenolics may act as chelating molecules or MnII oxidizing compounds, such an increase in the cellular level of these compounds may significantly contribute to a high Mn tolerance in this species. The results of the long-term experiment (eight weeks) showed that *Mentha aquatica* is able not only to tolerate high levels of Mn, but also accumulates this element in the mature leaves up to 3.3 mg g⁻¹ DW. Our data suggested this species being suitable for the study of heavy metals on the levels of secondary metabolites with medicinal properties

60. Change pattern in cellular carbohydrate metabolism of bread and durum wheat under cold stress

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Cold stress seriously damages the product, therefore metabolic acclimation plays an important role in the survival, growth, and performance of plants. In this research, the metabolic responses of bread wheat (Norstar) and durum (Gerdish and SRN) genotypes in two groups acclimated to cold (after 14 days of exposure to 4°C) and non-acclimated for 24 h under -5 °C were evaluated. Analysis of variance of glucose, fructose, sucrose, fructan, raffinose, arabinose and hexose phosphates showed significant differences between thermal treatments, genotypes and their interaction. During cold stress, the electrolyte leakage rate (ELI) of Norstar and then Gerdish was lower than SRN, especially in acclimated plants. Cold stress in acclimated plants caused a significant increase in sucrose, glucose, fructose, arabinose and raffinose, especially in Norstar compared to durum genotypes. During cold stress, significant decrease in carbohydrates (especially sucrose) in non-acclimated plants compared to acclimated plants along with increase in ELI indicate the role of acclimation in inducing metabolic responses. An increase in hexose phosphates, especially in non-acclimated plants indicated the degradation of sucrose and the production of more glucose and fructose than the acclimated plants, which was confirmed by the significant increase in the transcript levels of sucrose synthase and acid invertase. According to the results, higher cold tolerance of Norstar genotypes and then Gerdish is related to the process of acclimation and metabolism of carbohydrates. Consideration of other carbohydrates such as starch is suggested.

61. Patterns of *Pinus teada* rooting in different soil depth and relationship of it with soil properties in plantation of kacha region in Guilan province

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The present study was conducted to investigate the biomass of micro-roots and macro-roots in Teda pine species in Kacha forestry in Gilan province and its relationship with soil characteristics. Sampling was done randomly by taking 8 square samples with dimensions of 15 x 15 meters. In each plot, soil samples were taken along with roots from two depths of 0-10 and 10-20 cm. After separating the fine and coarse roots in the laboratory, their dry weight was determined using an oven. Some physical and chemical characteristics of the soil were also determined. The results showed that there is a significant difference in the amount of fine roots and coarse roots in the Teda pine species at both depths. In the first depth (0-10 cm), the amount of fine roots (0.27 ± 0.21 g/cm²) is significantly higher than in the second depth (0.14 ± 0.01 g/cm²). Also, regarding the coarseness of the roots, in the first depth, the amount of coarseness of the roots (3.56 ± 0.54 g/cm²) is significantly higher than in the second depth (0.54 ± 0.59 g/cm²). The correlation between different soil properties and the amount of coarse and fine roots showed that the amount of coarse and fine roots of Teda pine at both depths had a positive correlation with the percentage of saturated soil moisture and a negative correlation with organic carbon, phosphorus, absorbable potassium and soil pH. have. The results of this research showed that Teda pine species shows different rooting patterns in different soil depths, and in this regard, soil characteristics can influence these patterns.

62. Transfer of genetic construct containing GUS reporter gene to *Brassica carinata* oilseed plant

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Brassica carinata is one of the allotetraploid plants from the Brassicaceae family. This plant, due to its relatively good resistance to pests and diseases, as well as its production of 42-52% oil and 18-28% protein in its seeds, can play an effective role in sustainable food production, especially in oil production and ensuring food security. It can be a suitable candidate for correcting undesirable traits through genetic engineering. Genetic engineering plays a significant role in plant genetics by overcoming limitations such as being time-consuming, costly, and also the lack of compatibility between species in traditional breeding methods. The vector pBI121 contains the GUS reporter gene and the selective marker nptII, which is used as a valuable tool to assess the efficiency of gene transfer processes in plants. In this study, *Agrobacterium tumefaciens* strain EHA105 carrying the pBI121 construct and hypocotyl and cotyledon explants isolated from 7-day-old *B. carinata* seedlings were used. The results showed that the nptII and GUS genes were present and expressed in regenerated cotyledons, which were cultured for 2 days in a pre-culture medium, 10 minutes in a bacterial inoculation medium, 3 days in a co-culture medium, and then for 30 days in a selection medium containing 1.5 mg/L BAP and 10 mg/L kanamycin. These results were confirmed by Polymerase Chain Reaction (PCR) for the nptII gene and the histochemical GUS assay. Based on the regeneration of seedlings in a medium containing kanamycin and the validation of molecular and histochemical tests, it can be concluded that this plant is transgenic. The transfer of reporter genes to *carinata* plants could pave the way for trait modifications in this plant.

63. Taxonomic significance of morphology, micromorphology and karyology traits in the genus *Aethionema* W. T. Aiton (Brassicaceae)

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The genus *Aethionema* from the tribe Aethionemae (Brassicaceae) has about 18 and 70 species in Iran and the world, respectively. This genus has the most variety in Iran and Turkey. Stonecress species grows in open, rocky pastures, lowland to mountainous areas and the slopes of limestone mountains in Europe and West Asia. It is classified in the *Aethionema* genus based on its morphological features, including vegetative form, leaf shape, and fruit. Fruit morphology is essential in species identification. The lack of ripe fruit makes it difficult to identify the species. The importance of the surface structure of seeds and pollen grains is as a reliable method in classification. This method is very important in determining the diagnostic characteristics of *Aethionema* species compared to other Brassicaceae genera. From the taxonomic point of view, traits such as shape, color and pattern of seed surface decoration, pollen grain shape, polar and equatorial axis of pollen grain, thickness of exine and intine, pollen grain surface decoration, thickness of testa and endosperm in showing the interspecies relationships of the family for Species identification is important. The number and size of chromosomes are different for species of the same genus. The basic chromosome number of *Aethionema* is seven or eight and due to polyploidy, it can be up to $x = 24$. As a result, it is important to separate the members of Brassicaceae family by comparing the number and size of chromosomes and the position of centromeres from a systematic and evolutionary point of view.

64. The first chromosome number report of the endemic species *Allium bungei* Boiss. in Iran

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The genus *Allium* L. is a member of the Amaryllidaceae family, which includes over 100 species in Iran. In this study, the chromosome number of *Allium bungei* Boiss. was investigated. This species is one of the endemic species of the genus *Allium* in Iran and grows in the central parts of the country. Plant samples (bulbs) were collected from various regions of Isfahan province, and their fresh roots were treated with colchicine solution to capture cells in the metaphase stage. After appropriate staining of the roots, microscopic examination was conducted. The results showed that the basic chromosome number for this species is $2n = 2x = 16$. Chromosome parameters were also measured, with the mean length of the short arm (p) being $5.9 \mu\text{m}$ and the mean length of the long arm (q) being $7.7 \mu\text{m}$, giving a mean p/q ratio of 0.76. According to the Levan method, all chromosomes were identified as metacentric. These findings are consistent with previous reports on similar species, indicating the stability of the chromosome number in this species. Conservation of endemic species is crucial, and this research represents the first documented report of the chromosome number of the endemic *Allium bungei* in Iran. The results can contribute to a better understanding of the genetic diversity and adaptability of this species in different habitats, as well as to phylogenetic and systematic botanical studies.

65. Investigation of antioxidant properties and secondary metabolites of *Alcea Koelzii* L. flowers

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Alcea koelzii L. contains high amounts of phenolic compounds, flavonoids, and anthocyanins, which are among the most important natural antioxidants. In this study, the flowers of four genotypes of **Alcea** from four villages in Khoy County (Bedelabad, Pirmousa, Qarq Yashar, and

Khaneqah) located in Khoy, West Azerbaijan Province, were harvested in July 2024, and their biochemical traits were analyzed. The antioxidant capacity was measured using the DPPH method, the total phenol content was determined with a spectrophotometer, and polyphenols were measured using High-Performance Liquid Chromatography (HPLC). The antioxidant capacity of *Alcea* flowers ranged from 44.78% to 58.33% using the DPPH method. The highest total phenol content was 322.51 mg per 100 g of fresh weight in gallic acid, observed in the second genotype (Qarq Yashar). Additionally, eight polyphenolic compounds were extracted from *Alcea* flowers, including gallic acid, caffeic acid, chlorogenic acid, rutin, coumaric acid, rosmarinic acid, quercetin, and cinnamic acid, with chlorogenic acid being identified as the predominant polyphenol with an average of 28.23 micrograms per gram. Based on the results of this study, different genotypes of *Alcea* contain natural antioxidants and polyphenols. Overall, the findings of this study can contribute to the optimal utilization of natural resources, enhance human health, and improve the cultivation, harvesting, and processing methods of medicinal plants to increase the concentration and quality of these compounds in plants.

66. Investigating oxidative damage in tomato lines under heat stress

Ghabileh M.M.¹, Ramshini H.¹, Lotfi M.², Aliniaieifard S.² 1- Department of Agricultural Sciences and Plant Breeding, Aburaihan Campus, University of Tehran, Pakdasht, Iran. 2- Department of Horticultural Sciences, Aburaihan Campus, University of Tehran, Pakdasht, Iran CA: ghabileh.mahdi@ut.ac.ir Global warming has become an important issue worldwide due to its negative impact on agricultural production. Most plant responses to heat stress are secondary to oxidative stress. Electrolyte leakage (EL), hydrogen peroxide (H₂O₂), and malondialdehyde (MDA) are important indicators of oxidative stress, which were studied to find out the effect of heat stress on plants. EL is a widely accepted parameter to measure the sensitivity of plants to heat stress (Alsamir et al., 2021). H₂O₂ is a reactive oxygen species that accumulates under stress conditions, including high temperatures (Inaba & Crandall, 1988). MDA is a product of lipid peroxidation, which is considered a common indicator of the occurrence of oxidative stress in plant species (Karkute et al., 2021). In the present research, 21 tomato genotypes were grown in a greenhouse under natural light with a day/night temperature of 25±3/18±3°C. When the seedlings reached five true leaves, the plants were divided into two groups, some of which were kept at standard temperature (25±3.3 °C; (control)). and the other half (plants under thermal stress) were placed at 40°C for 24 hours. After 24 hours of treatment, leaf samples were collected from each plant for analysis. In our research, tomato plants grown under heat stress conditions showed significant differences in EL, MDA, and H₂O₂ levels compared to plants grown at normal temperatures. In another study, similar to the results of the present research, tomato-sensitive genotypes showed the highest increase in H₂O₂ and MDA compared to the control (Shomali et al., 2023). This suggests that heat stress causes membrane damage and disrupts cellular homeostasis, leading to electrolyte leakage and increased markers of oxidative stress.

67. Investigation of the effect of cefazolin antibiotic on tomato and carrot

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Misuse and excessive application of antibiotics can have negative effects on the environment. Residues of these drugs can enter the environment through contaminated waste and harm plants. This problem is very important for crops used in food production. Releasing of antibiotics into environments can lead to the accumulation of these substances in plant tissues and can ultimately be transmitted to humans and animals through the food chains. Present study was conducted to investigate the physiological effects of cefazolin antibiotic on tomato and carrot under lab

conditions. The results showed that the cefazolin has different effects on the growth parameters of carrot and tomato. Tomato is more sensitive to cefazolin than carrot. Cefazolin has a negative effect on the germination of both plants, but at low concentrations increased root and shoot growth in carrot and reduced growth in tomato. Increasing the cefazolin dose reduced the fresh and dry weight of the roots and aerial parts of both plants. Cefazolin affects the metabolism of photosynthetic pigments in carrot and tomato directly or indirectly, and this effect depends on the concentration of this compound.

68. Investigation of the Effects of Wheat Straw Biochar on Physiological and Biochemical Parameters of Wheat Seedlings (*Triticum aestivum*) Under Cadmium Stress

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One of the significant applications of biochar is its ability to adsorb heavy metals from soil and water. Therefore, this study aimed to investigate the effect of wheat straw biochar on reducing cadmium toxicity and its impact on certain biochemical parameters in wheat (*Triticum aestivum*) seedlings. Seeds were cultivated in Petri dishes within a germinator for one week. To investigate the effect of biochar on reducing cadmium toxicity, Petri dishes containing 10 mL of cadmium nitrate solutions at concentrations of (0, 100, and 200) mg/L-1 were treated with four levels of biochar (0, 0.5, 1 and 2 gr/l-1). These treatments were then compared with cadmium treatments without biochar. The results indicated that the percentage of germination, germination rate, dry weight of roots and aerial parts, root and aerial part lengths, as well as the contents of chlorophyll a, b, carotenoids, and total protein decreased in cadmium-stressed treatments at all concentrations compared to the control. However, the addition of various biochar concentrations significantly enhanced these parameters. The levels of hydrogen peroxide increased in the cadmium-treated plants compared to the other treatments. Additionally, the activities of catalase and guaiacol peroxidase enzymes exhibited a significant enhancement in the cadmium and biochar treatments relative to the other groups. Overall, the results of this study indicate that the application of biochar can effectively mitigate the stress induced by cadmium through enhancing the activity of antioxidant enzymes.

69. Investigation of edible Coatings on traits related to strawberry shelf life 'Gavita' cultivar

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Strawberry is a fleshy fruit that softens quickly after harvesting and has a short shelf life. The use of edible coatings by affecting the rate of respiration and interfering with gas permeability somehow plays a role in creating a moderated atmosphere around the fruit and inhibiting many oxidative reactions and reduces ethylene production. In this context, sodium alginate and chitosan are considered as two types of edible coatings. In this design, strawberries were coated with both coatings at a dose of 1%, then packaged and stored at 4 degrees and 85% humidity, and four times (0, 5, 10, and 15 days) were investigated. In general, coating significantly prevented weight loss by preserving fruit juice and preventing evaporation. And chitosan had the most statistically significant effect on this trait. The results showed that coating with both coatings significantly increased the gray rot of the fruit compared to the control, and increasing the storage period caused a significant increase in the gray rot. In this experiment, the chitosan treatment was superior to the control in terms of titratable acidity, this treatment slowed down the aging of the fruit. Coating with sodium alginate caused a significant increase in the soluble solids of the fruit compared to the control. So. The use of covers can be a tremendous change in the field of fruit and vegetable after harvesting by increasing the storage life

70. Investigating the effect of different hormonal compounds on the regeneration of soybean cultivars (*Glycine max* (L) Merr)

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The first step in the process of gene transfer to plants, including soybean, is tissue culture optimization. The aim of this research is investigation of different factors in soybean plant regeneration. In order to sterilize soybean seeds, two methods were used: 50% sodium hypochlorite and chlorine gas. Sterile seeds were cultivated in B5 germination medium with 3% sucrose and 7% agar with pH of 5.8, and their percentage of germination and contamination were checked in light and dark conditions. To optimize tissue culture, the cultivars Katoul, Saman, Saba, Williams, Sahar, Salter, Tapour and Amir were used. To prepare explants, sterile seeds were soaked in sterile water for about 20 hours. Then a longitudinal cut was made along the center of the seed, the two halves of the seed were separated and the seed coat was removed. The embryonic axis was cut from 3 mm to the end and the bud attached to the node was also removed. Explants were placed in callus formation medium (B5 medium containing 1.67 mg/liter BAP and 0.25 mg/liter GA3). Factors affecting regeneration including different concentrations of hormones BAP, Zea, TDZ and the combination of TDZ+BAP were investigated in the stem induction media. The results of seed sterilization methods showed that chlorine gas has the most efficiency in removing pollution and the least negative effect on the germination rate. Sahar variety has the highest percentage of regeneration and BAP 1mg/l is the best medium in the stem induction media for regeneration.

71. Investigating the effect of salinity stress on growth, development and their relationship with salinity tolerance in sesame cultivars

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Sesame (*Sesamum indicum* L.) is an annual herb. Sesame is known as the queen of oil seeds due to its high percentage of protein, carbohydrates and fat among oil seeds. Sesame grows in tropical and subtropical regions. Salt stress is one of the most serious soil problems in the region, limiting the growth and productivity of sesame trees. Therefore, it is important to know which varieties are salt tolerant. The aim of this study is to compare the salt tolerance of two sesame varieties, Oltan and Sardar. For this purpose, NaCl (0.75, 150 mM) was applied to the plants four weeks after planting. The effects of high salinity on plant yield (number of capsules), seed germination and growth parameters were examined in both methods. Mining germination rate and ratio of daily germination rate to maximum germination rate were higher in Sardar than in Oltan. While the number of capsules was higher in Sardar than in Oltan in low salinity and high salinity, plant height, fresh and dry weight were found to be higher in Sardar than in Oltan in high salinity such as. Based on the results obtained, we can conclude that Serdar has better resistance to oxidative damage and is probably more salt tolerant than Oltan in order to maintain or increase its growth rate. Therefore, the results of this study can be used to improve sesame cultivation areas in saline areas.

72. Investigating the effect of growth regulators in the micropropagation of several cultivars of African violet

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African violet is one of the most popular ornamental plants due to its beauty, diversity in color and flowers. This plant can have flowers throughout the year. Micro propagation is one of the scientific methods for propagating all kinds of plants. Growth regulators play an important role in plant tissue culture. In this research, in order to optimize the propagation of African violet from the leaf sample, three cultivars Pretty Miss Kelly, Nightfall and Cool Blue and growth regulators indole acetic acid (IAA), benzyl amino purine (BAP) and naphthalene acetic acid (NAA) were used. became. This research was carried out in the form of a completely randomized block design with at least three replications in the research greenhouse of Damghan University. In this study, modified MS medium with BAP (concentrations of 0, 0.5 and 1 mg/liter) with and without IAA (concentrations of 0 and 0.1 mg/liter) were used for stem formation. In the rooting medium, IAA (concentrations of 0, 0.25, 0.5, 0.75 and 1 mg/L) with and without NAA (concentrations of 0 and 0.2 mg/L) were considered. The results show that the concentration of 0.5 mg/liter of BAP along with 0.1 mg/liter of IAA had the highest number of shoots (15.5) and the lowest was observed in zero concentrations (1.2). In root induction, the concentration of 0.75 mg/L IAA without NAA was the highest (6.2) and the lowest was observed at zero concentration (0.2). After adaptation, the resulting seedlings entered the flowering stage between 4 and 6 months later.

73. Evaluating the effect of growth regulators on callus induction and cell suspension culture in hyssop medicinal plant (*Hyssopus officinalis* L.)

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Hyssop (*Hyssopus officinalis* L.) is a medicinal plant from the Lamiaceae family, that is used in beauty products, pharmaceutical and food industries. This plant is used in the treatment of asthma, sore throat and colds and has antifungal, antibacterial, anti-inflammatory, wound healing, blood glucose lowering properties. Hyssop is composed of volatile oils, flavonoids and tannins. Plant tissue culture is an excellent source for the extraction of many secondary metabolites. Therefore, plant tissues, organs and cell suspension cultures are used for the accumulation and analysis of numerous phytochemical compounds and for the biotransformation of physiologically less active compounds into pharmacologically active compounds. In this experiment, the effect of plant growth regulators 2, 4-dichlorophenoxyacetic acid (0.5, 1, 1.5, 2 mg/l) and 6-benzylaminopurine (0.5 and 1 mg/l) in MS culture medium (Murasnige & Skoog, 1962) was studied on cell suspension culture of Hyssop, the number and relative growth rate of cells and amount of phenolic and flavonoid compounds of cultured cells. Cell cultures grown in the presence of 0.5mg/l BAP, 0.5mg/l 2,4-D had the highest number of single and separate cells. The highest amount of fresh weight and flavonoid compounds was obtained in medium supplemented with 0.5mg/l BAP, 2mg/l 2,4-D and the highest level of phenolics were observed in cultured cells in presence of 1mg/l BAP, 0.5mg/l 2,4-D. From this research, it can be concluded that MS medium with combination of 0.5mg/l BAP, 0.5mg/l 2,4-D is a suitable medium for cell suspension culture to having the largest number of separate cells and addition of different elicitors different to increase secondary metabolites in hyssop plant.

74. Allelopathic effects of bitter olive extract on the germination parameters of two weed species (*Lepidium azadarch* L. and *Malva sylvestris* L.)

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Due to the presence of some phytochemical compounds, most plants can have adverse effects and play an important role in managing weeds and reducing the of herbicides. The present study was conducted in Danesh Alborz laboratory in 1402 and the effects of leaf extract of bitter olive plant (*Melia azedarach* L.) at four levels of zero, 15, 30 and 50% were investigated on some indicators of germination and early growth of weed seeds hoary cress (*Lepidium draba* L.) and high mallow (*Malva sylvestris* L.). The results showed that by increasing the concentration of leaf bitter olive extract, the percentage of germination, the length and fresh weight of the seedlings and also the seed germ have a significant decrease in both hoary cress and high mallow seeds significantly ($P \leq 0.01$). This reduction could be due to the inhibitory effects of phenolic compounds, tannins and terpenoids present in bitter olive leaves. Therefore, bitter olive leaf extract can be considered as a biological herbicide in order to control the germination of ezmak and cheese seeds in order to reduce the harmful environmental effects of chemical herbicides.

75. Evaluation of the allelopathic effect of wheat and redroot pigweed on antioxidant system activity in intercropping

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Allelopathy refers to the beneficial and detrimental effects of one plant on another plant in both crops and weeds through the production of secondary compounds. In order to evaluate the allelopathic effects of wheat (*Triticum aestivum* L.) as a crop and redroot pigweed (*Amaranthus retroflexus* L.) as a common weed worldwide on each other in intercropping, these plants were cultivated under controlled conditions at Tabriz University laboratory. The ratios of wheat to redroot pigweed were, 100: 0 and vice versa as a control, 75: 25, 50: 50, and 25: 75. The results showed that shoot peroxidase (POD), root superoxide dismutase (SOD), and root and shoot catalase (CAT) activities in redroot pigweed increased in all intercropping ratios compared to the control. POD activity in wheat roots was higher at all ratios than in the control. Furthermore, the ratio of 75: 25 (wheat: redroot pigweed) led to increased activity of POD enzyme and malonedialdehyde (MDA) content in wheat shoots. Moreover, roots of redroot pigweed showed increased activity of ascorbate peroxidase (APX) and SOD enzymes and MDA content. The findings showed that the roots were more exposed to oxidative stress due to direct contact with allelochemical compounds. Our results support the hypothesis that increasing the density can reduce the toxicity of allelochemical compounds and that increasing the activity of the antioxidant system will improve plant growth under allelochemical stress.

76. The effect of SNP on some phytochemical characteristics in the cell suspension culture of *Cannabis indica*.

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Cannabis indica is widely used for medicinal purposes. Cell suspension culture technology can be an optimal method for producing secondary metabolites from this plant. Sodium nitroprusside (SNP) was used as one of the nitricoxide (NO) donors in plant studies to investigate the effect of this elicitor on cell suspension culture. In this research, after establishing a suitable callus for cell suspension culture, the effect of different sodium nitroprusside treatments (50, 100 and 150 mg/L) on some phytochemical characteristics and the production of CBD and THC alkaloids from the cell suspension of the cannabis plant was investigated. The results showed that the activities of

catalase, peroxidase, and the levels of soluble sugars and proline increased with the use of sodium nitroprusside compared to the control, while the activity of the phenylalanine ammonia-lyase (PAL) enzyme decreased compared to the control. Measurements of the alkaloids using high-performance liquid chromatography (HPLC) did not show an increase in the studied alkaloids compared to the control. The increase in catalase and peroxidase enzyme activities in the cell suspension is related to the response to oxidative stress, while the decreased PAL activity is related to the activation of the phenylpropanoid pathway and the synthesis of secondary metabolites involved in the plant defense process. The increase in proline levels can be due to the response to the potential stress created in the studied suspension. Therefore, these changes reflect the adaptation responses of the cell suspension to the conditions created by the studied elicitor. This research suggests that by optimizing the concentration of sodium nitroprusside, it may be possible to modulate the antioxidant properties of the hemp plant, which could provide better understanding of the suspension response of this plant to oxidative stress and antioxidant function in the cells.

77. The effect of silicon and silicon nano-chelate on the growth and some physiological parameters of wheat plant (Shiroodi cv.) under salt stress

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Today, use of mineral nutrition methods, such as silicon fertilizer is one of the ways to reduce the harmful effects of salinity. To compare the effects of silicon and silicon nano-chelate on the wheat (Shiroodi cv.) resistance to salinity, an experiment was conducted in a hydroponic system. Treatments were silicon (0 and 2 mM), silicon nano-chelate (0 and 0.424 g/lit), and NaCl (0 and 150 mM), and interactions of these elements with each other. Results shown that silicon nano-chelate decreased the root and shoots dry weight, activity of catalase and ascorbate peroxidase, and proline and sugar content of shoots and roots under salinity stress. Moreover, silicon treatments increased dry weight of shoots and protein content of the plant, and decreased the activity of catalase and ascorbate peroxidase, proline and sugar content of roots and shoots under salt stress. Overall, the results indicated that the silicon increased plant growth and also has a stimulant effect on the activity of its antioxidant system. But silicon nano-chelate significantly decreased the plant growth and antioxidant system activity. Therefore it can be suggested that this concentration of silicon nano-chelate, under the conditions used in this study, compared to silicon doesn't improve plant growth.

78. Investigating the effect of ecological conditions on the amount of essential oil constituents and antimicrobial properties of two species of medicinal plants, Fars province

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Herbal medicines are known as common treatment options in the world and it is believed that they are safer than chemical medicines. This research investigated the properties of plant essential oils and their effect on pathogenic bacteria. The essential oils of two plants, *Francoeuria undulata* and *Haplophyllum tuberculatum*, were collected in June 2023 from different areas of Fars province, including Jahrom Islamic Azad University, Bidzard-Jahrom Willow Road, and Eram Hostel in Shiraz, and were extracted by water distillation method. The chemical compounds of these essential oils were identified using gas chromatography (GC) and gas chromatography-mass spectrometry (GC/MS) devices. The results showed that the main compounds were identified in *Haplophyllum tuberculatum* essential oil, are alpha-pinene and limonene. In the essential oil of *Francoeuria undulata*, compounds such as 1 and 8 cyanol and alpha-tripinol were dominant. The

minimum inhibitory concentration (MIC) and minimum lethal concentration (MBC) of the extracts were evaluated against *Escherichia coli*, *Salmonella typhi* and *Shigella dysenteriae* bacteria. The findings show that the essential oils of the studied plants have significant antimicrobial properties and the effect of climatic conditions on their chemical compounds and antimicrobial activity is significant. For future research, it is suggested to investigate the effects of these essential oils on other pathogenic microorganisms and evaluate their antioxidant properties.

79. Influence of different concentrations of Nickel on seed germination and early growth of garden rocket (*Eruca sativa* Mill.)

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Garden rocket (*Eruca sativa* Mill.) is an annual herbaceous plant belonging to the family of Brassicaceae. which grown in poor soils and adapted to several environmental stresses such as salinity, water deficiency and heat stress. Nickel is an essential heavy metal that is toxic to plants in high levels. Germination is the first process of physiology that can be affected by the nickel (Ni) in the soil, on the other hand, the most of hyperaccumulator and tolerant plants belong to Brassicaceae. Then we evaluated different concentrations of Ni (6 levels) on the germination factors, root and hypocotyl length in *Eruca sativa* seedlings. The results showed that the germination percentage of *Eruca sativa* seeds was not affected by different concentrations of Ni except in the highest stress level (500 ppm). The mean germination time (MGT) and germination index (GI) enhanced and reduced, respectively, in the concentration of 500 ppm treatment compared to control. Root and hypocotyl length was significantly decreased by Ni, at 50 ppm and higher exposure levels. But root length at 25 ppm increased more 2-fold compared to control. Seedling growth is much more sensitive to Ni than seed germination which It may be due to the increased permeability of the seed coat to Ni in during seed germination.

80. Investigating the impact of different forms of cerium on enhancing seed germination and *Zea mays* seedling growth under saline conditions

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Salinity is a significant agricultural issue as it leads to osmotic stress, ionic imbalance, and oxidative stress in plant cells, ultimately hampering plant growth and performance. There is considerable interest in finding solutions to mitigate salinity stress in plants. Recently, cerium has been suggested as a rare element that can reduce damage caused by abiotic stresses. This element is available in various forms for consumption. This study aimed to investigate how seed priming with cerium nitrate, cerium oxide nanoparticles, and cerium hydroxide nanoparticles can help reduce salinity stress in *Zea mays* plants. The experiment was conducted using a completely randomized design with three replications. The experimental treatments included cerium nitrate, cerium oxide nanoparticles, and cerium hydroxide nanoparticles in concentrations of 5 and 10 mg/liter, along with salinity stress induced by 100 and 200 mM NaCl concentrations. The results indicated that the use of cerium nanoparticle forms had a greater impact on germination speed, germination percentage, germination strength, and the fresh and dry weight of the hypocotyl compared to the use of cerium nitrate form. Therefore, it is recommended to use cerium nanoparticle forms, preferably to minimize plant stress damage.

81. Investigating the effect of zinc (Zn) as a heavy metal on the germination characteristics of *Haloxylon ammodendron*

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Since the mechanisms of resistance against various abiotic stresses are similar, it is believed that the halophyte species can tolerate high concentrations of heavy metals as abiotic stress as well. The effect of different concentrations of Zn (0, 100, 200, and 300 mg/L) on the germination characteristics of *Haloxylon ammodendron* as a halophyte plant was investigated to investigate this hypothesis. For this purpose, the seeds were cultivated in sterile petri dishes with uniform intervals and in three replicates for one week at 25°C. The results showed that the germination percentage of this plant did not change significantly at the concentration of 100 mg/L Zn, but at the concentrations of 200 and 300 mg/L Zn, it showed a significant decrease. While the length of the stem and root of *H. ammodendron* under Zn treatment did not show a significant effect, the dry weight of these organs showed a significant decrease in high concentrations of Zn. It can be concluded that *H. ammodendron* had a good relative tolerance in such concentrations of Zn. The germination stage can be decisive for the continued growth of the plant in stressful conditions so that proper germination in a severe stressful condition can indicate the power of a plant to continue growing and developing in those stressful conditions. Therefore, the relative ability of *H. ammodendron* to germinate in high concentrations of Zn can indicate the ability of this plant to survive in an environment contaminated with this heavy metal, which requires more extensive experiments.

82. Investigating the inhibitory potential of flavonoid *Apigenin-7-O-glucoside* in the targeting of squalene synthase

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Cardiovascular diseases are one of the main causes of death in the world. It is estimated that they kill 17.9 million people worldwide every year. It is noteworthy that the increase in serum cholesterol concentration can increase the risk of heart attack. Squalene synthase is one of the important enzymes in cholesterol synthesis. This enzyme catalyzes the first regulation step in the cholesterol biosynthesis pathway. Therefore Squalene synthase inhibitors are associated with decreased formation of cholesterol. This study aims to investigate the inhibition of this vital enzyme by Apigenin-7-O-glucoside. Apigenin with code 5385553 was extracted from the PubChem site and saved in PDB format. The protein file (squalene synthase) with the code 3ASX was downloaded from the Protein Data Bank, and to perform the molecular docking process, to prepare the protein, using Discovery software, water, and its extra chains were removed. Finally, docking was done using Auto Dock Vina software. Apigenin was placed in the active site of the enzyme with binding energy - 7.806 kcal/mol. Based on the docking results, apigenin, as a flavonoid which present in many plants, formed one bond each with amino acids TYR-171 and ASN-215 and two bonds with amino acid GLN-212. According to the interaction results and the appropriate energy level, Apigenin well occupied the active site of the enzyme. The studied compound can be a suitable inhibitor for squalene synthase enzyme. This research was done through by bioinformatics study and to confirm the results it is necessary to carry out laboratory procedures.

83. Investigating the effect of zno nanoparticles on the morphological and physiological of parameters of baby sun rose (*Aptenia cordifolia*) under salinity stress

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Salinity is one of the most important environmental problems in the world. Salinity negatively affects the physicochemical properties of the soil and reduces crop production. In order to study the effect of foliar application of different levels of ZnO nanoparticles on the morphological and physiological parameters of the Baby sun rose plant under salinity stress conditions, a factorial experiment was carried out in the form of a completely randomized design with three replications in the greenhouse of Korramabad Research Center in 1402. The experimental treatments included salt stress with concentrations of 0, 50, 100 and 150 millimolar sodium chloride and spraying with ZnO nanoparticles (0, 500, 750 and 1500 mg/L). Indicators such as growth parameters, chlorophyll content, phenol, flavonoid and total antioxidant were measured in this experiment. Data analysis was done using SPSS software and Duncan's test. The results showed that salinity significantly reduced plant height, fresh and dry weight of roots and, chlorophyll content ($P < 0.05$). While foliar application of zinc oxide reduced the negative effects of salinity stress by increasing growth, carotenoids and, total antioxidants. The highest amount of phenol ($480/36 \mu\text{g g}^{-1} \text{FW}$), flavonoid ($96/22 \mu\text{g g}^{-1} \text{FW}$) and carotenoid ($27/11 \mu\text{g g}^{-1} \text{FW}$) was observed at a concentration of 1500 ML of ZnO nanoparticles at a salinity level of 150 mM. The application of ZnO nanoparticles has a positive effect on improving the morphological and physiological characteristics of the Baby sun rose plant, and with the optimal use of ZnO nanoparticles, it is possible to increase the salinity resistance of the ice flower plant.

84. Investigating the effect of nanoparticles containing zinc and thiourea on the germination of *Brassica napus* under arsenic stress

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In recent years, various processes related to the growth and development of plants, including the germination of crops, have been strongly affected by environmental stress conditions, including heavy metals and metalloid stress. Arsenic as a metalloid is an unnecessary and toxic element that can be absorbed by plants through irrigation of crops with contaminated water and ultimately lead to the reduction of growth parameters. Several studies have shown that the application of nanoparticles can improve growth and germination parameters in plants. Unique physical and chemical properties of nanoparticles stimulate signaling pathways and increase plant metabolism. In this research, germination parameters of *Brassica napus* treated with arsenic and nanoparticles containing zinc and thiourea were investigated. For this purpose, the treatments were carried out in a completely randomized design with three replications of sodium arsenate with concentrations of 0, 50, 100, and 200 micromolar (μM) and nanoparticles containing zinc and thiourea with concentrations of 0, 25, and 50 mg/liter. The results showed that high levels of arsenic lead to a decrease in the germination parameters of *Brassica napus*, however, the use of nanoparticles containing thiourea increased these parameters. According to these results, it is suggested that the use of nanoparticles containing zinc and thiourea can be used as an effective technique to increase germination and resistance of *Brassica napus* under arsenic stress.

85. Effect of molybdenum nanoparticles on biochemical characteristics (*Phaseolus vulgaris* L.) under drought stress

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Drought stress is one of the factors limiting the growth and development of plants. And it has many negative effects on the morphological and physiological parameters of plant. In order to study the interaction effects of drought stress and molybdenum nanoparticles on some of physiological characteristics in (*Phaseolus vulgaris* L.). Factorial experiment was conducted in a completely randomized design (drought in 4 levels 0, -3, -7 and -9 Bar polyethylene glycol and molybdenum nanoparticles in 3 levels 0, 1000, 3000 mg/l) with 3 replicates. The results show that by increasing drought stress from 0 to -9 Bar, the amount of root length, proline, protein, solution's glucose and photosynthesis pigments increased. While the amount of in soluble's glucose, level of leaf, length of aerial organ, weight of wet root, and aerial organ decreased. In addition, it was observed that, in the treatments with drought stress and molybdenum nanoparticle, the amount of fresh weight of shoots and roots, leaf surface, malondialdehyde, proline, protein and photosynthetic pigments increased with the increase of molybdenum nanoparticle from treatment (control) to treatment. 1000 mg/L increased, then decreased in the 3000 mg/L treatment. These results show that molybdenum nanoparticles in low concentrations can compensate the damages caused by drought stress.

86. Synergistic effect of titanium oxide nanoparticles and water and alcohol extract of aerial parts of *Zhumarja majdae* against *Trichophyton rubrum*, *Trichophyton mentagrophytes* and *Microsporum gypseum*

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Due to the spread of resistance to antimicrobial agents, innovative treatment methods are necessary to fight against antibiotic-resistant pathogens such as plant compounds and nanoparticles. The aim of the research is to investigate the antifungal effect of titanium oxide nanoparticles on the mentioned fungi and also to investigate the antifungal effect of Morkhosh plant. Using the disk diffusion method Morkhosh plant, titanium dioxide nanoparticle and combined essential oil were effective on *Trichophyton-rubrum*, *Trichophyton-mentagrophytis* and *Microsporum-gypseum* fungi. But the synergistic effect of Morkhosh plant alcoholic extract and titanium dioxide nanoparticles had a more positive effect on *Trichophyton-rubrum* fungus. *Trichophyton-rubrum*, *Trichophyton-mentagrophytis* and *Microsporum-gypseum* fungi grew in some concentrations of Morkhosh essential oil and titanium dioxide nanoparticles alone. The simultaneous use of plant and nanoparticle, the synergistic effect of nanoparticles with plant essential oil was positive and there was no statistically significant difference. The most important reason was the complete inhibition of the growth of fungi at a concentration of 24 mg/ml on *Trichophyton-rubrum*, *Trichophyton-mentagrophytis* 20 and on *Microsporum-gypsum* 19 micrograms and ng/ml which increased the effectiveness of the two mentioned factors and decreased their use. The use of medicinal plants instead of chemicals and drugs - Biological fight against pathogenic agents by plants - Calculated harvesting of medicinal plants - Export control of medicinal plants - Care in choosing the right solvent to extract the effective substances of plants - The simultaneous use of medicinal plants with chemical drugs is suggested.

87. Investigating the antimicrobial effects of medicinal plant extracts on urinary system pathogens

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In recent years, bacterial resistance has been considered as the main challenge all over the world, and various studies have shown that the effectiveness of existing antibiotics against pathogenic bacteria has decreased. Medicinal plants are remarkable due to having secondary metabolites with therapeutic and preventive effects, and one of the most important uses of this group of biochemical compounds is to use them as antibiotics against various types of microorganisms. In the present study, in order to investigate the antimicrobial effects of different medicinal plants against Gram-positive and Gram-negative pathogenic bacteria of the urinary system, after extracting the extracts of the medicinal plants of Marigold, Myrthus, Rosemary, and Peppermint, the antimicrobial effects using minimal techniques The inhibitory concentration (MIC) and the minimum bactericidal concentration (MBC) were estimated, and finally, the amount of antimicrobial potential was measured by the well diffusion technique on bacteria causing urinary system infection, including *Escherichia coli*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Enterococcus faecalis*, *Klebsiella pneumoniae* was determined. The results showed that the rosemary plant showed the most antimicrobial effect on all the studied bacteria. Based on the obtained results, gram-negative bacteria showed more resistance to the antimicrobial effects of the medicinal plants used. Based on the obtained results, it can be said that due to the beneficial environmental effects and higher safety of plant antimicrobial compounds, plant secondary metabolites can be used in the production of natural antibiotics and reduce the increase in bacterial resistance.

88. Investigating the effect of cultivation on the growth and content of phenolic compounds in hyssop (*Hyssopus officinalis* L.)

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Hydroponics is an emerging technology that allows better control of water and nutrient supply, improves plant productivity, reduces the need for crop rotation and the use of pesticides. Hyssop plant (*Hyssopus officinalis* L.) is a long-lasting plant, from the shade of mint that goes to the auto state. Hyssop plant is used as a medicinal plant for the treatment of fever, cold, asthma, cough, bronchitis, rheumatism, stomach ulcer, bloating, gall bladder and liver, and as an antiseptic and blood sugar reducer. This research was conducted with the aim of investigating the effect of rockwool and perlite on the growth indicators and the content of phenolic compounds of hyssop plant in the greenhouse of Al-Zahra University (S) Tehran in the form of a completely randomized design with three replications. After sowing, the seeds were watered with distilled water until germination. After that, Hoagland's solution was used for irrigation three times a week. The samples were taken after 90 days and the results were checked. In terms of The indices of shoot height and root length showed better performance in the perlite bed, which is due to the advance of the roots in the perlite bed to obtain water and food. It performed better than the perlite substrate. As a result, stone wool substrate is recommended for hyssop cultivation without soil.

89. Investigating the possibility of rapid assessment of seed vigor (a case study of pinto beans)

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Strong seed production is one of the basic issues in the process of agricultural production. Planting strong seeds guarantees the green percentage and ultimately the number of plants per unit area. So far, various methods have been invented under the name of seed vigor tests to evaluate seed viability. The aim of this study is to provide a rapid method for seed viability evaluation. This test was conducted in a completely randomized design in three replications. The treatments included foliar spraying of the mother plant at three levels (control, foliar spraying with iron sulfate and foliar spraying with zinc sulfate). According to the obtained results, foliar spraying of the mother plant with iron sulfate and zinc sulfate significantly increased the seed vigor, so that the highest germination percentage, length of shoot and root, dry weight of shoot and root, and the lowest electrical conductivity It was related to the foliar treatment of the mother plant with iron and zinc sulfate. The study of the gradient of electrolyte leakage in the seeds showed that the seeds obtained from the mother plant sprayed with iron sulfate and zinc sulfate have the lowest gradient with respect to time compared to the control seeds. Therefore, using a simple and fast 12-hour electrical conductivity test, it is possible to screen pinto bean cultivars in terms of their vigor, and there is no need for a germination test with a 14-day period.

90. Analysis of some biomedical and physiological parameters under different salinity periods in two Iranian Landrace Wheats (*Triticum aestivum*)

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Wheat (*Triticum aestivum* L.) is an important cereal crop and is one of the main sources of calories and protein. Salinity is one of the greatest problems in the world affecting plant crop growth and products. In this study we measured the length, fresh weight, dry weight, proline accumulation, inorganic ion contents, and activity of the antioxidant enzymes including superoxide dismutase (SOD), ascorbate peroxidase (APX), and catalase (CAT) in the root and shoot of two Iranian Landrace Wheats to evaluate their tolerance to 250 mM salinity. A completely randomized factorial experiment was performed under controlled conditions with two recommended bread wheat landraces (3623,3625) and two NaCl levels (0 and 250 mM) in three replicates. The samples were harvested at (0,1,3,6,12,24) hours and 10 days after exposure to salinity. According to the results in the short and medium term, Landrace 3625 shows a faster response to salinity stress and has a better recovery ability in the growth in salinity stress. But in the long term it was the Landrace 3623 that was better able to tolerate salinity stress. Therefore, these Iranian wheat genotypes seem to have good characteristics for cultivation in saline lands.

91. Investigating some phytochemical compounds of medicinal plant *Urtica dioica* L. in five habitats

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There are many types of nettle, but large nettle with the scientific name *Urtica dioica* L. is known as medicinal nettle in traditional medicine books as "Anjara Kabir" or "Nabat Elnar". Nettle leaves form its medicinal part and the best time to harvest and collect it is from May to September. Nettle is a dioecious plant with effective compounds and special medicinal properties, which has a great economic value. Among the most important phytochemical compounds of this plant that are effective in controlling and treating cancers, we can mention the following compounds: Caffeic

acid, Gallic acid, Vanillic acid, Chlorogenic acid, Ferulic acid and Synergic acid. The aim of this research is to investigate the aforementioned phytochemical compounds in nettles from five different habitats and to introduce the selected base in the natural production of these important medicinal compounds. The desired branches were obtained from the collection of the Research Institute of Modern Biotechnology of Zanjan University and the National Botanical Garden of Iran. During the collection of the plant, it was tried to collect the leaves in the growing season of the phenological stage and in a short time interval during the peak hours of sunlight in order to have the most secondary metabolites. In order to measure the content of phenolic compounds, an aqueous extract was prepared and analyzed with a spectrophotometer (UV-Vis) using Folin Ciocalteu reagent. Also, in order to identify specific phenolic compounds, ethanol extract was prepared and injected into the HPLC device. The results showed that the highest amounts of total phenol by Folin-Ciocalteu method belonged to the samples of the National Botanical Garden of Iran. In HPLC analysis, the highest amount of Gallic acid and Ferulic acid belonged to Zanjan1 samples, the highest amount of Synergic acid, Vanillic acid and Chlorogenic acid belonged to Gilan samples and the highest amount of Caffeic acid belonged to Amol samples. Finally, we concluded that Gilan samples can be used to use the aforementioned medicinal compounds, and Zanjan1 can be suggested for applications where Gallic acid is important.

92. Studying the response of three populations of *Atriplex leucoclada* to different salt treatments

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Iran with its diverse climatic conditions and land use history support large areas of saline habitats and diverse halophytic flora. In current study, the salinity tolerance of three populations of *Atriplex leucoclada*, from Isfahan, Arak and Orumieh were investigated under greenhouse condition. For this purpose, NaCl treatments at different concentrations of 0, 100, 250 and 500 mM were applied in hydroponics. Photosynthetic pigments and time course electrical conductivity) EC (changes of the hydroponic solutions were measured. The findings indicated that at the highest salt concentration (500 mM) photosynthetic pigments were decreased and also, EC of hydroponic solutions increased with increasing salt concentration ($P \leq 0.05$) compared to controls and by time. *A. leucoclada* from Arak increased EC more evidently compared to other populations. Desired properties of *Atriplex leucoclada* in colonizing in hydroponic condition, suggest it as an anticipated plant for phytoremediation of saline solutions.

93. Biochemical and Physiological Responses of 4 Grape (*Vitis vinifera* L.) genotypes to PEG induced Drought Stress

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Drought stress is one of the most significant environmental factors limiting the growth and quality of agricultural products, including grapes, worldwide. This study aimed to investigate and compare some physiological responses of four different grape genotypes in terms of drought tolerance under various levels of water restriction. For this purpose, a factorial experiment was conducted in a completely randomized design with three replications. In this study, the effects of different concentrations of polyethylene glycol (0, 1%, 2%, 4% of PEG 6000) on Fakhri, Tabarzeh, Lal, and Red genotypes were measured for some traits such as dry weight of shoot and root, root length, levels of antioxidant enzymes (catalase and Guaiacol peroxidase), ion (potassium and chlorine), MDA (malondialdehyde), and proline contents at a 5% probability level. The results showed that

with increasing drought stress levels, the dry weight of shoot and root and root length significantly ($P < 5\%$) decreased, with the highest reduction observed at the 4% stress level. As drought stress levels increased, antioxidant enzymes activity, ions, MDA, and proline contents showed a significant increase. Among the studied genotypes, the highest reduction in dry weight was observed in the Red (81.42%), and the lowest was in Fakhri (37.89%) when compared to control plants. The highest increase in antioxidant enzymes was found in the Fakhri, while the lowest was in the Red. The overall results indicated significant differences in the measured traits among grape genotypes under stress conditions. Among these, the Red was sensitive to drought stress, whereas the Fakhri managed to tolerate stress conditions well.

94. Investigating the antioxidant potential and antimicrobial effects of medicinal plants on Gram-positive and Gram-negative bacteria

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In recent years, the spread of bacterial resistance to various antibiotics has caused widespread concern around the world. With the increase in public knowledge about the side effects of chemical compounds, people's desire to use herbal and organic medicines and products with minimal negative effects is increasing. Antimicrobial effects and antioxidant properties of secondary metabolites of medicinal plants have been proven and many studies have been conducted in this field. In this study, to investigate the antioxidant potential of aqueous and alcoholic extracts of different medicinal plants, including rosemary, lavender, turnip, peppermint and chamomile, DPPH reagent was used and compared with vitamin C as a standard. In order to investigate the antimicrobial effects of the aqueous extract and alcoholic extract of the studied medicinal plants, after determining the minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) on Gram-positive and Gram-negative bacteria (*Escherichia coli*, *Staphylococcus aureus*, *Klebsiella pneumoniae* and *Pseudomonas aeruginosa*), well diffusion technique was used and compared with common antibiotics (gentamycin and ampicillin). The results showed that the highest antioxidant potential was related to the alcoholic extract of the rosemary, and the alcoholic extract of the peppermint was in the next rank. Turnip water extract had the lowest antioxidant potential. Alcoholic extract of peppermint showed the most antimicrobial effect on both gram-positive and gram-negative bacteria groups. Chamomile had the lowest antimicrobial effect. In total, gram-negative bacteria showed higher resistance to aqueous and alcoholic extracts. In general, alcoholic extracts of medicinal plants had higher antioxidant potential and antimicrobial effects than aqueous extracts. Based on the obtained results, it can be said that the use of medicinal plants, while having significant antimicrobial properties, can be used as a rich source of antioxidant compounds.

95. Determination of fatty acids profile of *Nannorhops ritchieana*

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Mountain palm or Daz with the scientific name *Nannorhops ritchieana* is one of the native trees of Iran and Southwest Asia. From an ecological and agronomic point of view, Daz plays a significant role in biological stabilization and preservation of river bed soil. Dried fruits and fresh sprouts were used as food. Also, in times of drought, bread is prepared from the spherical and woody core of Daz. Large quantities of date kernels are produced every year, and these kernels are often fed to livestock, while these kernels are rich in nutrients like the date mantle. One of the most important compounds in date kernels is fatty acid. Different dates have different types of saturated and unsaturated fatty acids, and the purpose of this research is to determine the fatty acids in the kernel of the mountain date. Fatty acids in date kernels were extracted after collection and sampling processes by Soxhlet method and using three solvents: distilled water, ethanol and chloroform. The results showed that there are 13 types of fatty acids with a carbon number less than 25, of which 4 are unsaturated fatty acids and 9 are saturated fatty acids, and also the largest amount of fatty acids in the nucleus are fatty acids with a long carbon chain and more than 25 carbons. The amount of fatty acid extracted with distilled water solvent was higher compared to ethanol and methanol. While in terms of percentage, fatty acid extraction, ethanol solvent had the best performance.

96. Study of the effects of several culture media on biomass of alga, *Gracilaria corticata*

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The genus *Gracilaria* is a red agarophyte algae that is widely distributed in the waters of tropical regions. In this genus, the species *Gracilaria corticata* is considered the most important agarophyte along the southern coast of Iran. The aim of this research was to investigate and optimize the cultivation of *G. corticata* first under laboratory conditions and then in the external environment. For this purpose, *G. corticata* was collected from the shores of Bushehr port. The algae were transported to the laboratory, washed first with seawater and then with one molar saltwater, and their epiphytes and mud were separated. Laboratory cultivation was carried out in two-liter containers by inoculating equal amounts of algae into four types of culture media. The media were Johnson medium, TMRL medium, Urea medium (0.001g/L), and Johnson medium containing urea (0.001g/L). The salinity of all environments was adjusted to one molar salt. Additionally, the culture medium was placed under the same conditions in terms of pH, initial weight of inoculated algae, light, and temperature. During the cultivation period, aeration was performed continuously and uniformly with an air pump. The weight of the algae was measured, and the culture medium was changed every seven days. The results showed that after 28 days of cultivation, the amount of algae biomass production increased compared to the initial amount in Johnson culture medium and decreased in the other environments. Additionally, the color of the algae thallus in Johnson's culture medium did not change, while in other culture media, it became straw-colored.

97. Investigating the effect of different concentrations of ammonium on cadmium toxicity in basil plants (*Ocimum basilicum* L.)

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Cadmium (Cd) is considered as a strong pollutant due to its easy absorption and high toxicity for plants. Considering the importance of nitrogen nutrition on the growth and yield of plants, the effect of inorganic nitrogen as ammonium (1, 2, and 4 mM) was investigated on growth and some biochemical characteristics of basil plants under 40 μ M Cd stress. The seeds were sown in trays containing peat moss soil and perlite, with 16 h of light and 8 h of darkness, light intensity of 350 μ mol. m⁻². s⁻¹, a thermoperiod of 24 \pm 2 °C at light and 16 \pm 2 °C at darkness, and relative humidity of 75%. After 3 weeks, the plants were transferred to Hoagland nutrient solution. After 7 days, the plants were exposed to different concentrations of ammonium and Cd stress. After 10 days, the plants were harvested and indicators such as weight, photosynthetic pigments, total amino acids, malondialdehyde, soluble proteins, and total phenolics were measured. The results showed that in the presence of Cd, lower and higher concentrations of ammonium lead to a significant decrease in fresh and dry weight and the content of carotenoids. Nevertheless, the presence of ammonium in all concentrations increased the total chlorophyll, soluble proteins, and lipid peroxidation in plants under Cd stress. Higher concentrations of ammonium decreased the content of Cd in the root and shoot and led to an increase in amino acids and total phenolics in the shoot. It seems that although the higher concentration of ammonium did not have a positive effect on the growth of basil under Cd stress; it was able to prevent Cd further translocation to the shoot probably through competition with Cd, and moderate Cd stress by improving some biochemical indicators.

98. Examining the impact of varying concentrations of lead on the accumulation of organic acids in the harmel plant

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The presence of toxic lead levels in the environment affects plants, causing physiological changes that can diminish growth potential and, in severe cases, lead to plant death. This study aims to investigate the impact of varying concentrations of lead on the levels of organic acids in the harmel plant. Harmel plants were exposed to lead concentrations of 0, 5, 10, 25, and 50 mg L⁻¹ for 14 days. Additionally, plants affected by lead exhibited significant levels of organic acids. The results indicate that the concentrations of all measured organic acids, except for acetic acid, were elevated in the harmel plant. Citrate accumulation significantly increased under the influence of lead, suggesting that citrate is the most effective option for forming complexes with lead in the vacuole. The highest increases in organic acid levels-malic, oxalic, citrate, acetate, and fumarate-were observed at a concentration of 50 mg L⁻¹ of lead. The acids-oxalic, malic, and citric-were clearly identified as chelators of lead in the vacuoles, while the differences in the concentrations of oxalic and malic acids were relatively minor. The relatively high accumulation of citric acid in the aerial parts of harmel may explain the plant's strong ability to absorb lead in this section and suggests its potential use for cleansing lead-contaminated soils.

99. Evaluation of temperature priming of seeds on some germination characteristics of *Ocimum basilicum*

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Seed priming is one of the methods to increase the resistance of plants under environmental stress conditions such as salinity, drought and temperature. In order to study the wet temperature priming of seeds on some characteristics of basil seed germination in petri dishes and under sterile conditions, 7 temperature treatments and their duration were investigated as follows: T1, control ; T2, 45 °C / 20 min; T3, 45 °C / 40 min; T4, 45 °C / 60 min; T5, 55 °C / 20 min; T6, 55 °C / 40 min; T7, 55 °C / 60 min. The results showed that the effect of pretreatment on the percentage of seed germination and root length was high significant ($p < 0.01$), on the fresh and dry weight of seedlings was significant ($p < 0.05$) and on the stem length of seedlings was not significant. The highest percentage of germination was observed in T2 treatment and decreased with increasing of the temperature and time. The maximum length of root and stem was observed in T4 and T1 treatments, respectively. The decrease in fresh weight of seedlings in treatments T2, T4, and T5 was significant compared to the other treatments, and the highest dry weight of seedlings was observed in treatment T2. In addition to improving some germination characteristics, the seed priming process can activate the stress memory of the plant and increase the plant's resistance to environmental stresses. It is suggested that the effect of environmental stresses should be studied on the seedlings.

100. Impact of different pH ranges on growth factors in *Haematococcus lacustris*

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Astaxanthin, a red keto-carotenoid, is among nature's most powerful antioxidants that have taken keen interest of researchers worldwide due to its extensive applications in the medical, cosmetic, and nutrition industries. The primary source of this potent antioxidant is the single-celled green microalga *Haematococcus lacustris*. This microalga produces astaxanthin as a defense mechanism under abiotic stresses like high light intensity, temperature fluctuations, nutrient deficiency, and pH changes. The current study investigated the impact of pH stress on the production of astaxanthin by *H. lacustris*. The specific BBM culture medium for microalga was adjusted (between 5 and 9) using NaOH and HCl to induce stress. Each test was conducted in triplicate over two weeks. Notably, acidic pH levels negatively impacted microalgae growth, while alkaline pH levels resulted in favorable growth and increased biomass. At pH 5, the microalgae did not grow well, displaying minimal green color. In contrast, at pH 9, they thrived, displaying a dark green color and producing the highest biomass. The direct relationship between pH (from acidic to alkaline) and *H. lacustris* growth suggests that adjusting pH could enhance the favorable growth in this microalga and acidic pH can be effective in astaxanthin production in subsequent stages. Further molecular research related to this topic is recommended.

101. Evaluating the effect of *Trichoderma* isolates on the content of chlorophylls and nutrients of liquorice (*Glycyrrhiza glabra* L.) under drought stress

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Drought is one of the most important environmental stresses limiting plant growth and performance. Using *Trichoderma* as a growth-promoting fungus to increase plant tolerance in stress conditions is considered as a biological solution. Fungal symbiosis increases chlorophylls production by improving water uptake and increasing the solubility and availability of nutrients involved in photosynthetic pigments synthesis, and as well as by activation of their producing

enzymes, that it causes an increase in chlorophylls production and subsequently improves the photosynthetic capacity and promotes the vegetative growth of the host plant. Accordingly, this study was aimed to assess the effect of *Trichoderma* fungi isolates on chlorophylls content and nutrients absorption in liquorice medicinal plant under different levels of irrigation in a factorial completely randomized design with 4 replications. In this research, liquorice inoculated with *T. harzianum* (T25) and *T. viride* (T36) and control without inoculation were exposed to different levels of drought stress (100% (control), 70% and 50% of field capacity (FC)) for two months. The results showed that drought stress decreased chlorophyll a, chlorophyll b and total chlorophyll content at 50% FC level. While the application of both *Trichoderma* isolates improved chlorophylls content at 70% FC and 50% FC levels. Also, in this research, inoculation of both fungi isolates, especially T36, significantly increased nutrients concentration in shoot as phosphorus, iron, zinc, magnesium and potassium at 50% FC level. The results suggest that *Trichoderma* can help to mitigate the destructive effects of drought stress and ameliorate nutritional status and growth in host plant by changing nutrients accumulation.

102. Evaluation of compatibility of Cucurbit rootstocks on absorption and yield in 'Khatooni' melon scion

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The grafting of vegetables is established in early 20 centuries with the grafting of watermelon on Bothell gourd. The production of grafted plants was recognized as a new method for optimal production along with the control of living and non-living stresses. Iran is one of the three largest countries in the world for production of watermelons and melons, and in recent years, the production of grafted seedlings is also of interest for these crops. Seven Cucurbit cultivars were used as rootstock 'Rout Power', 'ES 900', 'RZ 12', 'Nongwoo 01', 'RZ6' 'Shintozwa', 'Marvel' and 'Khatooni' (*Cucumis melo* GR. *Inodorus* accession Khatooni). Khatooni used as scion plant. A series of experiments were conducted in the form of randomized complete block design and some yield traits were evaluated, leaf contents of N, K, P, Ca, B and Mg. The number of fruits per plant, total yield, marketability, content of N, Ca, Mg and B in 'Shintozwa' was more than other rootstocks which was due to compatibility, formation of vascular bridge and under the influence of rootstock genotype. The production of healthy agricultural products with minimal chemical input is important, using a grafted plant with a cucurbit rootstock will minimize the consumption of chemical biocides and cause better and healthier production due to increasing the yield and resistance of the plant to environmental stresses. Choosing the right grafting combination will be one of the main factors influencing the success of grafting and guaranteeing a healthy and quality product. "Grafting", "Incompatible", "Mineral Production", "elements".

103. Investigating the effect of different wavelengths of visible light on the rate of photosynthesis in *Epipremnum aureum*

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Photosynthesis, the process in which plants convert light energy into chemical energy, is a vital biological process that maintains life on earth, and light, as one of the most important factors in photosynthesis, plays an important role in the intensity of photosynthesis in plants. The purpose of this research is to identify the wavelengths of light in the visible region that have the greatest impact on the photosynthesis process and can be used to optimize plant growth conditions and

increase agricultural productivity. In this research, controlled experiments have been conducted using pieces of Potus plant leaves with the scientific name *Epipremnum aureum*, which were placed in a solution of water and baking soda and were affected by violet, green, and white lights. The data obtained from the floating time of leaves under the influence of these lights were analyzed using statistical tests of independent one-way analysis of variance and Tukey's and James Howell's post hoc tests. The results showed that violet light significantly increases the rate of photosynthesis, while green light has less effect. These findings can be used in the development of new agricultural methods and increasing the sustainability of agricultural production and contribute to global food security.

104. Investigating the effect of mineral elements and silicon on the yield of Chamran bread wheat

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Wheat is the main food of people in many countries of the world. Wheat provides a large part of the calories and protein intake of humans. Considering the population growth of the country and the world as well as the current shortage of food in the world, examining all the solutions that increase the production and optimal use of the produced wheat is one of the important and significant issues. Therefore, the effect of mineral elements and silicon on the yield of bread wheat of Chamran cultivar was investigated in field conditions. This study included treatments of distilled water (control), silicon 12% and micro elements (nitrogen, iron 1.5%, zinc 2.8%, manganese and magnesium 2.5%) as foliar spraying of 2 liters per hectare (twice, 30 and 60 days after planting). The length of plant, leaf and spike, dry weight of leaf and spike as well as the amount of chlorophyll, sugar, protein and phenol in the leaf were investigated. The obtained results showed that there was no significant difference between the treatments on wheat leaf length. There was significant difference between silicon treatment and control on plant length, spike length and dry weight of leaf and spike, but microelements did not show a significant difference. The effect of the treatments on the amount of chlorophyll, sugar, protein and phenol of wheat showed no significant difference with the control. The yield of the product in silicon and micro elements treatments were 1.2 and 1.03 times of the control, respectively. Si is essential for growth and development, enhances lodging resistance by mechanical strength of stem, improves plant tolerance and enhances sustainable production in crop plants. Si fertilizer is suggested as a safe and eco-friendly practice.

105. Study of the impact of ZnO nanoparticles on the photosynthetic pigments in spinach (*Spinacia oleracea* L.) during the reproductive stage

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The growing use of nanoparticles in various industries has led to their release and accumulation in the environment, resulting in soil, water, and air pollution. This pollution adversely affects plant growth, which is a crucial link in the food chain. Thus, studying the effects of nanoparticles on plants is essential. In this study, the impact of zinc oxide nanoparticles on the pigments of spinach (*Spinacia oleracea* L.), a highly nutritious and globally cultivated crop, was investigated. Unlike most studies that focus on the vegetative stage, this experiment evaluated plants during the reproductive stage. Spinach plants were exposed to zinc oxide nanoparticles at concentrations of 0, 35, 75, and 150 mg/L, using a hydroponic growth medium in a completely randomized design with three replications. The results indicated that lower concentrations of zinc oxide nanoparticles,

particularly at 35 mg/L, increased chlorophyll a and chlorophyll b levels. Conversely, a concentration of 150 mg/L negatively impacted these chlorophylls, with a similar trend observed in total chlorophyll content. The increased chlorophyll content at lower concentrations may be attributed to the beneficial role of zinc in chlorophyll biosynthesis. Additionally, carotenoid content increased with higher concentrations of zinc oxide nanoparticles. It can be concluded that zinc oxide nanoparticles at low concentrations can enhance plant growth, while high concentrations lead to toxicity and reduced growth. Further investigation into the impact of these nanoparticles on seed quality is recommended.

106. The impact of Titanium Dioxide Nanoparticles on growth parameters of *Aptenia cordifolia* during the vegetative stages

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Titanium dioxide nanoparticles (TiO₂-NPs) are highly valued worldwide for their photocatalytic properties and extensive use in manufacturing various materials. Plants, essential to ecosystems, significantly influence nanoparticle fate in the environment. *Aptenia cordifolia*, used medicinally and decoratively, is a plant naturally exposed to nanoparticles. In this study, the impact of TiO₂-NPs on several growth parameters of this plant was investigated through foliar spraying. The experiments were randomized, using three replications and three concentrations (0%, 0.03%, and 0.05%) applied at stages of plant growth (7-, 14-, and 21 days post-treatment). The results showed that TiO₂-NP treatment reduced growth parameters such as shoot length, root length, leaf area, and leaf count at concentrations of 0.03% and 0.05% nanoparticles on days 7, 14, and 21. Conversely, the fresh and dry weight of shoots and roots increased at the 0.03% nanoparticle concentration, whereas these parameters decreased at the 0.05% concentration by the 21st day. Generally, nanoparticle treatment at a concentration of 0.05% on day 21 in studies concerning growth parameters exhibited the strongest impact. It appears that TiO₂-NPs initially boost plant growth during a critical phase but later accumulate, causing metal-induced toxicity. Therefore, measuring nanoparticle accumulation in various plant parts is advisable.

107. Floristic composition and depth-related variations in the soil seed bank of salafchegan rangelands, Qom province

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This study examined the soil seed bank in the Salafchegan area of Qom Province. Soil samples were collected from depths of 0-5 cm and 5-10 cm from a one-hectare site. After artificial cold treatment, the samples were transferred to a greenhouse and planted. Germinated seeds were regularly counted and identified. The characteristics of the soil seed bank, including composition, density, species richness, floristic similarity between the seed bank and the vegetation, percentage of species in the soil based on life form at the two depths, and the effect of sampling depth on the seed bank structure were investigated. Sorensen's similarity index and the Simper statistical test were used to compare the similarity between the aboveground vegetation and the seed bank, as well as between the two soil depths. Results showed significant differences between the seed bank and the species' floristic list, as well as between the two soil depths. At the Salafchegan site, 102 seeds from 24 species germinated, predominantly annuals and mostly dicotyledons (77%). According to the life form rank, therophytes had the highest germination percentage and number of species. Among the seedlings, the highest abundance was observed for *Androsace maxima* and

Chenopodium album, with 29% and 12% respectively, with almost all seeds germinating in the topsoil. Sorensen's similarity index indicated a 25% similarity between the soil seed bank and the aboveground vegetation at the Salafchagan site. The percentage similarity between the 0-5 cm and 5-10 cm depths with the established vegetation was 26% and 3.3%, respectively, and the percentage similarity between the two soil depths was 29%. *Androsace maxima* contributed approximately 28% to the dissimilarity in seed density between the two soil depths.

108. Study of floristic composition and depth variations of soil seed bank in hoze-soltan region, Qom province

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This study investigated the soil seed bank in the Hoz-e-Soltan area of Qom Province. samples were collected from depths of 0-5 and 5-10 cm from a one-hectare site. After undergoing artificial cold treatment, the samples planted in greenhouse. Germinated seeds were counted and identified. The characteristics of the soil seed bank, including composition, density, species richness, floristic similarity between the seed bank and the vegetation, percentage of species in the soil based on life form at the two depths, and the effect of sampling depth on the seed bank structure were assessed. Sorensen's similarity index and the Simper statistical test were used to compare the similarity between the aboveground vegetation and the seed bank, as well as between the two soil depths. Results showed significant differences between the seed bank and the standing flora, and between the two soil depths. 42 seeds from 3 perennial and dicotyledon species germinated. Phanerophytes had the highest germination percentage and number of species. The greatest abundance of seedlings and species was observed at the 0-5 cm depth, with *Seidlitzia rosmarinus* showing the highest abundance, as all its seeds germinated in the topsoil. According to Sorensen's similarity index, the similarity between the soil seed bank and the aboveground vegetation at the Hoz-e-Soltan site was 67%. The similarity percentages between the 0-5 cm and 5-10 cm depths with the established vegetation were 80% and 40%, respectively, and the similarity between the two soil depths was 50%. Simper analysis indicated that the average dissimilarity between the two soil depths was 62.3%, with *S. rosmarinus* contributing approximately 71% to the dissimilarity in seed density between the two depths.

109. Investigation of polyphenolic compounds and antioxidant activity of *Phlomis anisodonta* Boiss. in the west of Iran

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Phlomis anisodonta Boiss. is an aromatic endemic species in Iran belongs to the family Lamiaceae. It is one of the valuable medicinal plants in Iranian flora when has suitable distribution in different regions in the country. In this research, some polyphenolic compounds such as quercetin, chlorogenic acid, caffeic acid, rutin, rosmarinic acid, gallic acid, catechin and salicylic acid were measured by HPLC. Also antioxidant activity of this medicinal plant was investigated in populations including Hamedan, Kermanshah, Kurdistan provinces. For this, aerial parts of the plant were collected in natural habitats, dried under the shadow (at 25°C), and then milled. Methanolic extract was prepared by maceration method and analyzed by HPLC. Antioxidant activity of the essential oil was also evaluated by the activity in scavenging stable DPPH radical. Results showed the most phenolic compounds belonged to Kermanshah plants and the lowest amount was in the Hamedan. Chlorogenic acid had the highest amount and quercetin had the

lowest amount in Kermanshah and Hamadan. In Kurdistan also rosmarinic acid had the highest amount and the rutin lowest amount. Regarding the antioxidant effects, ANOVA results was significant ($F_{3, 8} = 50.42$). Accordingly, the highest and lowest activities were observed in the populations of Kermanshah and Hamedan ($179.17 \pm 10.50 \mu\text{g/ml}$ to $59.45 \pm 3.24 \mu\text{g/ml}$), respectively. Therefore, this valuable medicinal plant has suitable constituents with high antioxidant activity which can be considered in different aspects.

110. Anatomical and micromorphological study of some Eleusininae species in Iran

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Eleusininae (Cynodonteae, Poaceae) is composed of Poaceae with 7 genera in Iran. Most of these plants have a wide distribution in dry habitats. The Kranz anatomical symptoms and short bicellular Chloridoid hairs are present in these grasses. These are economically important as grains and fodder and are also considered a potential source of biofuel and oilseed products. This study aims to find diagnostic characters from anatomical, morphological and micromorphological features for subtribe separation in some taxa of the Eleusininae in Iran. Leaf anatomical structures (dorsal epidermis and cross-section at the middle of the leaf) of 2 species named *Eleusine indica* and *Cynodon dactylon* are considered. This study measured and evaluated 16 qualitative and 7 quantitative characters of different accessions. Some of these characters were varied among species, but some were nonvariant. Factor analysis based on main component analysis revealed that the most variable characters among species are the number and shape of short cells, long cells shape, form of long cells walls, situation of short cells (suberization or not), shape of bulliform cells, length and number of long cells, number of vascular bundles, radial differentiation in mesophyll, sclerification of inner bundle sheath cells, width and shape of silica bodies, presence or absence of micro-hairs in adaxial surface and shape of abaxial surface. Species separation and delimitations due to the selected anatomical features are discussed.

111. Investigating drought stress on antioxidant enzymes and proline accumulation in 10 varieties of *Sesamum indicum* L.

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Sesame is considered as the "queen of oil seeds" due to its nutritional and health benefits for both humans and animals. Its seeds contain 27.89 to 62.7% oil, 16.72 to 27.79% protein, 13.5% carbohydrates, minerals and various antioxidants. The plant's response to abiotic stress conditions is different according to the species, genotype, cultivar, time of exposure to these conditions and the plant's osmotic regulation capacity and controlling the absorption and transfer of these ions. Enzyme antioxidant defense system includes various antioxidant enzymes such as polyphenol oxidase (PPO), catalase (CAT) and peroxidase (POX). When oxidative stress is experienced by cells, these enzymes act in several subcellular compartments to prevent damage. The aim of this research is to investigate the effects of drought stress on antioxidant enzymes and proline accumulation. The effects of drought stress at three levels of 0, 3- and 6-bar of PEG6000 were investigated on 10 sesame genotypes cultivated in hydroponic environment. The activities of polyphenol oxidase (PPO), catalase (CAT) and peroxidase (POX) enzymes were measured with a spectrophotometer and the amount of proline was measured by the Bates method at different wavelengths. Which had the highest amount in Naz single branch and Sardari cultivars and the lowest amount in Yellowwhite and Ultan cultivars. It seems that in drought-tolerant sesame

genotypes, increased activity of antioxidant enzymes and accumulation of proline, along with decreased lipid peroxidation in cell membranes, has led to an increased level of drought tolerance.

112. Evaluation of berberine production in callus and suspension cultures of *Berberis vulgaris* L

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Berberine, an alkaloid found in the root of *Berberis vulgaris* L., possesses significant medicinal properties, including antimicrobial, anti-inflammatory, and antidiabetic effects. However, traditional extraction methods from natural resources can lead to environmental damage. This study explores sustainable alternatives for berberine production using tissue culture techniques, specifically callus and suspension cultures. In this research, callus cultures of *B. vulgaris* were grown in B5 medium supplemented with various concentrations of benzyladenine (0.5, 1, and 2 mg/L) and naphthalene acetic acid (0.5 and 1 mg/L). The callus was transferred to a liquid medium to establish a suspension culture. Additionally, the effect of methyl jasmonate as an elicitor in the suspension culture was investigated at concentrations of 50, 100, and 150 μ M. The berberine content was quantified using HPLC analysis of methanolic extracts from both cells and callus. The optimal conditions for growth (0.49 gDW) and berberine production (1.01 mg/gDW) were achieved with 2 mg/L benzyladenine and 0.5 mg/L naphthalene acetic acid. Furthermore, methyl jasmonate significantly enhanced berberine production, with the highest yield (0.21 mg/gDW) observed at 100 μ M, compared to 0.09 mg/gDW in the control treatment. These findings provide a foundation for optimizing conditions to maximize berberine production in callus and suspension cultures of *B. vulgaris*, contributing to sustainable practices in natural product production.

113. Study of Gynoecium morphology in the genus *Fritillaria* (Liliaceae) with SEM

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Electron microscopy (SEM, ZEISS DSM 940) were used to explore the complex structures of the gynoecium. The plant materials were collected by the authors in Iran or obtained from cultivated plants in Goteborg Botanical Garden, Sweden. Shape and size were studied on fresh material by light microscope. The gynoecium of 27 taxa of *Fritillaria* has been examined through scanning electron microscopy and light microscopy. The ovary is characterized as three-carpellate and three-locular. All species can be categorized, based on style division, into two sections: Olostyleae (undivided styles) and Trichostyleae (3-fid styles). Trifid styles were observed in *Fritillaria*, excluding *F. zagrica* and *F. uva-vulpis*. *Fritillaria* sub-genus exhibits a diverse array of styles. *Fritillaria* (excluding *F. kotschyana* and the *F. crassifolia* groups) are papillose, whereas those of *Fritillaria* sub-gen. *F. kotschyana*, and the *F. crassifolia* groups (except *F. straussii*) are glabrous. The ultra-structural studies of filaments and anthers are our complimentary studies in systematics of *Fritillaria* at the subgenus level, they are important for biodiversity and pollinator studies for the care of this species gene bank in Iran and the world.

114. Interspecies relationships in the species complex '*Phlomoides labiosiformis*' based on chloroplast marker

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The genus *Phlomoides* Moench (tribe Phlomideae) encompasses over 170 species distributed across Europe, Mongolia, India and China with Central Asia and the Iranian highlands recognized as the main centers of species diversity. Recent molecular studies have confirmed the monophyly of *Phlomoides* by incorporating several genera- including *Paraeremostachys* Adylov, Kamelin & Makhm., *Eremostachys* Bunge, *Pseuderemostachys* Popov, *Lamiophlomis* Kudô, *Notochaete* Benth., *Metastachydium* Airy Shaw ex C.Y.Wu & H.W.Li, *Peudemarrubium* Popov into this genus. As a result, *Phlomoides* is regarded as one of the most taxonomically challenging genera within the subfamily Lamiioideae (Lamiaceae). This study aims to elucidate the “species concept” within the species complex of *Phlomoides labiosiformis* (Popov) Adylov, Kamelin & Makhm. In Iran, this complex includes four species: *P. labiosiformis*, *P. laciniata* L., *P. binaludensis* Salmaki & Joharchi, and *P. semnanensis* Ranjbar & C. Mahmoudi, all of which are widely distributed in the semi-mountainous regions of northeastern Iran and neighboring countries. A significant taxonomic challenge posed by this group is defining the boundaries between morphologically similar species. In this study, the *P. labiosiformis* complex was investigated using morphological characteristics (e.g., plant height, leaf shape, inflorescence, calyx, ...) along with sequencing of the chloroplast marker trnT-A. The low sequence diversity and the limited informative nucleotide positions in the data matrix suggest a high degree of affinity among the members of this complex. Our findings corroborate the synonymy of *P. semnanensis* with *P. labiosiformis*. Additionally, the results support the “lumping approach” to the species concept in the genus *Phlomoides*, as proposed by the Russian botanist Popov in 1940.

115. Investigating the morphology and histology of glandular Trichomes of sesame plant

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Sesame (*Sesamum indicum* L.) is a herbaceous plant from the Pedaliaceae family. This plant is used as a remedy in traditional Iranian and Middle Eastern medicine. Various compounds are produced in the specialized glandular trichomes of the plants, which are used in pharmacy, food industry, cosmetics and personal care. Therefore, understanding the compounds in plants glandular trichomes is crucial. The aim of this study was to investigate the morphology and histology of glandular trichomes in sesame plants. For this purpose, sesame plants were grown in a greenhouse for 40 days. Subsequently, morphological and histochemical examinations of the plant leaves were carried out using light microscopy (LM) and scanning electron microscopy (SEM). Through the research, it was found that the leaves of the sesame plant contain one type of uniseriate non-glandular trichome and two types of glandular trichomes including short peltate and long capitate. Common secretory compounds were identified in both types of secretory trichomes, such as phenolic compounds, alkaloids and phospholipids. Considering the functional role of trichomes, they can be regarded as a nearly closed biochemical system with few inputs that contain several highly active biochemical pathways for the production of primary and secondary metabolites. In general, the results of the current research show that secretory trichomes in plants are suitable structures for the production and storage of secondary metabolites, and identifying these compounds in these trichomes is essential for their optimal use.

116. Pollen micromorphology and ultrastructure of *Tulipa julia* K. Koch

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In this study, *Tulipa julia* K. Koch was examined by Light Microscopy (LM), Scanning Electron Microscopy (SEM), and Transmission Electron Microscopy (TEM) for the first time in the world. The pollen grains were monad, medium in size, spheroidal shape, rugulate-striate exine ornamentation and tuberculate intine ornamentation. About ultrastructure characters, we can mention the absence of the endexine layer, having the small thickness foot layer compared to the other exine components (Columellae and Tectum), and also the approximate thickness similarity of the intine layer with the exine layer. With compared to the previous research and the information obtained from this study, there was variation in the characters of pollen grains both micromorphology and ultrastructure, and had taxonomical value.

117. Systematic survey of the *Tilia* species in Iran using geometric and traditional morphometry

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The genus *Tilia* of Malvaceae family includes 33 species in the world, which are mostly found in Europe, northeastern America and temperate regions of tropical Asia and Hyrcanian region of Iran. Finding a solution to identify the species due to the many problems of identifying the species of this genus and its hybrids in Iran, is the goal of the leading research. In this regard, herbarium samples of 7 species in Iran were examined. Comparison of species based on morphological traits and their statistical analysis with the help of classification charts based on PCA and cluster analysis using Ward method in SPSS software was done on 36 populations of 7 species of the *Tilia* genus. 12 Quantitative and 12 qualitative characteristics were determined with the help of Iranian flora, and were examined in the samples. Geometric morphometric analysis was done with the help of Shape software to check the broad shape and the margin of the leaves of these species. After checking the data by Shape software, the set of 433 selected homologous points were collected in an Excel file and then the data was analyzed in SPSS software using Discriminant analysis method to check the variables simultaneously. The results of cluster analysis could distinguish *T. cordata*, *T. sabetii* and *T. stellato-pilosa* species from others. The results of geometric morphometric analyzes based on Discriminant analysis show that the margin and width of the leaf were unsuccessful in separating the species. Also, according to the results of geometric morphometry, none of the species could be distinguished from other species with a high percentage of differences. But the geometric morphometry of the leaf was able to be effective in differentiating the two species of *T. ×euchlora* and *T. sabetii*.

118. Investigation of *Nostoc commune* cyanobacterial extract on rice plant growth parameters under salt stress

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Placing plants in extreme environmental conditions such as salt stress has a negative effect on the production and development of crops. Various biological stimulants have been used to increase plant tolerance to salt stress, and cyanobacteria extract has provided significant effects on plant performance. It is important to investigate the effects of salinity stress on agricultural products and especially on rice. Therefore, in the present study, the effects of *Nostoc commune* extract on rice growth parameters under salt stress were investigated. Salt stress was created for rice plants with concentrations of 100 and 150 mM of sodium chloride. Then, 25, 50 and 100% concentrations of 0.5 g/l cyanobacterial extract were used to evaluate the growth indicators. The results showed that

the salinity treatment decreased the height of the hypocotyl, the length of the radicle and the weight of the seedling compared to the control. The hypocotyl height increased by 10% only in the 100 mM salinity which was treated with 100% extract. The length of the radicle in the 100 mM salinity, which was treated with 25% and 100% extracts, increased by 31% and 30%, respectively. While the hypocotyl height and radicle length decreased in the simultaneous treatment of 150 mM salinity and different concentrations of the extract. Seedling weight in 100 and 150 mM salinity, which was treated with 100% extract, increased by 25% and 8%, respectively. The results indicate that *Nostoc commune* extract can be effective in improving rice plant growth under salt stress.

119. Investigating the antioxidant activity of cell suspension culture in *Dracocephalum moldavica* L.

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Dracocephalum moldavica L. is a herbaceous and annual plant from Lamiaceae family. This plant has many healing properties with high antioxidant properties. Cultivation of medicinal plants in nature is associated with problems such as pest attacks, the presence of weeds, and environmental changes and stresses. In vitro culture methods are adopted with the aim of obtaining the maximum amount of secondary metabolites in the minimum possible time. There are few reports regarding the suspension cultivation of *Dracocephalum moldavica*. In the study conducted by Weremczuk-Jeżyna, et al (2017) the suspension culture of *Dracocephalum moldavica* from root explant was stabilized in liquid MS medium with 0.5 mg/L 2,4-D and 0.2 mg/L BAP. The content of rosmarinic acid and antioxidant potential in suspension culture was higher than callus derived from roots. *Dracocephalum moldavica* seeds were prepared and cultivated in Murashige and Skoog medium (MS) after sterilization. Stem and leaf explants were used to induce callus in MS media containing NAA-BAP + 2,4-D and Kin + 2,4-D. In order to establish the cell suspension culture, suitable calli were transferred to liquid MS medium containing the same hormones and subcultured every 12 days. The calli derived from the stem explant in the culture medium with 0.5 mg/L Kin + 0.5 mg/L 2,4-D, the callus derived from the leaf explant in the culture medium with 0.25 mg/L 2,4-D, 0.5 mg/L BAP + 0.5 mg/L NAA + 0.5 mg/L 2,4-D and 1 mg/L BAP + 1 mg/L NAA + 1 mg/L 2,4-D showed the best conditions for cell suspension culture. The results showed that the highest growth rate of cells obtained in culture media containing 1 mg/L BAP + 1 mg/L NAA + 1 mg/L 2,4-D hormones. The highest content of phenolic and flavonoid compounds, antioxidant activity by measuring free radical 2,2-diphenylpicrylhydrazyl (DPPH), and the reducing power activity with ascorbic reduction (RP) and superoxide anion radical (SO) reduction obtained in MS media with 0.25 mg/L 2,4-D hormone. According to past research, it was found that there is an inverse relationship between growth and production of secondary metabolites. Based on this, slow cell growth seems necessary for the optimal production of these metabolites. In addition to the whole plant, phenolic compounds are also synthesized in cells and tissues cultured in in vitro cultures. In this regard, it is important to choose the conditions that cause the accumulation of these compounds. Some components of the culture medium, including hormones and hormone-like compounds, are among the most important growth regulator of the production of secondary metabolites in plant cell cultures. Therefore, cell suspension culture is one of the useful tools for the production of secondary metabolites, which produces a lot of biomass in a short period of time in completely sterile and controlled conditions. According to these results, investigating the secondary metabolites of the plant in different stages of tissue culture and also preparing suspension media in these stages is suggested.

120. Floristic study of Gorzlangar village in Ilam province

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Iran with 1,648,195 km² and various climatic conditions, is one of the most important areas from aspect of species diversity and speciation. Therefore, the floristic study and investigation of its plant species is important. Gorzlangar is one of the villages of Darreh-shahr city on the slopes of Kabirkooch of Ilam province with 543 hectares and 1,081 m above sea level. For identification and introduction plant species area, plant materials were gathered and deposited in herbarium of Kharazmi University. In this study, 83 plant species of 70 genera and 29 families is identified. The number of highest species was belonged Lamiaceae, Fabaceae and Asteraceae, respectively. Some species have medicinal value. The highest life forms of the plants were included therophyte and the most of the plants of this area was belonged to Irano-Turanian floristic elements.

121. Survey of phytochemistry of *Marrubium astracanicum* Jacq. in three provinces in the west of Iran

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Marrubium astracanicum Jacq. is belonging to the Lamiaceae family. In this study, five populations of *M. astracanicum* from Hamadan (Ghang nameh), Kurdistan (Aghche darband, Tazeh abad Oreyeh) and Kermanshah (kani shahpasand and cheshmeh sherdival) were collected. After drying the plant samples, methanolic extract was prepared by maceration method and analyzed by HPLC for polyphenolic compounds identification. The standards of rutin, rosmarinic acid, caffeic acid and chlorogenic acid at 280 and 320 nm wavelengths were used to investigate and detect polyphenols in populations in different regions. The amount of these polyphenols were various in different regions. The results of comparing the average of the regions showed that the plants in Hamadan region had the most effective compounds and the plants in Kermanshah region had the least compounds. The highest composition was related to rutin (5.36 ppm) and caffeic acid (4.79 ppm) and the lowest chemical composition was related to rosmarinic acid (2.02 ppm). The results of the soil analysis showed that Aghche darband region in Kurdistan is different in terms of soil texture, soil type and soil physical test (percentage of clay, sand and silt) compared to the soil of other stations. Unlike the other four stations that have medium soil, the soil of this station was heavy. Our results showed that soil type, altitude and weather conditions in each of these regions cause changes in polyphenolic compounds.

122. Anthocyanin content and superoxide dismutase activity of aqueous and acetonic extracts of bitter olive leaves and fruits

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The bitter olive plant belonging to the Meliaceae family is considered a medicinal plant due to the presence of phytochemical compounds in different parts with antibacterial and antibiotic properties. In this study, anthocyanin content and superoxide dismutase (SOD) enzyme activity were investigated in two parts of leaf and fruit extracted with two solvents, water and acetone. Extractions of both organs and solvents were done by maceration method and anthocyanin content and enzyme activity were measured by spectrophotometer. The data were statistically analyzed by SPSS software in $P \leq 0.05$. The results showed that the content of anthocyanin and enzyme activity in the acetone extract was higher than in the water extract, and in the leaves, compared to the fruits, the values were significantly higher. So that the highest content of anthocyanin and enzyme

activity was observed in the extract of the leaves. Therefore, it is possible to obtain an extract with maximum antioxidant activity and medicinal properties from the bitter olive plant by choosing the appropriate solvent and plant organ.

123. Investigating the content of photosynthetic and non-photosynthetic pigments in different parts of leaves, petals and stamens of *Nelumbo nucifera* in the aquatic ecosystem with different environmental conditions

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Chlorophylls, carotenoids and anthocyanins are among the most important plant pigments, which respectively have functions such as absorption of light energy for the process of photosynthesis, protection of chlorophyll against light degradation and protection of plants from stresses and attraction of pollinators. The purpose of this research is to investigate the content of photosynthetic pigments (chlorophylls a and b and carotenoids) and non-photosynthetic pigments (anthocyanins) in different parts of leaves, petals and stamens of the *Nelumbo nucifera* in 4 wetlands or aquatic ecosystems (T1, T2, T3 and T4) with different environmental conditions in Mazandaran province. Chlorophylls and carotenoids were extracted using 80% acetone and anthocyanin using acidic methanol solvent and measured by spectrophotometric method. The results showed that the content of chlorophylls (a and b) and carotenoids in the leaves in T3 ecosystem was almost 32% higher than T1, T2 and T4 ecosystems. The content of carotenoids in stamens and petals was higher in T4 ecosystem than in other ecosystems. Considering the high content of chlorophylls in T3 wetland, it seems that this wetland has more favorable environmental conditions than other ecosystems because this wetland is not exposed to agricultural pollution (agricultural toxins and pests). On the other hand, the content of anthocyanin in leaves and petals in T4 ecosystem was higher than other ecosystems. Considering the higher content of carotenoids and anthocyanins in the stamens and petals in the plants of T4 wetland, probably the plants of this wetland are more successful in attracting pollinators.

124. Ethnobotanical study of the central parts of Gilan province based on edible and industrial applications

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Gilan province is one of the northern provinces of Iran, this province includes the green areas of the northwest of the Alborz mountain range and the western part of the southern shores of the Caspian Sea. There are 16 cities and many villages in this province. The forests of Gilan provide more opportunities for feeding and wildlife with a green bed full of plants and a large area of this province is covered by forest. In the present research, an ethnobotanical study was conducted in 9 cities and their adjacent villages in the central parts of Gilan province for documentation purposes. The information about the plants used and the introduction of the important plant species used in the industry and food of the people of these parts were done using ethnobotanical indicators. The method used in this study was to use semi-structured questionnaires and interview 61 local people about local plants and their usage. Also, personal observations were made between 1401 and 1402 and all documented plants were collected and identified. The obtained data were analyzed using ethnobotanical (ethnobotanical) quantitative indicators. A total of 128 plant species were identified, of which 27 species belonging to 12 families were identified for edible use, most of which belonged to the Rosaceae, Lamiaceae, and Fabaceae families. Also, 14 plant species were

identified for industrial use, which were mostly from Rosaceae, Fabaceae, Asteraceae, and Poaceae families. Unfortunately, the destruction of the forests of Gilan in the last few decades has been immeasurable and today only a cover of destroyed forests can be seen up to a high altitude in the mountains of Gilan and if they are not restored, their ecological and economic value will be lost and this is an alarm for the valuable plants in the area. Therefore, by identifying and protecting these plants, it is possible to protect the genetic reserves of the region.

125. Morpho-anatomical investigation of *Astragalus spinosus* (sect. *Poterion*) in Iran

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The study of morphological traits has been the basis for the classification of different plant taxa for centuries, and the simultaneous use of anatomical features has made it possible to distinguish between species of the genus. *Astragalus spinosus* is a thorny shrub from the *Poterion* section and belongs to the leguminous family (Fabaceae). The present study was conducted with the aim of investigating the morphological and anatomical characteristics of this species and determining their taxonomic value. After collecting samples from its natural habitats in Khuzestan province and identifying them by reliable flora, morphometric studies of vegetative and reproductive structures were done by stereomicroscope. In order to examine the stem and leaves anatomical, sections were manually cut and the best sections were selected for staining and examination by light microscope. The amounts of different components were measured with an optical micrometer. Morphological investigations showed that this species can be easily distinguished from other species of this section by the numerous veins of the calyx and the fruit with lateral compression. In the anatomical structure of the stem, there were 5-6 collenchyma layers of the sub-epidermis and the ratio of the thickness of the parenchyma of the cortex to the pith was 0.46-0.47 μm . In the leaflet, the cells of the upper epidermis are larger than the lower epidermis and the mesophyll tissue is differentiated into four rows of palisade parenchyma. The middle vascular bundle, with a diameter of 242.35 μm and a large cap of sclerenchyma was observed. The study of this species from morpho-anatomical aspects was presented for the first time in Iran.

126. Molecular investigation of endemic species in gypsum areas of Semnan province

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Gypsum soils are one of the most widespread unusual beds in the world. The gypsum habitats of Iran are important reserves of biodiversity containing endemic and rare species. Plants in gypsum habitats are very diverse, but only some of them are native. These are called gypsum and grow almost exclusively on gypsum soils. Genetic identification and their registration will be of great help in preserving these species. Since the identification of endemic and gypsophyte in the eastern region of Semnan has been done until now, based on morphological traits, therefore, their scientific investigation and accurate and reliable identification, based on molecular and genomic studies, is necessary and essential to It seems In this study, available sources such as floras, articles and monographs related to the species were used, and the intended habitats, field studies and collection of species from nature were also discussed. Then, DNA extraction was done by conventional CTAB method and amplification of desired fragments by PCR method using designed primers and electrophoresis and sequencing of amplified fragments. In this study, 10 species of native plants were examined morphologically and molecularly with ITS and psbA-trnH barcodes and a

comparison was made with these species and other genera. In this study, these two barcodes were accepted for species. In this study, where nrDNA ITS region was used, it was found that nuclear sequences can also be used as suitable regions for molecular studies. In various studies, different genomic regions have been recommended for markers, and it seems that most of the genomic regions can be used to identify medicinal plants. Markers used in molecular identification should be designed based on conserved sequences and be relatively short to enable the multiplication of damaged DNA sequences.

127. Determination of total flavonoid content of walnut (*Juglans regia* L.) in southern, central, and western regions of Iran

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The walnut, scientifically known as *Juglans regia*, is a valuable type of nut belonging to the Juglandaceae family. The green leaves of the walnut tree are a source of natural compounds with beneficial antioxidant properties. In the present study, to investigate the total flavonoid content of walnut samples from different provinces, leaf samples were collected from walnut trees with a trunk diameter of more than one meter, at least 100 meters apart, with five replicates from Kohgiluyeh and Boyer-Ahmad (elevation 2018 meters), Isfahan (elevation 2362 meters), Fars (elevation 2227 meters), and Kerman (elevation 2029 meters) provinces. Ethanolic extracts of dried walnut leaves were prepared, and the total flavonoid contents were measured using colorimetric aluminum chloride assay. Total flavonoid concentrations were calculated using the quercetin standard curve as mg/g leaf-dried weight. The highest and lowest amounts of total flavonoid of leaf walnuts were observed in samples from Kohgiluyeh and Boyer-Ahmad (158.23 mg/g DW) and Isfahan (60.27 mg/g DW), respectively. The findings of this study indicated that the effect of elevation on total flavonoid content is significant, with an inverse relationship between them. Given the amount of ethanolic extract obtained, walnut leaves can be introduced as a substitute for synthetic antioxidants.

128. Investigating the total content of phenol and flavonoid in the vegetative and reproductive parts of *Hypericum scabrum*

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Hypericum scabrum is a medicinal plant belonging to the genus *Hypericum* and the family Hypericaceae. Due to their high ability to adapt, members belonging to this genus have a wide distribution in Iran. Numerous studies have been conducted to investigate the secondary metabolites of members belonging to the genus *Hypericum*, however, researcher have reported varying outcomes. This study was conducted to compare the amounts of total phenol and flavonoid in the vegetative and reproductive parts of *H. scabrum* from two habitats in Ilam and Lorestan provinces, in the west of Iran. In this study, the vegetative and reproductive parts of this plant were collected from two habitats and dried at ambient temperature in the shade. The powder was then prepared, and their extracts were extracted by methanolic method. The amount of total phenol and flavonoid was measured using the Folin-Ciocaltio method and the aluminum chloride colorimetric method, respectively. The statistical analysis was conducted using SPSS software, and the comparison of averages was done using Duncan's test. In Chardavol and Alashtar habitats, the highest content of total phenol and flavonoid related to the extractions of the leaves of this plant is 6.41 ± 0.71 and 5.97 ± 0.32 mg GA/gr, and 2.41 ± 0.71 and 2.09 ± 0.12 mg Q/mg of dry weight, respectively. The lowest value related to flower parts was found in the Alashtar habitat with a

value of 5.01 ± 0.41 mg GA/gr, and 1.98 ± 0.09 mg Q/mg. There is a significant difference between the average total phenol and flavonoid content of the two extracts obtained from two habitats, as well as between two parts of this species ($P < 0.05$). The results showed that there was a difference between the amounts of phenol and total flavonoids in different ecological conditions and different parts of the plant, and that the plant produced different amounts of secondary metabolites in order to deal with environmental stresses.

129. Micromorphology development of reproductive bud and staminate flower wild pistachio (*Pistacia atlantica* Desf.)

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Wild pistachio (*Pistacia atlantica* Desf.) is a dioecious plant with multiple medicinal properties and ecological adaptation to dry environment. Meanwhile, most of its developmental aspects remain unrevealed. This two years research aimed to study the structure and development of reproductive bud and male flower in *P. atlantica*, subsp. *mutica*. Samples collected at regular intervals from Fars province, were fixed in FAA, after a short passage in methanol. After dehydration in alcohol series, air drying in hexamethyldisilazan, and gold coating, they were observed under the SEM. Dormant buds were covered with compact and rigid scales, the outer surface of which had short and long trichomes. After removal of the scales, SEM revealed the undifferentiated male inflorescence, as a green mass, under each scale of the autumn and winter buds. Each flower consisted of thin scales with intertwined protective trichomes, four developed sepals and five immature anthers. Swelling of the eco-dormant buds and appearance of the dense panicle occurred in early March. Pollen grains had three apertures, reticulated ornamentations and a secretory tapetum. *P. atlantica* showed the same developmental pattern, i.e., nine months interval between floral induction and appearance of the inflorescence, as for already reported pistacia species. During early morphogenesis, wild pistachio may form bisexual flowers and unisexuality occurs, as for *P. vera*, during inflorescence development.

130. Investigation and identification of phenolic compounds, flavonoids and anthocyanins of *Zataria multiflora* and *Thymus kotschyanus*

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Zataria multiflora and *Thymus kotschyanus* are among the most well-known medicinal plants from the Lamiceae and are used in traditional medicine in the treatment of digestive diseases as well as respiratory infections and local wounds, and also have anti-inflammatory and antibacterial properties. A wide range of compounds are synthesized in plants for growth and development and response to environmental conditions. Secondary metabolites are a group of these compounds that do not directly play a role in plant growth and development, but play a vital role in protecting the plant against biotic and abiotic stresses. Phenolic compounds, flavonoids and anthocyanins are in this group. These compounds are important for maintaining health and preventing diseases in humans due to their positive effects. In this study, the phenolic compounds, flavonoids and anthocyanins of these two plants (collected from Kerman province) were studied and identified by HPLC. The results of the HPLC chromatogram of phenolic and flavonoid compounds showed that both plants have 13 similar phenolic and flavonoid compounds and only the amount of these compounds is different in these two plants and these compounds are Gallic acid, P_OH_Benzoic acid, Catechin, Epicatechin, Rutin, P_Coumaric acid, Myricetin, Quercetin, Caffeic acid, Luteolin, Chlorogenic acid, Apigenin, Kaempferol. The results of HPLC chromatogram and the study of

anthocyanins of these two plants also showed that these two plants have two similar anthocyanin compounds named Cyanidin_3_glucoside Cyanidin_3_rutinoside and only the amount of these two compounds is different in these two plants.

131. Investigation and comparison of production and propagation methods of some species of *Acrocarpous* and *Pleurocarpous* mosses in Iran

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After flowering plants, mosses have the largest number of species, with 25,000 species. They do not have any true organs and settle themselves on the substrate with rhizoids and due to the lack of a vascular system, they absorb nutrients from the air and transfer them from cell to cell using the gametophyte organs. These plants have unique characteristics that, in addition to their important role in maintaining the ecosystem, are used in pollutant monitoring, carbon dioxide storage, nitrogen fixation, production of medicinal secondary metabolites, and genetic research. Cultivation of moss in artificial conditions helps to provide raw materials for studies related to moss and its other uses and to prevent the harvesting of moss from nature and the destruction of the moss cover of forests. Although much research has been done on the sexual propagation (sporophyte) of mosses, their asexual propagation (gametophyte) has received less attention. In this research, for the first time in Iran, 10 species of moss including pleurocarpous and acrocarpous species from the forests of the north of the country were cultivated asexually in two methods of fragmentations (on two different substrates, cocopeat, and sterile gauze), and parent plant cultivation. As a result, and by examining the factors involved in the growth of mosses, such as the influence of the substrate, nutrition, and the type of culture (fragmentations/ separated shoots from the parent plant), cultivation of fragmentations on the integrated substrate (cocopeat-sterile gauze) was introduced as a suitable method for the asexual propagation of moss.

132. Female disease and their ranks in the ethnopharmacology of local communities of Jahrom city, Fars Province

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The present study was conducted with the aim of studying and recording the knowledge of ethnopharmacology of medicinal plants in Jahrom region in the treatment of women's diseases. Ethnopharmacological data of medicinal plants were collected using a semi-structured questionnaire. It was collected from open interviews. A total of 51 people were randomly selected to conduct this research, including herbalists, farmers, graduates of agriculture and natural resources, and users of natural resources. Quantitative analysis and analysis of ethnopharmacological data was done using the Use report and the Information Consensus Factor (ICF). Lamiaceae and Apiaceae families were the most used plant families in the treatment of female diseases in Jahrom County. However, the most reported use was related to date tree products (*Phoenix dactylifera*), *Marrubium vulgare* and *Vitex agnus-castus*. Finally the value ICF for the female disease was 0.9, which indicates the high diversity of utilization of medicinal plants in the treatment of female diseases by the locals of Jahrom County.

133. Response of salt-exposed mango (*Mangifera indica* L.) plant to nano selenium

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Mango is an important fruit of tropical regions. This plant is classified as salt sensitive plant. Nanomaterials, particles with dimensions between 1 and 100 nanometers, are of interest in agriculture mainly as nano-fertilizers. Due to their small size, nanoparticles pass through biological barriers, enter the plant and are easily transferred to various tissues. Selenium nanoparticles have been introduced as stable nanoparticles for use as plant fertilizers. In the current research, the effects of selenium and irrigation by saline water was investigated on physiological characteristics and ion content of mango plants. The experiment was carried out in a completely randomized design. The factors were included foliar spraying of nano selenium (0, 10, 20 and 40 ppm) and NaCl salinity (0, 25, 50 and 100 mM). Chlorophyll content (a and b), carbohydrate content, calcium, chlorine, sodium and potassium were investigated at the end of the experiment. The results indicated that salinity made decreases in chlorophyll content (a and b), calcium and increases in carbohydrate, chlorine, sodium and potassium. Under 50 mM salinity, nano selenium spraying improved carbohydrate (32 %) and potassium (11 %) and lessened chlorine, sodium and calcium content (7.3, 12 and 13 % respectively). In general, it can be concluded that foliar spraying of nano selenium (40 ppm) can play an effective role in reducing the adverse effects of salinity in mango plants.

134. Response of leaf morphology of *Amygdalus orientalis* and *Crataegus pontica* to browsing by livestock in the semi-arid forests of Zagros (Ilam)

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Livestock browsing is one of the most important destructive factors affecting the forests. To protect themselves against browsing stress, trees make changes in their various organs, especially leaves, so that they can adapt to new conditions. Understanding the change in leaf characteristics determines the adaptation strategy of the plant and can greatly help to understand their response to environmental changes. The aim of this research is to investigate the leaf morphological response of two forest species, *Amygdalus orientalis* and *Crataegus pontica* under the influence of livestock browsing in Zagros forests. For this purpose, six morphological characteristics of leaves: leaf width, leaf length, petiole length, leaf circumference, leaf area, leaf density, were investigated in five forest stands of Ilam province. Five individuals were randomly selected from each stand and 20 mature leaves were collected separately from the lower branches as browsed and from the upper branches far away from livestock as unbrowsed. The results showed that livestock browsing caused a decrease in all leaf morphological traits except for leaf density. Trees with wider leaves showed more changes. There is a positive correlation between most leaf morphological traits to each other. When plants are browsed by herbivores and subjected to continuous stress, the metabolic balance is disturbed, leading to changes in the transport of nutrients and carbohydrates from roots to leaves. Therefore, the decrease in the number and weight of the leaves along with the change in other characteristics of the leaves is the result of the depletion of nutrients in the roots of the plant affected by browsing.

135. Adaptive Responses of Fenugreek (*Trigonella foenuem-graecum* L.) as a Result of Repeated Short-Term Soil Drought and Subsequent Re-Watering

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Drought stress caused by above-optimal temperatures and water deficiency can adversely affect plant growth and diminish crop yields. This study aimed to test whether pre-exposure to drought stress can enhance subsequent drought responses in fenugreek. In this study, changes in various metabolites in the shoots of fenugreek plants were measured under short-term soil droughts of

varying intensity and subsequent irrigation. One-month-old fenugreek plants were grown in controlled conditions and divided into control plants (well-irrigated), primed plants (PP, primed by exposure to drought with PEG 5% or 10% application for 72 hours, re-watered for 10 days and then exposed to water depletion for 72 hours) and non-primed plants (NPP, well-watered for 43 days and immediately followed by drought as PP). Compared to the non-primed plants, primed plants showed an improvement in biomass production and improved photosynthesis parameters with a higher accumulation of photosynthetic pigments. PP group exposed to severe stress also had higher concentrations of total sugars and glycine betaine, which led to better water status maintenance. The stressed plants exhibited lower levels of oxidative stress markers, such as hydrogen peroxide, malondialdehyde, and antioxidant activity. The accumulation of total sugars was identified as a key component in the drought memory of fenugreek plants. However, confirmation of this suggestion requires metabolite profiling studies on a broader spectrum of fenugreek cultivars. Overall, this research suggests that fenugreek plants can benefit from early exposure to stress, enhancing their ability to cope with future drought conditions.

136. Comparison of the toxicity of sulfated salts (K_2SO_4 and Na_2SO_4) on the germination potential, growth and physiological parameters of second-generation rape seeds treated with K_2SO_4 and Na_2SO_4 salts

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The effect of different salts on the germination of plants is different and each salt has different toxicity. In this study, the effect of salinity stress of sulfated salts (Na_2SO_4 and K_2SO_4) on the growth and physiological parameters of second-generation canola plant seeds treated with salts (Na_2SO_4 and K_2SO_4) was investigated. The rate and percentage of germination were also lower in the concentration of 120 and 80 mM Na_2SO_4 compared to the same concentrations in the K_2SO_4 treatment. The speed and percentage of germination in roasted seeds treated with Na_2SO_4 was lower than roasted seeds treated with K_2SO_4 . Germination percentage in 120 mM Na_2SO_4 concentration was 19% less than 80 mM Na_2SO_4 concentration. Also, fresh and dry weight of aerial parts and roots were measured. The fresh weight of aerial parts was higher in concentrations of 40 and 80 mM K_2SO_4 compared to the same concentration in Na_2SO_4 treatment, and comparing the dry weight of aerial parts, the difference was insignificant. The fresh and dry weight of the shoots of the roasted seeds treated with these salts was higher than the fresh and dry weight of their roots. In general, the toxicity of Na_2SO_4 on the seeds of the second-generation roasts was higher than the toxicity of K_2SO_4 salt in similar concentrations. In a summary, the toxicity of Na_2SO_4 was higher with the presence of sodium element than K_2SO_4 , and its negative effects were the germination potential of second-generation roasts with these sulfate salts.

137. GC–MS profiling of volatile compounds of two Germander species, *Teucrium stocksianum* and *Teucrium polium* from Baluchestan area with a viewpoint on pinene production pathway

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Teucrium (Germander), a fairly large genus of the Lamiaceae, is a polymorphic and cosmopolitan genus of perennial plants, comprising more than 300 species mainly distribute in the Mediterranean area. This genus is rich in sesquiterpenoids, iridoids, diterpenoids (mostly neo-clerodane as chemotaxonomic markers), triterpenoids, and phenolic compounds with diverse pharmacological activity. In this study the chemical composition of the essential oils (EOs) obtained by hydrodistillation from the aerial parts of *T. stocksianum* and *T. polium* collected from Iranshahr in Sitan and Baluchestan province are reported. EOs were analyzed by GC-FID and GC-MS equipment. Thirty-two and nineteen compounds representing 93.7 and 95.6% of the total EOs were identified for *T. stocksianum* and *T. polium* respectively. α -pinene (36.83%), β -pinene (13.39%), trans- α -bergamotene (7.92%) and α -thujene (7.33%) were the main compounds of *T. stocksianum*. While α -pinene (37.52%) β -pinene (9.74%), D-limonene (5.92%), and (-)-caryophyllene oxide (4.23%) were dominant constituents of *T. polium*. According to the results, pinene (α and β) are the main compound of both species. This monoterpene prominently used in the production of fragrances, pharmaceutical products, and jet engine biofuels. Its production pathway starts with the C5 intermediates, isopentenyl pyrophosphate (IPP) and dimethylallyl pyrophosphate (DMAPP). These are condensed by the enzyme GPPS to form geranyl pyrophosphate (GPP), which is then cyclized by pinene synthase (PS) to produce pinene. This pathway can be engineered in microorganisms like *E. coli* to enhance pinene production.

138. Mycosporine-like amino acids (MAAs) profile in phytoplankton's of a mountain lake (Tar Tehran, Iran) and their temporal variations

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Biodiversity of phytoplankton reveal the ecological conditions of each ecosystem and phytoplankton in mountain lakes have different defense mechanisms in order to survive and protect against damage caused by ultraviolet radiations, especially UV-B. The most important defense mechanism is producing or accumulation of photoprotective metabolites, especially mycosporine-like amino acids (MAA) with different amounts at different times (depending on the intensity of radiation). In this research, the profile of mycosporine-like amino acids in the dominant colonial phytoplankton of Tar Lake was investigated during a 6-month period (spring and summer 1400). These compounds were extracted with 25% methanol and then the filtered extract was injected into the HPLC system for separation, identification and quantification. The dominant phytoplankton identified were *Dictyosphaerium pulchellum*, *Asterionella Formosa* and *Oocystis parva*, which had the highest proportion of biomass, and six MAAs including mycosporine-glycine, palythine, asterina, porphyrya-334, shinorine and palytinol were identified. The lowest concentration of these compounds was recorded in May and the maximum content was recorded in July. Among the identified mycosporine-like amino acids, mycosporine-glycine and porphyrya-334 exhibited the highest proportion. Finally, it was found that the phytoplankton of Tar mountain lake, like the phytoplankton of some other mountain lakes, for protecting their cells, synthesize a diverse group of mycosporine-like amino acids, and in the months when the ultra-violet radiation is strong and stressful or because the fish larvae feed on the phytoplankton and the water turbidity decreases, the biosynthesis of these compounds increase.

139. Secondary metabolites profile of *Zataria multiflora* cell cultures through biotic elicitation and their cytotoxic effects on MCF-7 cells

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Zataria multiflora is an important medicinal plant with antioxidant and anticancer properties, attributed to their phytochemicals. In the present study, the cell suspension cultures of *Z. multiflora* were made in liquid B5 medium and then treated with chitosan (0, 10, 20, and 40 mg L⁻¹) and yeast extract (0, 400, 800, and 1200 mg L⁻¹). The cells were treated at their logarithmic growth phase for 3 days and the contents of the major terpenoids and flavonoids were determined by high performance liquid chromatography (HPLC). The yeast extract and chitosan induced the production of caffeic acid, benzoic and 4-hydroxy benzoic acid, and epicatechin in the cells. Compared with chitosan, yeast extract increased the contents of gallic acid, vanillin, salicylic acid, catechin, carvacrol, and thymol (6.3, 4.4, 2.7, 2.1, 1.8, and 1.8 folds of their controls, respectively). Subsequently, the cytotoxicity of the cell extracts was evaluated on MCF7 cancerous cells by MTT assay. The IC₅₀ after elicitation with yeast extract was 0.97 mg mL⁻¹, significantly lower than that after chitosan elicitation, 3.5 mg mL⁻¹. In conclusion, the optimal concentration of chitosan and yeast extract could enhance secondary metabolites production.

140. Effect of melatonin treatment on chlorophyll content and chlorophyllase enzyme activity of broccoli

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Broccoli (*Brassica oleracea*) belongs of the Brassicaceae family. Due to being sensitive to transportation damage and moisture reduction, broccoli has a short storage life. Therefore, the purpose of this study is to investigate the effect of melatonin treatment on chlorophyll content and chlorophyllase enzyme activity after harvesting broccoli during storage. In this study Broccoli was divided into control and treatment groups and factorial experiment was conducted using a randomized completely design with three replications. After 30 minutes immersion in 100 μmol L⁻¹ as treatment and distilled water as control. Then it was kept at a temperature of 4°C for 4 weeks. In this research, the indicators of content of chlorophyll pigments, and chlorophyllase enzyme activity in weeks 0, 1, 2, 3 and 4 were evaluated after storage and with three repetitions. The results indicated that there was a significant difference ($p < 0.05$) in the content of chlorophyll a and b in different weeks of storage between the control and the melatonin-treated groups. The melatonin treatment can increase the content of chlorophyll a, b and total chlorophyll by suppressing the activity of chlorophyllase enzyme. So that, melatonin treatment led to a decrease in chlorophyllase enzyme activity, and this decrease in the fourth week in the melatonin-treated group was about 47.8% less than the control group. In general, post-harvest treatment with melatonin can be effective through increasing the content of chlorophyll pigments and also the effect on the activity of chlorophyllase enzyme on the shelf life of broccoli after post-harvest.

141. Influence of different pulsing treatment on rooting of *Ferula assa-foetida* medicinal plant explants under in vitro condition

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Ferula assa-foetida is a medicinal plant with numerous bioactive compounds, historically used in various Iranian regions since antiquity. Traditional propagation methods of this plant have many challenges, so in this research, was studied using tissue culture technique as an effective method. For investigating, at the first, seed culture of this plant was done under in vitro condition in test tubes. Then obtained stemlets, were prepared for different pulsing treatment for rooting experiments. Explants were immersed in solutions containing various IBA concentrations (1, 2, and 3 mg. L⁻¹, with 0.1 mg. L⁻¹ BA) for different durations (1, 2, and 3 minutes). After that, the explants were cultured in MS culture medium without any plant growth regulator and then transferred to growth chamber with photo period of 16/8 hr light/darkness and 25 °C. After 28 days, the results showed the pulsing treatment with 2 mg. L⁻¹ of IBA for 2 min had the highest rooting percentage (73.5%). These findings can be used in the development of tissue culture protocols for the mass production of *F. assa-foetida* and protection of this valuable medicinal plant. *F. assa-foetida* research can be focused on optimizing the cultivation conditions and transferring the plant to in vivo conditions.

142. The effect of nanopolyethylene phytotoxicity on the germination of tomato plant *Solanum lycopersicum* L. in hydroponic cultivation conditions

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This study investigated the morphological and physiological responses of tomato to soil contamination with polyethylene nanoplastics (0.01, 0.1, and 1 g/kg soil) at the vegetative growth stage. In this research, nano polyethylene (PE) was synthesized. The characteristics of nano polyethylene were determined by transmission microscopy (TEM). Nanoplastic pollution led to severe changes in plant organogenesis and morphogenesis in the vegetative phase. The phytotoxicity of nanoplastics was associated with a decrease in shoot and root biomass and an increase in root length. Abnormalities in germination caused by nanoplastic toxicity indicate significant genetic changes and meristem dysfunction. This study draws attention to the fundamental risks associated with soil contamination with nanoplastics. These findings raise concerns about the hazardous aspects of nanoplastics for agricultural ecosystems and food security. Micro-nanoplastics cause significant negative or positive effects on plants, depending on the characteristics and species of plants. This issue has become a global concern because microplastics are ecosystem pollutants that pose a new threat to the environment, human health and other life forms.

143. The effect of silicon on ionic Balance and plasma membrane depolarization in grapevine (*Vitis vinifera* L.) under salinity stress

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Silicon (Si) efficiently reduces the effects of salinity stress in plants and can increase salt tolerance in grapevine. However, the mechanisms by which Si develops salinity tolerance in grapevine and the influence of Si application on different grape genotypes under salt stress are not fully understood. A hydroponic study was conducted to evaluate the effects of Si on the dry matter, photosynthesis rate, sodium (Na⁺), chloride (Cl⁻) accumulation, and plasma membrane depolarization between two grape genotypes differing in salt tolerance: Chawga (salt tolerant) and AghUzum (salt sensitive). Salinity stress led to diminished photosynthesis rate, accumulation of toxic ions (Na⁺ and Cl⁻), disturbed ion homeostasis, and inhibited growth of both grape genotypes. The results showed that the Si supplementation significantly reduced salinity-induced toxicity, but its effect is genotype-dependent. The maximum salinity damage occurred at the highest accumulation of Na⁺ and Cl⁻ ions, which declined the plant photosynthesis rate and biomass of grapes. However, the ratio of Na⁺/K⁺ dropped under Si treatment at all salinity levels in both genotypes. Salinity stimulated plasma-membrane depolarization in Chawga and AghUzum, while Si supply reduced the intensity of plasma-membrane depolarization in both genotypes. These findings may benefit the development of new strategies to protect grapevines against salinity stress and provide the mechanism of Si-induced salt mitigation in different grape genotypes.

144. The influence of bio-climatic conditions on quantitative and qualitative of *Salvia* subg. *Perovskia* species volatile compounds

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Salvia subg. *Perovskia* are aromatic erect herbs that are used in Iranian folk medicine, especially for the treatment of cutaneous leishmaniasis. Climatic conditions affect qualitative and quantitative properties of plant essential oils (EOs). This work was designed to study the chemical composition of *S. abrotanoides* EO obtained from two different bio-climatic areas (according to multivariate statistical classification) belonging to medium semi-arid, very cold and relatively snowy (Chenaran in Razavi Khorasan province), and very arid, warm with windy and dust (Taftan in Sistan and Baluchestan province) regions of Iran. Both samples were investigated using GC-FID, and GC-MS methods, to evaluate phytochemical constitutions. The sample yields were in 1.3% and 1.1% content for essential oil of Chenaran and Taftan respectively. Altogether, 32 chemical compounds were identified in the essential oil with 1,8-Cineole (20.40%) and Camphor (25.30%) as dominant chemical metabolites. While geranyl acetate (55.64%), and 1,8-cineole (10.50%) were major constituents in *S. abrotanoides*-EO of Taftan region. It was observed that *S. abrotanoides* growing at semi- arid and cold such as Chenaran region had a higher quantity in camphor, and 1,8-cineol while those growing at the very arid, warm with windy and dust climate had a lower camphor (1.60 %) and 1,8-cineol quantity. According to findings, it can be concluded that quantitative and qualitative properties of *Salvia* sp. EOs are affected by bio-climatic conditions such as temperature, air humidity and wind speed.

145. The effect of melatonin on the physiological properties of *Catharanthus roseus* (L.) G. Don

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Melatonin (N-acetyl-5-methoxytryptamine) is an indoleamine molecule widely found in plants. Melatonin improves plant physiological processes due to its ability to inhibit strong free radicals and modulate plant signaling and response pathways through known mechanisms. *Catharanthus roseus* (L.) G. Don, belonging to the Apocynaceae family, has a special place in the list of medicinal plants. In this study, the effect of different concentrations of melatonin (0, 50, 100, and 200 $\mu\text{mol.L}^{-1}$) on growth and physiological parameters of in-vitro cultured seedlings of *Catharanthus roseus* was investigated. For this purpose, 30 days old seedlings were treated with melatonin in a completely randomized design with three replications and harvested after one week. Melatonin treatment had a significant effect on all studied traits. According to the obtained results, melatonin caused an increase in seedling biomass, chlorophyll content, proline levels, protein content and the activity of antioxidant enzymes such as superoxide dismutase (SOD), peroxidase (POD), and catalase (CAT). Melatonin treatment also reduced the content of hydrogen peroxide (H_2O_2) and malondialdehyde (MDA), which can help to increase the plant's defense capacity against oxidative stresses. Melatonin reduces reactive oxygen species and thus prevents damage to cell membranes and other organelles. Overall, the application of melatonin at appropriate concentrations had an effective role in the quantitative and qualitative growth of *Catharanthus roseus*. The greatest effect was observed with melatonin concentrations of 50 and 100 $\mu\text{mol.L}^{-1}$.

146. Effect of zinc oxide- and titanium dioxide-nanoparticles on some biochemical parameters of grape cv. Sultana under cadmium toxicity

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In order to study the effect of zinc oxide- and titanium dioxide-nanoparticles on white grape (cv. Sultana) seedlings under Cd stress, a factorial experiment was conducted based a completely randomized design with three replicates. The first factor was cadmium stress at three levels (0, 50 and 100 mg/kg soil) and the second factor was the spraying of the nanoparticles of zinc oxide and titanium dioxide at 3 levels (0, 50 and 100 mg L^{-1}). The results showed that cadmium stress significantly increased the total phenol, proline and total soluble carbohydrate. Foliar application of zinc oxide- and titanium dioxide-nanoparticles improved biochemical characteristics, including total phenol, proline and total soluble carbohydrate under cadmium stress. The highest amount of total phenol and total carbohydrate was observed at the level of 100 mg titanium nanoparticles and the highest amount of proline was observed at the level of 100 mg zinc nanoparticles. Based on the results of this research, it seems that foliar spraying the nanoparticles of zinc oxide and titanium dioxide (especially at the concentration of 100 mg L^{-1}), can improves the biochemical under cadmium stress, and increases plant tolerance to harmful effect of this toxic metal in grape cv. Sultana.

147. Effect of chitosan nanoparticles and salinity on the activity of some enzymes antioxidants in *Zea mays* L.

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Sodium (Na^+) ion cytotoxicity, high osmotic pressure of soil solution, oxidative stress, and impaired membrane integrity are major cytotoxicity risks associated with salinity stress that threaten the food supply for the rapidly growing world population. Our main goal of this research is to determine the best concentration of chitosan nanoparticles (CSNPs) (among 0, 0/05, 0/1 g/l

concentrations) against salinity stress (in 0, 0/07, 0/14 gr/kg soil stages) to improve the agriculture industry. To check the effect of CSNPs against salinity stress we have used a leaf of (*Zea mays* L.). The ascorbate peroxidase (APX) enzyme activity was compared with catalase (CAT) and phenylalanine ammonia lyase (PAL) enzymes activity. In this research the effect of CSNPs 50 nm with spray on (*Zea mays* L.) in the above concentration of nanoparticles and above salinity stages checked out. This experiment was done by spectrophotometry. In all data in statistical analyses, the mean differences were statistically evaluated based on Tukey's multiple range test at $P \leq 0.05$. Respectively the maximum amount of PAL, CAT and APX enzymes activity was observed with salinity and CSNPs higher by an average of 77.6% than that of the control group (in PAL), in the salinity 0.07 gr/kg soil and CSNPs 0/1 g/l (in CAT) and significantly in CSNPs at the 0/1 g/l concentration (in APX). This study showed us which treatments increase behaviors of enzyme activity, following the application of CSNPs to mitigate the symptoms of toxicity caused by salinity in the maize seedlings.

148. The effect of acorn weight on germination, survival and growth of Persian oak (*Quercus brantii* Lindl.) seedlings (Case study: Harsam village, Islamabad Gharb city)

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Persian oak (*Quercus brantii* Lindl.) is one of the valuable species of Zagros forests, which is the dominant species in the forests of Kermanshah province. The present study was conducted with the aim of investigating the effect of Persian oak seed weight on some characteristics of oak seedlings, i.e. height growth rate, collar diameter and number of leaves of seedlings in Kermanshah province. To carry out this research, a number of seeds were collected from the forest area of Hamil sector in Islamabad city. Next, the weight of the collected seeds was measured and in three groups (treatments): heavy seeds (greater than 15 grams), medium (10-15 grams) and light seeds (less than 10 grams) in the form of a completely random design in the greenhouse of the Agriculture and Natural Resources Campus. Razi University in December 2023 each was planted in three rows. In June 2023, the quantitative traits of greened seedlings such as collar diameter (mm), height of seedlings (cm) and the number of green leaves were measured. After collecting the required information, statistical analysis was done. The results of the test using one-way analysis of variance showed that the effect of seed weight on some quantitatively measured traits was significant at the 99% confidence level ($P < 0.01$). The results of comparison of averages using Duncan's test showed that the seedlings grown from heavy seeds had the highest and the seedlings grown from light seeds had the lowest collar diameter and height. The results of examining the relationship between the measured variables and the weight of oak seeds using the Pearson correlation test showed that there is a positive and significant statistical relationship between the weight of the seeds and the diameter of the collar and the height of the sprouted seedlings, but there is no relationship between the number of leaves of the sprouted seedlings and the weight of the seeds. There was no statistical significance at the 95% confidence level. According to the results obtained in this research, it can be seen that the weight of the oak seed has a more appropriate effect on the diameter and height growth as well as the number of leaves of oak seedlings from a statistical point of view.

149. The Effect of Seed Priming with Sodium Hydrosulfide (NaHS) on Enhancing Alkaline Stress Tolerance in *Lallemantia royleana* (Balangu Shirazi)

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Soil alkalinity is one of the limiting factors for plant growth and performance in arid and semi-arid regions. The plant *Lallemantia royleana*, known in Iran as Balangu Shirazi, possesses numerous medicinal properties. This experiment investigated the effect of seed priming with sodium hydrosulfide (NaHS) on improving alkali stress tolerance in Balangu Shirazi. For this purpose, the seeds were divided into three groups. The first group was incubated in distilled water, the second group in a 0.25 mM NaHS solution, and the third group in a 0.5 mM NaHS solution for 24 hours, and then planted. Treatment continued 20 days after germination with a 15 mM Na₂CO₃ solution and pH=10.84 for 24 hours. The experimental groups included: 1) Control (distilled water), 2) Alkaline stress (Na₂CO₃), 3) Priming with different concentrations of NaHS, and 4) Alkaline stress + priming with different concentrations of NaHS. Data analysis results indicated that alkaline stress led to increased accumulation of malondialdehyde, hydrogen peroxide, and proline, and priming with 0.5 mM sodium hydrosulfide significantly reduced their accumulation compared to conditions without priming. Sodium hydrosulfide significantly reduced oxidative damage under alkaline stress conditions. In conclusion, seed priming with sodium hydrosulfide enhanced the tolerance and adaptability of Balangu Shirazi to alkaline stress.

150. The ameliorative effects of Selenium dioxide (SeO₂) seed priming against alkaline stress in dragon's head (*Lallemantia royleana*)

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Considering the destructive effects of alkaline stress in soils, the present study aimed to investigate the effect of seed priming with selenium dioxide (SeO₂) on improving tolerance to alkali stress in *Lallemantia royleana*. The seeds were divided into 5 groups. The first group was incubated in distilled water solution and the second to fifth groups were incubated in 25, 50, 100 and 150 μ M selenium dioxide (SeO₂) solutions for 24 hours, respectively. Treatment was performed 5 weeks after germination and continued for 12 hours. The experimental groups consisted of: 1) control (distilled water), 2) alkaline stress (15 mM Na₂CO₃), 3) priming with different concentrations of SeO₂ and 4) alkaline stress + priming with different concentrations of SeO₂. The data analyses showed that alkaline stress led to an increase in the amount of malondialdehyde, hydrogen peroxide and proline, and the use of 150 μ M SeO₂ improver significantly reduced the amount of these factors in the plant to the lowest level (P<0.05). As a result, seed priming with SeO₂ increased the tolerance to alkaline stress in dragon's head plant.

151. Osmotic stress shifts production of carbohydrates and proline towards the accumulation of lignans in *Linum album* cell culture

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Linum album contains lignin compound podophylotoxin and 6-methoxy podophylotoxin, which are used as precursors of 3 important anti-cancer substances etoposide, etopophos and teniposide. The aim of this study was to evaluate the effect of different concentrations of polyethylene glycol (PEG 6000) (0, 2.5, 5, 7.5 and 10%) on lignan production and its metabolic relationship with free sugars and proline in *Linum album* cell culture. The results showed that in present of 2.5 and 7.5% PEG the content of rhamnose/xylose, glucose and mannose were increased compared to the control. These compounds provide energy source and carbon skeleton for the biosynthesis of amino acids such as proline. The results also indicated that different concentration of PEG led to

an increment in proline compared to the control. Eventually, osmotic stress induces the production of podophyllotoxin and 6-methoxy podophyllotoxin, that the highest amount of these compounds was obtained at 7.5% PEG treatment. Consequently, it can be suggested that the osmotic stress redirects the dynamics of carbohydrates and proline towards the accumulation of lignans in *Linum album* cell culture.

152. The effect of heat stress on the content of amino acids in sensitive and resistant varieties of flax plant

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Changes in 14 amino acids in response to heat stress (37°C) were investigated using HPLC in flax plants. The contents of aspartic acid, glutamic acid, histidine, alanine, tyrosine, methionine, valine, phenylalanine, isoleucine and leucine were significantly increased after the plants were placed at 37°C for 72 hours in the sensitive cultivar TN-97-2. decreased to control (25°C). However, heat treatment increased the amount of serine (21.91%) and proline (25.69%) amino acids. The contents of glutamic acid, proline, tyrosine and methionine after heat treatment in the tolerant cultivar TN-97-290 increased significantly compared to the control and the content of amino acids decreased. In our experiment, the tolerant cultivar TN-97-290 showed a different response to heat treatment, which was observed in the amino acids arginine, valine, phenylalanine, isoleucine, leucine and lysine, which were reduced in the flax leaves. Plants that are under stress usually increase proline and other amino acids in them. Accumulated amino acids act as osmolytes, regulating ion transport, opening stomata and detoxifying heavy metals. They also affect the synthesis and activity of some enzymes, gene expression, and homeostasis of reductases

153. The effect of chloride and sulfate salt stress on the activity of antioxidant enzymes, the content of hydrogen peroxide and malondialdehyde in Canola

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Salinity is a major environmental problem in agriculture and serious threat to the growth, yield of plants and the quality of agricultural products. Two groups of chloride and sulfate salts are the main factors influencing salinity stress in agricultural lands In present study, a field experiment was conducted as a factorial in a randomized complete design with three replications. Seedlings in 5-6 leaf stage treated with chloride salts (NaCl and KCl) in concentrations of 80, 160 and 240 mM and sulfate salts (Na₂SO₄ and K₂SO₄) in concentrations of 40, 80 and 120 millimolar were cultured. The results showed amount of malondialdehyde and hydrogen peroxide was highest in shoots and roots of the plants treated with Na₂SO₄ at a concentration of 120 mM and lowest in the plants treated with KCl at a concentration of 80 mM. Also, activity of superoxide dismutase enzyme was highest in shoots and roots of plants treated with Na₂SO₄ at a concentration of 120 mM and lowest activity in treatment with KCl and NaCl at concentration of 80 mM. While activity of peroxidase enzyme was lowest in both shoots and roots of plants treated with Na₂SO₄ at concentration of 120 mM. In stress caused by Na₂SO₄ salt, a high increase in activity of superoxide dismutase enzyme and a decrease in activity of peroxidase enzyme were accompanied by a significant increase in hydrogen peroxide in canola. In fact, results showed Na₂SO₄ salt at concentration of 120 mM caused greatest toxicity compared to other salts in canola plants.

154. Genetic diversity shapes antioxidant reactions in *Dunaliella salina* under selenium-enriched condition

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The investigation of molecular, physiological, and genetic responses to selenium toxicity and selenium stress in plants and algae has recently been conducted. This study focused on analyzing the antioxidant and enzymatic responses of two strains of *Dunaliella salina* (Gavkhooni and Maharloo) to varying concentrations of sodium selenite (ranging from 0 to 2 mg/L). The findings indicated that at lower concentrations of sodium selenite (up to 1mg/l), there was an increase in total antioxidant levels, proline content, and enzyme antioxidant activity, particularly catalase and ascorbate peroxidase, leading to enhanced cell division in both strains. However, when selenium concentration exceeded 1mg/l, the activity of superoxide dismutase, catalase, ascorbate peroxidase, and total antioxidant enzymes decreased in both Gavkhooni and Maharloo strains. Treatment with 2mg/l sodium selenite resulted in a significant increase in electrolyte leakage by approximately 98% and 62% in Gavkhooni and Maharloo strains, respectively. Moreover, at this concentration, the levels of MDA rose by 45% and 31% in Gavkhooni and Maharloo strains, respectively, correlating with reduced growth in environments with high selenium concentrations. Notably, the cell division rate of the Gavkhooni strain was significantly higher than that of the Maharloo strain under low selenium levels. The study identified the threshold limit of selenium concentration for optimal growth of *Dunaliella salina* to be around 1mg/l. Overall, the results suggest that improved cattle growth at low selenium levels may be attributed to the enhanced antioxidant capacity of total antioxidant, enzymatic, and non-enzymatic components.

155. Effects of arginine treatment on the tomato fruit

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The tomato plant (*Solanum lycopersicum* L.) belongs to the Solanaceae family. It is very important to maintain and increase the storage period and shelf life of tomato fruit due to its perishable nature. Extending the shelf life of tomato is very important to maximize its commercial value. The objective of this study was to investigate the effects of arginine treatment on the physiological characteristics of tomato fruit during the storage period. Tomato fruits were treated with exogenous arginine by immersing them in solutions containing concentrations of 0 (control group) and 2 mM of Arginine (treatment group) for 15 minutes at 20°C. During this storage period. Throughout the storage period, the study involved assessing multiple parameters of the tomato fruits on specific days, namely 0, 7, 14, 21, and 28. The results of this study revealed arginine treatment significantly reduces weight loss percentage, so that by the end of the storage period (28 day), the control sample had lost 7.3% of its weight, whereas the fruits treated with 2 mM arginine had lost only 3.71%. By the end of the storage period, the electrolyte leakage of the control sample had reached 43%, while the electrolyte leakage of the 2 mM arginine treatment sample had only reached 31%. the arginine treatment led to reductions of 22.9%, 63.54%, and 49.74% in malondialdehyde content compared to the control sample on days 14, 21, and 28 of storage, respectively. In summary, the findings of this study show that arginine treatment can be used to reduce chilling stress and thus increase the storage period of tomato fruit.

156. The effect of different selenium concentrations on growth and some physiological parameters of mustard plant

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Selenium, as an essential micronutrient, plays a significant role in regulating various biological processes in plants. However, high concentrations can lead to toxicity. This study aims to investigate the effect of different selenium concentrations on growth and some physiological parameters of the mustard plant (*Sinapis arvensis*), known as a selenium accumulator. For this purpose, mustard seeds were collected and planted in pots under controlled conditions. After reaching the four-leaf stage, the seedlings were treated with 0, 10, 20, and 30 mg/L sodium selenate for three weeks. Growth parameters, total phenolics, total flavonoid, and proline content were then measured. The results showed that with increasing selenium concentration, shoot length, fresh weight, and dry weight significantly decreased compared to the control. It was also found that total phenolics content increased only at 20 mg/L, while total flavonoid content significantly increased at 30 mg/L selenium. Proline content in the shoots increased significantly at all selenium concentrations compared to the control, with the highest level observed at 20 mg/L. It appears that different selenium concentrations activate varying defense responses in mustard plants, with 30 mg/L potentially causing the most stress.

157. The Effects of Different Salinity Levels on the Anatomical Traits of Spinach Plants (*Spinacia oleracea* L.)

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Salinity is one of the most important abiotic stresses worldwide, especially in arid and semi-arid regions, adversely affecting the growth, performance, and quality of plants. In recent years, the mechanisms of plant resistance to salt stress have received attention. In this study, the anatomical traits of spinach (*Spinacia oleracea* L.) were investigated under 0, 50, 150, 250, and 350 mM NaCl concentrations, with a 12 h light/12 h dark cycle at a temperature of 25±5°C, in a completely randomized design with three replications. The results showed that root diameter, root stele diameter and root cortex thickness decreased with increasing salinity. Since root characteristics affect water conduction and movement, this indicates a balance between root diameter and adaptation to changing conditions. Similarly, stem diameter, xylem vessel diameter of the stem, diameter of the leaf midvein, and xylem vessel diameter within the midvein decreased with increasing salinity. Additionally, the results revealed that the thickness of the palisade parenchyma increased at 250 and 350 mM NaCl, while the intercellular space of the spongy parenchyma decreased. Hence, the palisade parenchyma plays a greater role in the increased leaf thickness compared to the spongy parenchyma. The findings of this study suggest that anatomical changes may function as mechanisms of plant adaptation to salinity. Given that these changes in the plant are related to osmotic and ionic stress, it is recommended to investigate the alterations in the balance of ions such as Na⁺, K⁺, and Ca²⁺.

158. Effect of different concentrations of sodium chloride on growth, photosynthetic pigments and astaxanthin content in the green algae *Scenedesmus obliquus*

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Chlorophyta or green algae are one of the most numerous, scattered and morphologically diverse branches of algae. Green algae *Scenedesmus obliquus* is also from Chlorophyta, which inhabits freshwater and is a biological indicator of these environments. The cells of this algae are non-motile and lack flagella and sometimes form a colony. Salinity stress is one of the most important stresses that algae endure. Based on previous studies, the increase in sodium chloride level in the

algae cultivation environment has caused an increase in lipid content and an increase in saturated and unsaturated fatty acids. In this study, the effect of salinity stress on cell growth, astaxanthin content and photosynthetic pigment amounts in *Scenedesmus obliquus* algae was studied. For salinity stress, BG11 culture medium with 0, 150, 250 and 350 mM NaCl concentrations was used. In order to grow algae better, they were cultured on a shaker at 95 rpm in a culture chamber and under intense aeration, with a light intensity of 200 $\mu\text{mol photons/m}^2/\text{s}$ and a light protocol of 16 hours of light and 8 hours of darkness at a temperature of 23 ± 2 degrees Celsius were kept. Growth (number of cells), photosynthetic pigments and astaxanthin content were measured during 14 days. Algae growth increased in the concentration of 150 mM NaCl and decreased in the concentration of 250 and 350 mM. The lowest amount of photosynthetic pigments was observed in the concentration of 350 mM NaCl and the highest in the control samples. Meanwhile, the content of astaxanthin increased in these stresses. And in the concentration of 350 mM NaCl, the highest amount of astaxanthin was observed. The results show that NaCl in the applied concentrations caused a significant decrease in algae growth. But in the same proportion, it increased the amount of astaxanthin to deal with these tensions. Also, the reduction of photosynthetic pigments indicates the low resistance and lack of adaptation of this algae species to high salinity.

159. Effect of *Pergularia tomentosa* L. on hair removal of sheep skin

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This study aimed to evaluate the *P. tomentosa* activities on hair removal from sheep skin. *Pergularia tomentosa* L. is a member of the Asclepiadaceae family and is a medicinal plant. Skin tissues of the control and treated groups were taken (1×1 cm) and sections were fixed in 10% formalin. The tissues were dehydrated in ascending concentrations of ethanol and cleared in xylene. The tissues were embedded in a paraffin block and then sectioned (5 μm) were made using a rotary microtome. Slides were stained in hematoxylin and eosin (H&E), and mason trichrome staining was examined under the light microscope. All skin layers including the epidermis, skin appendages, and papillary and reticular layers were healthy in the control group of sheep skin. In the root and leaf group, sheep skin's epidermis and hair follicles were lost; in some, only a remnant of follicles remained. In Mason's trichrome staining, collagens of the reticular layer were well stained, which indicates the preservation of the natural structure of the reticular layer of the skin after using the roots and leaves of the plant. The extract of *P. tomentosa* is a combination of many cardenolide glycosides, and the hair removal activity of its extract is related to these compounds.

160. Effect of methanol foliar application under drought stress on crop growth rate and net assimilation rate in soybean

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In order to investigate the effect of methanol spraying solution and drought stress on the crop growth rate (CGR) and net assimilation rate (NAR) of soybean, a factorial experiment was conducted in the form of a completely randomized design with three replications. Drought stress including irrigation after 40, 60 and 70% of available moisture discharge as the main factor and methanol foliar spraying including no foliar spraying (control) and foliar spraying with 7, 14 and 21% by volume of methanol are considered as secondary factors. The results of the research showed that there significant difference between levels of methanol in the growth rate and net assimilation rate. They showed an increase with the increase in the use of methanol. Therefore, according to the obtained results, it can be concluded that methanol improved the plant's resistance to drought stress.

161. Impact of foliar nano-potassium on growth and photosynthetic properties and induction of salinity stress tolerance in Peppermint

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One of the most significant environmental issues affecting plant growth and yield is soil salinity. Peppermint, belonging to the Lamiaceae family, is a highly utilized herb with numerous applications in the cosmetic, food, and pharmaceutical sectors. Hence, it is crucial to discover novel approaches for enhancing development and increasing tolerance to salinity. The present research was conducted on Peppermint plants to evaluate the effects of potassium nanoparticles (0 and 0.1 mg.ml⁻¹) at different levels of salinity stress (0, 50, 100, and 150 mM NaCl). The experiment complied with a factorial arrangement based on a completely randomized design with three replications. The most significant decrease in fresh and dry weight of shoot (43.79%, 28.12%), fresh and dry weight of root (79.9%, 25.83%) was observed in 100 mM and 150 mM NaCl, respectively. Also, the parameters of shoot and root length and relative chlorophyll content showed the greatest decrease (14.56%, 77.66%, and 12.43%) at 150 mM salinity. The lowest relative content of leaf water (9.9%), chlorophyll a (3.2%), chlorophyll b (2.7%) and carotenoids (2.43%) were observed at 50 mM salinity. But stomatal conductance and chlorophyll fluorescence (7.714%, 1.34%) were the lowest at 100 mM salinity. According to the findings of this study, the application of potassium nanoparticles improved tolerance to salinity stress in peppermint plants, in addition to enhancing growth and photosynthetic parameters.

162. The impact of nano copper on salt-exposed guava (*Psidium guajava* L.) plants

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Guava, due to twice bearing season, is an economic fruit crop in tropical regions. Since salinity is one of the destructive stresses on the growth of guava, providing a suitable method to reduce its detrimental impacts can be effective. Nanomaterials are of interest in agriculture mainly as nano-fertilizers. Copper, as a micro element, presents in the structure of important plant enzymes and plays a role in electrons transfer. There is no report on improved salinity tolerance through treatment with nano-Cu in guava. Therefore, the aim of this research is to survey the effects of salinity and Cu nano-fertilizer on biochemical traits of guava plant. The experiment was carried out as a factorial in completely random design in three repetitions. Twelve-month-old guava seedlings were cultivated in plastic pots. Sodium chloride (0, 5, 7.5 and 10 dS/m of salt) was considered as salinity treatment. Foliar treatment with nano- Cu (0, 10, 20 and 40 ppm) was applied twice. Eight weeks after the end of salinity, leaf total chlorophyll and carotenoid content, relative water content, proline and chlorophyll fluorescence were measured. Based on findings, the lowest total chlorophyll was belonged to 10 dS/m salinity and absence of nano-Cu treatment. The 20 and 40 ppm of nano-Cu increased total chlorophyll. The 10 dS/m of salinity caused an 25% reduction of carotenoids compared to no-salt treatment. The 20-ppm nano-Cu caused a 14.5% boost in carotenoid. Also, the 7.5 and 10 dS/m of NaCl caused 15.5 and 24.3% decline in leaf relative water content. Treatment with nano-Cu boosted the parameter about 7.5%. Enhanced salt levels and foliar spray with nano-Cu, both caused an improvement in proline content. Moreover, the highest chlorophyll fluorescence was obtained in plants under the absence of salt and sprayed with 20 and 40 ppm of nano-Cu. Among the nano-Cu treatments, under 7.5 and 10 dS/m salinity conditions, 20 and 40 ppm of nano-Cu had the most significant positive effect on the studied parameters.

163. Iron nanoparticle improves physiological responses in canola plants under drought stress

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Drought stress is a major abiotic stress that negatively impacts plant growth and crop production. Among various techniques used to alleviate drought stress in plants, nanoparticle (NP) application is considered to be effective and promising. The present study was designed to highlight the role of iron NP on physiological responses in drought-stressed canola. Plants were subjected to drought stress (0, 5, 10 and 15% PEG) and iron NP (1.5 and 3 mg/L). Drought stress reduced growth parameters in canola plants, whereas iron NP mostly stimulated growth of stressed plants, which was accompanied by strengthening in defense mechanisms. Iron NP enhanced compatible osmolytes such as by protein, proline and soluble sugar contents. The iron NP application induced the enzymatic defense system (catalase and polyphenol oxidase) and promoted the non-enzymatic antioxidants (phenol, flavonol and flavonoid). Enzymes of Krebs cycle, namely aconitase and succinate dehydrogenase, were induced by iron NP in canola plants grown under drought conditions. These results recommend a multifaceted involvement of iron NP, through regulation of activity of antioxidant enzymes and respiratory enzymes, osmoregulation and secondary metabolites metabolism, in response to drought stress.

164. The effect of naphthalene aromatic hydrocarbon on the antioxidant total phenol of purslane root and stem

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Aromatic hydrocarbons are one of the most common groups of persistent organic pollutants that cause oxidative stress in plants. Naphthalene is one type of aromatic hydrocarbon with low molecular weight, which is increasing every day. Purslane with the botanical name *Portulaca oleracea* L. belongs to the *Portulacaceae* family. Having a strong antioxidant system, this plant can fight the toxic effects of naphthalene. First, purslane seeds were cultivated in the seedling tray, then transferred to the hydroponic medium. Finally, in order to determine the effect of naphthalene on the antioxidant total phenol of purslane roots and stems, the plants were subjected to three levels of naphthalene concentrations including 15 mg/l (weak), 30 mg/l (moderate) and 60 mg/l (severe) for 10 days. Each had 4 repetitions. Folin-Ciocalteu method was used to measure total phenol. The amount of total phenol in the control, weak, mild and severe root stresses was 0.344, 0.457, 0.552 and 0.254, respectively. The amount of total phenol in the control, weak, mild and severe stress of the stem was 0.767, 0.887, 0.944, and 0.733, respectively. The results show that the amount of total phenol increases significantly, at 5 percent level in both the root and the stem under weak and moderate stress compared to the control, but decreases significantly, in severe stress. Therefore, the plant was able to resist the stress in weak and medium concentration with the increase of total phenol, but in severe stress, the stress conquest the metabolism of plant.

165. Taxonomy of the Subfamily Dipsacoideae of the Family Caprifoliaceae in Iran

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Dipsacoideae subfamily belongs to Caprifoliaceae family and Dipsacales order. Dipsacoideae has about 150 species of biennial or perennial plants and shrubs classified in 14 genera distributed in Europe, Asia and Africa. Some species are ornamental and some are known sources of herbal medicine. In the flora of Iran, this subspecies has 5 genera (*Dipsacus*, *Knautia*, *Cephalaria*, *Pteroccephalus* and *Scabiosa*) and 54 species. To carry out this research, herbarium studies and detailed examination of morphological characters were carried out. Also, about 150 plant samples

from different regions of Iran were collected and identified. herbarium specimens were also prepared and kept in the herbarium. The purpose of this research is to investigate the taxonomy of this subfamily and to determine its exact key in order to determine the species limits. The morphological similarities and high diversity among the species, especially the calyx and fruit characters, have been discussed. Therefore, the classification and genealogy of species in this subfamily has changed significantly over time. This subfamily contains 6 genera in Iran. Some species of Scabiosa (*L. caucasica* and *L. olivieri*) have been included in the genus *Lomelosia*. About 9 species are endemic to Iran. In this study, the description of the studied genera and species is given along with the distribution and status of the taxon.

166. Bioinformatic Analysis of Nonribosomal Peptide Synthetase Gene Clusters in Six Pathogenic Species of *Colletotrichum*

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Identifying the genes responsible for enzyme codification is crucial for understanding various mechanisms of pathogenicity and/or virulence. With next-generation sequencing technology, complete genomes enable access to the genes encoding enzymes for biosynthesis of specialized metabolites produced by non-ribosomal peptide synthetase (NRPS), which are clustered in biosynthetic gene clusters (BGCs). BGCs are groups of genes responsible for producing a specific metabolite lie near each other in the genome. Ascomycetes fungi are the leading producers of natural products. We identified and compared NRPS genes and clusters among six pathogenic species of *colletotrichum* including *C. fruticola*, *C. gloeosporioides*, *C. nymphaeae*, *C. siamense*, *C. graminicola* and *C. orbiculare* using a comparative genomics approach. The results of this research show the similarity of the main genes in one NRPS in *Trichoderma virens* with 6 NRPS including *C. orbiculare* (NRPS8), *C. gloeosporioides* (NRPS7), *C. fruticola* (NRPS8), *C. nymphaeae* (NRPS1), and *C. graminicola* (NRPS5). The NRPS products of *T. virens* fungus were hydroxamate-type siderophore freechrome peptide synthetase, which enables the absorption of iron from the surrounding environment. Therefore, the predicted products of biosynthetic gene clusters containing CnNRPS1, CgrNRPS5, CoNRPS8, CgNRPS7, CfNRPS8 and CsNRPS8 genes may be siderophores.

167. Analysis of the stability of reference genes in different growth stages of the basil (*Ocimum basilicum* L.) using Real-Time PCR technique

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Medicinal plants are a primary and rich source of various secondary metabolites, which are of great importance in the field of healthcare. Basil plant is of interest due to its phenylpropanoid compounds, and several studies have been conducted in the field of isolating and investigating the expression of biosynthesis genes of this group of metabolites. The use of real-time PCR as a powerful technique in investigating gene expression requires the availability of reference genes with high stability of expression in different conditions. Considering the different pattern of gene expression in different growth stages, in the present study, the expression pattern and stability of six widely used reference genes (ACTIN, EF-1 α , β -Tubulin, HSP, GAPDH and 18SrRNA) in the four-leaf, the beginning of flowering and the complete flowering stages of the basil plant was evaluated. After performing the real-time PCR reactions, the stability of the studied reference

genes were subjected to statistical analysis. The results showed that the 18SrRNA gene had the highest stability in the four-leaf stage and full flowering and the ACTIN gene in the beginning of flowering. In general, using the obtained ranking, it was found that ACTIN, 18SrRNA and EF-1 α genes have the highest stability, respectively. Finally, it seems that ACTIN reference gene is a suitable option for data normalization in real-time PCR method for basil plant.

168. Bioaccumulation of sunscreen metabolites and antistress carotenoids in the Copepods of Neor Lake (Ardebil, Iran)

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Zooplankton have developed various strategies to diminish potential damage from solar ultraviolet radiation (UVR), including the biosynthesis of mycosporine-like amino acids (MAAs) as UV absorbing metabolites and carotenoids as protective metabolites against oxidative stress. Therefore, in this research, it was considered to identify the Copepods of the Neor as a shallow mountain Lake (2700 meters above sea level) for investigating the qualitative/quantitative composition of carotenoids and mycosporine-like amino acids. Zooplanktons were collected during six field sampling program in spring and summer of 2020. In order to perform HPLC analysis, the extracted methanolic extract was concentrated, dried, and before injection the dry extract was resuspended and dissolved in 25% methanol. The most abundant identified Copepods were: Cyclops latipes, Cyclops venustus, Cyclops exilis, and Cyclops magnus, respectively. Two mycosporine-like amino acids, shinorine and Porphyrin-33, were identified in these Copepods, and it was determined that 95% of the total amount of extracted mycosporine-like amino acids belongs to shinorine. The highest concentrations of mycosporine-like amino acids were recorded in the months of June/August, while the lowest amount was observed in July. The levels of carotenoids (astaxanthin) during all sampling sessions and months were approximately double the measured amounts of MAAs, and different from MAAs, the highest carotenoid levels were measured in (July/August) with the lowest concentration observed in (August). The results of this study indicate that the copepod population in Lake Neor primarily relies on the accumulation of carotenoids to minimize damage from ultraviolet radiation.

169. Tolerance and accumulation of aluminum in *Lamium album* and *Mentha aquatica*, two species from acid soils of tea gardens

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Aluminum (Al), as the third most abundant element in the earth's crust, is not available for plant roots. Under low pH conditions in soil, however, the levels of free Al (Al³⁺) increases in the soil solution causing toxicity to plants. In this research, for the first time, water mint (*Lamium album* L.) and white nettle (*Mentha aquatica* L.) were collected from acid soils of tea gardens (Guilan province), and after rooting and adaptation with growth chamber conditions, were treated with three Al levels (0, 50 and 400 μ M) (pH 4.0) for four weeks. Plants biomass was improved by low Al level (50 μ M) in white nettle, but not in water mint. The leaf photochemical parameters, chlorophyll and carotenoids levels, nitrate assimilation and protein synthesis, all were improved under these conditions in both species. Exposure of plants to higher concentration of Al (400 μ M), in contrast, impaired growth of both species. Despite elevated activity of antioxidant enzymes, an increased level of ROS and damages to membranes implied an oxidative stress under these conditions associated with reduction of nitrate assimilation and enhanced lignification. Plants

grown for eight weeks under these conditions, showed Al accumulation in the old leaves in the range of Al hyperaccumulating species. Our data indicated a high adaptation to low pH and Al³⁺ phytotoxicity, characteristics for the soil of their natural habitat.

170. Anatomical changes of root and stem tissues in hyssop under drought stress

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"Zoofa" is the Persian names for *Hyssopus officinalis* L. belongs to the family Lamiaceae, and is one of the endemic species in Iran. Drought stress, one of the most common abiotic environmental stresses, which have adverse effect on growth and development of plants. The aims of this study is find out the changes in the anatomical characters of root and stem of Zoofa under drought stress conditions. This study was carried out at the greenhouse of the Faculty of Science, Razi University. Plants were cultivated for four weeks in perlite: sand and irrigated with Hoagland nutrient solution, then drought stress was applied with three different concentrations (0, 7 and 14 days of irrigation). Microscopic sections from plant tissues were prepared, stained with Carmen Zaji and Methylene Blue solutions, and studied using Olympus light microscopy. The results showed that in the roots and shoots, drought stress reduced the thickness of sclerenchyma tissue and cell walls. However, in the roots the lignin of the root's epidermal cell walls was increased. In stems, drought stress reduced the thickness of the xylem and phloem. Reducing of chlorenchyma tissue area and ground parenchyma tissue cell size were also seen. According to the results, the structural changes have a significant effect on increasing the adaptation and tolerance of the hyssop plant to drought stress.

171. Changes in photosynthetic pigments of *Calothrix* and *Microcheate* under nutritional stress

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Cyanobacteria as key candidates in algal bloom and nitrogen fixation are important in ecosystems. Considering the increase in salinity and the enrichment of groundwater with nitrogen fertilizers, an experiment was conducted on the growth and changes of photosynthetic pigments of two cyanobacteria *Calothrix* and *Microcheate*. For this purpose, ammonium (urea at 1 and 5 mM (with 25 mM salinity)), nitrate (sodium nitrate at a concentration of 5, 25, 50, and 100 mM (with 50 mM salinity)), and Na⁺ (NaCl at 25, 50, and 100 mM (without nitrogen source) along with control were treated on cyanobacteria during the 2-week growth period. Salinity higher than 50 mM showed a stimulating effect on the production of biomass, chlorophyll and carotenoids in both cyanobacteria, while the content of phycobiliproteins at 50 mM Na⁺ was 4 to 6 times higher than other concentrations in *Calothrix* and *Microcheate* respectively. Interestingly, nitrate up to 25 mM showed the highest biomass in both cyanobacteria while urea (up to 1 mM) had the same effect on *Microcheate*. Although nitrate had no significant effect on the content of chlorophyll and carotenoid of two cyanobacteria, urea at 1 mM increased the content of later pigments by 30%. The 3-fold increase of phycobiliproteins in 5 mM nitrate indicates that ammonium is more important in the biosynthetic pathway of photosynthetic pigments. In both cyanobacteria, phycoerythrin was recorded as the most phycobiliproteins. By understanding the growth conditions and physiology of cyanobacteria, it becomes possible to plan the ecological management of natural resources in the future.

172. Growth and photosynthetic changes in two rapeseed cultivars under the influence of melatonin application and lead heavy metal stress

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Heavy metal pollution has a negative effect on biological activities and soil fertility, plant metabolism, biodiversity. One of the appropriate approaches to reduce the negative effects of many stresses, including lead pollution, is the use of biological regulators, which increase the plant's tolerance against stress factors. In order to study the improving effect of melatonin on two cultivars of rapeseed (RG00s and Delgan) under heavy lead metal stress, a factorial experiment was conducted in the form of a completely randomized design with three levels of lead heavy metal (0, 2000 and 4000 mg/liter). And foliar spraying of melatonin regulators at a concentration of 100 micromolar was done with 3 repetitions. The results showed that with the increase of heavy lead metal stress, fresh and dry weight of shoots and roots, number of leaves, photosynthetic pigments (chlorophyll a, chlorophyll b, carotenoid), net photosynthesis, transpiration, stomatal conductance and Fv/Fm decrease. Also, according to the comparison of investigated cultivars, it can be stated that Delgan cultivar is more sensitive to lead stress compared to RGS00s cultivar. The external application of melatonin has a positive effect on increasing the plant's resistance to lead heavy metal stress by affecting physiological indicators.

173. Changes in phenolic compound levels in maize plants infected with sugarcane mosaic virus treated with chitosan

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Sugarcane mosaic virus (SCMV) is one of the most destructive pathogens in maize-growing areas worldwide. One of the main defensive mechanisms in plants is the production of secondary compounds such as phenols and flavonoids, which are considered strong antioxidants. Phenolic compounds suppress viral infection processes and prevent virus replication. To enhance the phenolic and flavonoid content in plants, various methods can be applied, including the use of elicitors like chitosan. Chitosan induces resistance against pathogens by creating acquired systemic resistance in plants. In this study, the impact of chitosan spraying as a non-toxic compound on the defense of maize plants against SCMV was investigated. The treatments included control maize plants (virus-free and without chitosan), virus-infected plants, and virus-infected plants sprayed with chitosan at concentrations of 0.05%, 0.15%, 0.45%, and 1%. The experiment was factorial in a completely randomized design with three replications. The results showed that the levels of phenol and flavonoid in SCMV-infected maize plants increased nearly twofold compared to the control plants. Chitosan spraying at concentrations of 0.45% and 1% on SCMV-infected plants resulted in increases of 3 and 4 times in total phenol content, respectively. Additionally, spraying chitosan at concentrations of 0.15%, 0.45%, and 1% on SCMV-infected plants resulted in increases of 3, 8, and 14 times in flavonoid content compared to the control plants. The significant increase in phenolic and flavonoid content in SCMV-infected samples treated with chitosan suggests a positive impact of chitosan spraying on enhancing the plant's defense mechanisms.

Babolsar

174. Iron Biofortification of *Arthrospira platensis*: Analyzing Growth Kinetics and Pigment Variations

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The cyanobacterium *Arthrospira platensis* contains a relatively high iron content, making it a valuable food supplement. A substantial portion of this iron is bioaccessible, making it a potential source of dietary iron. In this study, *A. platensis* was cultured in Zarrouk's medium at 30°C with a light intensity of 150 $\mu\text{mol photons m}^{-1} \text{s}^{-1}$. The study investigates the effect of iron at different concentrations, namely 2, 8, 16, 32, and 64 mg L⁻¹. Growth parameters, including dry weight, specific growth rate, doubling time, and biomass productivity, were measured at 560 nm. Pigments were extracted using methanol, and their concentration was measured using a spectrophotometer. SPSS was used to assess statistical differences among treatments. The findings revealed that the maximum specific growth rate occurred at an iron concentration of 64 mg L⁻¹. The highest dry biomass and optimal doubling time were at an iron concentration of 32 mg L⁻¹. However, there were no significant differences in biomass productivity between the treatments. The levels of chlorophyll a, b, total chlorophyll, and carotenoids progressively increased with higher iron concentrations, indicating a positive correlation between iron content and pigment accumulation. It has been suggested that iron, as a vital cofactor, may play a critical role in the enzymatic pathways during the biosynthesis of chlorophyll and carotenoids. Based on these results, biofortified *A. platensis* may be an effective food supplement. We recommend further examination of other physiological and biochemical factors to acquire a comprehensive understanding of iron's impact on *A. platensis*.

175. Diversity in the biochemical characteristics and seed oil composition of various quinoa (*Chenopodium quinoa*) cultivars and genotypes

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Quinoa (*Chenopodium quinoa*) is recognized as a rich and diverse source in human nutrition and has high nutritional value. Given the importance of this plant, assessing the diversity of its phytochemical and oil content in various cultivars and genotypes is essential to better understand the nutritional and health properties of this crop. To this end, an experiment was conducted in a completely randomized design on different quinoa cultivars (Atlas, Giza, Red Carina) and genotypes (Q4, Q29, Q2, Q12, Q3, Q1) with three replications in the Plant Physiology Laboratory of the Faculty of Agriculture, Razi University of Kermanshah, in the year 1403 (2024-2025). The evaluated traits included oil percentage, total soluble sugar content, total phenol content, and total flavonoid content. The results showed a significant difference at the 1% probability level between the different quinoa cultivars and genotypes in terms of the studied traits. Moreover, the comparison of the mean traits revealed that genotype Q4 had the highest total soluble sugar content (404.773 mg/L) and the highest total flavonoid content (0.825 $\mu\text{g/L}$). Heatmap analysis classified the cultivars and genotypes into two distinct groups. The first group, including (Q1, Giza, Red Carina, Q12), had the lowest amounts of total soluble sugar, total phenol, and total flavonoid content, while the second group, including (Q4, Q29, Atlas, Q2), had the highest amounts of these traits.

176. Pollen diversity in the subfamily Asteroideae (Asteraceae) in Iran

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Asteroidae is considered as the largest subfamily of Asteraceae with about 20 tribes, 1229 genera and 15,500 species. Asteroidae is monophyletic based on molecular analyses. In the present study, pollen morphology of 71 species from 10 tribes of Asteroidae, including Anthemideae (14 species), Heliantheae (4 species), Inuleae (20 species), Senecioneae (9 species), Astereae (12 species), Gnaphalieae (7 species), Tagetea (1 species), Millerieae (1 species), Calenduleae (1 species) and Eupatorieae (1 species) in Iran was examined by scanning electron microscopy. The pollen grains were identified and described based on seven palynological traits (including shape of the pollen grain, exine sculpture, length of polar axis, equatorial diameter, ratio of polar axis to equatorial diameter (P/E), spine length, pore diameter). The Pollen shape was observed oblate-spheroidal to spheroidal and suboblate. Based on the exine sculpture, four types of pollen grains were distinguished: echinate, echinate-perforate, spinulose-perforate and reticulate. Grouping of the species was done using WARD (Minimum spherical cluster method) and UPGMA (Unweighted paired group using average) analyses. Principal component analysis (PCA) was used to identify the most variable pollen grain characters among the studied species. The results of our studies almost supported the actually tribal classification in Asteraceae and showed that several features (including shape of the pollen grain, exine sculpture, ratio of polar axis to equatorial diameter (P/E), and spine length) of the pollen grains can be considered as important and valuable taxonomic traits.

177. Diversity and Distribution of the Family Pottiaceae (Bryopsida) of Lorestan Province

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Lorestan Province is situated in southwestern Iran and covers an area of approximately 29308 km², ranging from 46° 50' to 50° 3' E longitude and 32° 37' to 34° 22' N latitude. This article investigates the species diversity of the Pottiaceae family in Lorestan province. Plant samples were collected from various locations in the province during 2020 -2023. The collected samples were washed with water, air-dried at room temperature, and stored in paper bags. The samples were examined and photographed with a stereomicroscope and optical microscope for further analysis and observation. Samples were identified using available sources. The family Pottiaceae constitutes one of the largest known moss families, comprising three subfamilies, 85 genera, and nearly 1,500 species, or more than 10% of the 10,000 to 15,000 known moss species. These plants are widely distributed worldwide and are characteristic of variable or harsh environments constituting a significant part of the vegetation of arid, mountainous, or, arctic regions. The Pottiaceae family in Iran has 18 genera, 65 species, 7 varieties, and one subspecies. During the investigations carried out in this research, 13 genera and 23 species of this family were collected and identified in Lorestan province. Of these, the genus Phascum and three species Leptobarbula berica, Tortula leucostoma and Phascum galilacum (locality: Noorabad, Ghaslsgah waterfall), altitude 1802 m), are reported for the first time from Iran. The mentioned specimens are kept in the Herbarium of Shahid Beheshti University (HSBU) in Tehran, Iran.

178. Preparing a checklist of West Azerbaijan flowering plants

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Iran is located in the temperate part of the globe. The Zagros and Alborz mountain ranges extend from the northwest to the south of Iran and from the northwest to the northeast and play an important role in the plant and climate diversity of the region. In terms of vegetation, Iran is one of the most attractive and diverse countries in Southwest Asia. West Azarbaijan province is located in the northwest of Iran. The Zagros mountain range starts from the northernmost point of this province, Mako, and continues towards the southeast. So far, no comprehensive collection of flora of West Azerbaijan has been published. For this purpose, 182 volumes of Iranian flora were studied. 1552 species of flowering plants were extracted from West Azerbaijan province. Other Information was added such as height, growing area, and growing form. According to the final table, the largest families in terms of the number of species are: Fabaceae with 278 species, Asteraceae with 166 species, Poaceae with 139 species, Caryophyllaceae with 104 species, and the Brassicaceae with 93 species. In total, 81.41% of the species are dicotyledonous and 18.59% of the species are monocotyledonous. The biological forms are: hemicryptophytes with 43.59%, trophytes with 25.61%, phanrophytes with 7.36%, camphytes with 11.15%, cryptophytes with 11.84% and geophytes with 0.41%. The high percentage of hemicryptophytes indicates the cold and mountainous climate of the region.

179. Description of changes in quantitative characteristics of leaf epidermis in *Berberis integerrima* Bung. - Case Study: Semnan province

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The genus *Berberis* is one of the important and medicinal plants of the country, which has a significant population and species diversity, and *Berberis integerrima* Bung. is the common species in the country. In order to populationary investigation of species, 28 quantitative traits of leaf epidermis was measured using optical microscope and data analysis was done using SPSS software and ANOVA analysis method. The results showed that in the studied genotypes, there is a significant difference between stomatal length, guard cell length and stomatal valve length at the 0.05 level. The largest epidermal cells observed in the Shahroud genotype (Aber village) with an average length (53.16 μm) and width (29.4 μm) in the upper epidermis. The highest number of stomata was observed in the Semnan (Shahmirzad) genotype with 78 in the total of the lower and upper levels. While the lowest number of stomata was recorded in Damghan (Mehamanduyeh) genotype with 42 numbers. The highest number of cells per unit area on the lower surface of the leaf was 339 in the Semnan (Shahmirzad) genotype, and the lowest number of epidermal cells was 194 in the upper surface of Shahroud (Aber village) genotype Also, Shahroud genotype (Aber jungle) lacked stomata in the upper surface. The significance of the average of the evaluated traits can indicate the presence of intra-species variations in the studied species and also the adaptation ability to different climatic conditions. This information can be useful in the field of plant cultivation and protection against climate change.

180. Separation and identification of pyren and phenanthrene-degrading endophytic bacteria from the *Zea mayz* plant grown in an environment containing these substances and investigating the biodegradation potential of endophytes and metabolites resulting from decomposition

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Polycyclic aromatic hydrocarbons (PAHs) are a group of organic compounds that have two or more benzene rings and sometimes aromatic rings. Plant-related bacteria, including endophytic bacteria have been shown to be involved in the destruction of toxic compounds in contaminated soil (Haritash and Kaushik 2011). In this study, maize is grown in perlite containing these substances and then endophytic bacteria are isolated from the plant tissue. By tolerating the corn plant to these substances, the cause of this tolerance can be attributed to the breakdown of pyrene and phenanthrene by bacterial endophytes in the plant and the remaining amount of pyrene and phenanthrene after decomposition by endophytic bacteria of the corn plant is determined and also the effective bacteria are identified by molecular method. The results showed that 14 bacteria were extracted from the roots, leaves and stems of plants grown in culture medium containing pyrene and phenanthrene, and all these bacteria could use pyrene and phenanthrene as a source of carbon and energy. The results of HPLC analysis demonstrated that in the environment without bacteria, the concentration of phenanthrene and pyrene the more than other cultivation environments which shows that bacteria caused biodegradation of phenanthrene and pyrene. Among the extracted bacteria, four bacteria were most effective in pyrene and phenanthrene decomposition which were identified by molecular method. Gram-negative two bacterium of the genus *Bacillus* *Brevibacillus antibioticus*; *Bacillus safensis* effectively decomposed phenanthrene. GC-MC results showed that the most important compounds obtained from the decomposition of phenanthrene by these two bacteria, phthalate; 1,2-Benzenedicarboxylic acid bis(2 ethylhexyl); Naphthalene, 1,2,3,4-tetrahydro-1-nonyl and 1-Methyl-3-phenylindole Were identified and two bacterium *Bacillus pumilus*, *Bacillus licheniformis* had a greater effect on the decomposition of pyrene. The most important compounds obtained from the decomposition of pyrene by these two bacteria Methyl benzoate; Phthalic acid; 1H-Indole-2- carboxylic acid and 1,4- Benzenediol 2,5-bis Were identified

181. The *Ramalina* genus in Iran

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The lichen genus *Ramalina* belongs to the *Ramalinaceae* family, which has a wide distribution in the world and has 230 species. This genus consists of fruticose lichens with strap-like lobes and greenish cortex and has usnic acid in the cortex. *R. pollinaria* (Westring) Acharius is recorded from Gilan and Golestan provinces as the oldest report of *Ramalina* in Iran. The first report of this genus was made by Szatala (1957) who described 6 species and 3 varieties of *Ramalina* in his first survey of Iran's lichens. One hundred samples were collected from the Hyrcanian and Arasbaran forests for morphological and anatomical analysis. A thin-layer chromatography (TLC) method was also utilized to determine the chemical composition of the samples. Research indicates that 18 species in this genus have been accepted for Iran, with *R. arsenii*, *R. cf. conduplicans*, *R. implectens* and *R. lacera* being new to the country. The *Ramalina* genus in Iran has been the subject of a few studies, so the preparation of identification key and phylogeny can assist in further identification and completion of Iran's lichen flora.

182. Purification and Isolation of anthocyanin pigments in barberry (*Berberis integerrima*)

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Anthocyanins are widely distributed in nature in various plant species. They are mainly found in fruits and vegetables. They are valuable coloring agent for food and pharmaceutical preparations. Barberry (*Berberis integerrima*) anthocyanins were extracted from frozen in -18°C , with methanol containing 0.1% HCl (37% v/v). The crude extracts were passed through cation-exchange resin column. The elutes were combined and concentrated by rotary evaporator at 34°C . The final purification was achieved by preparative thin-layer chromatography (TLC) on cellulose microcrystalline and BunOH-HCl (1:1 v/v). The isolated bands were dissolved in 0.01% HCl in methanol, and the solvent was concentrated under vacuum. Four pigments were identified in Barberry were identified in onion by TLC and analysis UV-visible spectrophotometry.

183. Botanical characteristics of Japanese quince (*Chaenomeles japonica* (Thunb.) Lindl.), especially pollen grains and its phenomenology in Kermanshah (Iran)

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Japanese quince (Syn. *Cydonia japonica* (Thunb.) Pers.) is one of the important plants of landscape design, which has received attention in recent decades in Iran. It is a thorny shrub of Maloideae subfamily in Rosaceae. Some of its important chemical compounds include terpenoids, phenolics, flavonoids, benzoic acid derivatives, oxylipins and alkaloids. In Chinese medicine, it has been traditionally used for the treatment of various diseases since about 3000 years ago. In this research, the phenomenology of Japanese was carried out over several years. Its pink flowers create a pre-spring scene in the green space, so that the peak of its flowering in Kermanshah is almost every year at the end of March. In April and May, respectively, we saw the fall of flowers and the peak of leaves. In terms of fruiting, only in the years when pollination was well done by insects, relatively small fruits similar to apples were rarely produced. For palynological researches with light microscope, pollens were stained with safranin. The resulting studies showed that pollens were medium in size, monad, in terms of aperture condition, had tricolporate with striate ornamentation. Also, polar (P) (30.0-35.0-47.5 microns) and equatorial (E) (22.5-27.5-37.5 microns) dimensions of pollen grains and their P/E ratio equal to 1.3 were reported as prolate. Pollens were triangular-round from the polar view, oval-round from the equatorial view. Therefore this research shows the importance of this plant from different aspects.

184. Relationship between Rooting of *Alnus subcordata* with Soil Properties in Plantation of Kacha Region in Guilan Province

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The present study was conducted to investigate the relationship between micro-roots and macro-roots in *Alnus subcordata* in Kacha forestry in Gilan province with soil characteristics. Sampling was done randomly by taking 8 square samples with dimensions of 15 x 15 meters. In each plot, soil samples were taken along with roots from two depths of 0-10 and 10-20 cm. After separating the fine and coarse roots in the laboratory, their dry weight was determined using an oven. Some physical and chemical characteristics of the soil were also determined. The correlation between different soil properties and the amount of coarse and fine roots showed that in the case of summer alder, fine roots in the first depth (0-10 cm) have a positive correlation with soil moisture and a negative correlation with gravel. Also, at this depth, the roots of this species have a negative correlation with the true specific mass and a positive correlation with the porosity. In this regard, absorbable organic carbon, phosphorus, and potassium showed a positive correlation with root size. The results of Pearson's correlation between physical properties of soil, fine roots and coarse

roots of alder at a depth of 10-20 cm showed that only fine roots have a positive correlation with soil porosity and a negative correlation with true specific mass. The results of this research showed that the rooting pattern of alder is significantly influenced by soil characteristics and many soil characteristics can influence these patterns.

185. Pollen morphology of the subfamily Cichorioideae (Asteraceae) and its taxonomic significances

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The family Asteraceae is divided into four subfamilies (including Asteroideae, Barnadesioideae, Carduoideae and Cichorioideae) on the basis of morphological and molecular analyses. The subfamily Cichorioideae with about 240 genera and 2900 species is not monophyletic. There are few features that could provide apomorphies for this subfamily. For example, the lophate pollen is found exclusively in this subfamily and there are not in the other subfamilies. The present study aims to identify and describe the species of the subfamily Cichorioideae in Iran based on pollen characteristics and to determine their relationships. In this study, pollen morphology of 33 species (103 specimens) of the tribe Cichorieae is investigated using scanning electron microscopy. The pollen grains were described on the basis of seven palynological features (including shape of the pollen grain, exine sculpture, length of polar axis, equatorial diameter, ratio of polar axis to equatorial diameter (P/E), spine length, pore diameter). Based on the exine sculpture, two types of pollen grains were distinguished: echinate-lophate and echinate-perforate-lophate. In this study, multivariate statistical analyses for palynological data were presented. The PCA (Principal Component Analysis) showed that the first two PCA components comprised about 73% of total variation. Palynological features such as shape, ratio of length of polar axis to equatorial diameter (P/E), and the exine sculpturing were the most variable palynological features among the studied specimens and are clearly of taxonomic value for delimiting species within Cichorioideae.

186. Pollen grain micromorphology in some species of *Colchicum* from Iran

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Pollen grains micromorphological characteristics of two species of *Colchicum* including *Colchicum persicum* and *Colchicum speciosum* were evaluated by Light Microscopy (LM) and Scanning Electron Microscopy (SEM). Regarding quantitative characteristics (polar and equatorial measurements, lumina diameter and muri thickness), *C. persicum* had the largest sizes. About qualitative characteristics, although the pollen shape, pollen type and intine ornamentation were similar in the two examined species. The exine ornamentation was observed to be different. *C. speciosum* had the highest density of lumina on the exine surface. The data obtained from this research showed that the micromorphological characteristics can provide valuable information in the delimitation of taxa.

187. Pollen Micro-Morphology in Selected Species of *Astragalus* (Fabaceae, Astragaleae) and its Systematic Significance

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The pollen grains of 14 species of *Astragalus* were investigated using light and electron microscopy. The shared palynological characteristics are: isopolarity, tricolporate apertures, and

euprolate, subprolate, or prolate-spheroidal shapes. The polar axis ranges from 27.08 ± 1.02 to $43.92 \pm 2.95 \mu\text{m}$, while the equatorial axis varies between 22.02 ± 0.35 to $43.92 \pm 2.95 \mu\text{m}$. Exine is 0.52 ± 0.03 to $1.19 \pm 0.14 \mu\text{m}$ thick, while intine thickness typically varies between one-third to half of the exine. The pollen grains exhibit a trilobulate or triangular polar outline and a suborbicular, elliptic, or oblong-elliptic equatorial outline. Pollen surfaces exhibit five distinct sculpturing types: 1) equatorial: perforate – polar: perforate-psilate, 2) equatorial: faveolate-reticulate – polar: faveolate-reticulate-psilate, 3) equatorial: faveolate-reticulate – polar: psilate, 4) equatorial: microreticulate – polar: microreticulate-psilate, and 5) equatorial: microreticulate – polar: psilate. The output of FAMD statistical analysis indicates that six traits especially polar and equatorial axis size show the greatest weight on the first and second vectors. The least important factors are the P/E ratio and mesocolpium size. Interestingly, *A. echinops*, *A. christianus*, and *A. stocksii* belonging to the Phaca clade, are distinguished by their microreticulate ornamentations. Still, almost all scored pollen traits in our study, aid in species grouping and separation along different vectors with differing strengths. Therefore, this study highlights the potential application and efficiency of shows pollen morphology in species determination and grouping as well as characterization of monophyletic groups in *Astragalus*.

188. Structure and genetic diversity in populations of two *Avena* (Poaceae) species in Iran

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Avena (Poaceae) is a forage and medicinal annual genus with 27 species in the world from which, 8 species occur in Iran. *Avena* species show some morphological similarities that make difficult species separations for some taxa. In the present study the genetic variability in *A. fatua* and *A. sterilis* populations are considered. Genomic DNA was extracted from dried leaf samples using a CTAB-modified protocol. Ten Inter Simple Sequence Repeat markers (ISSR) were used to study the genetic variability on 23 populations (90 individuals) of these two species. Genetic diversity parameters, genetic distance and gene flow were determined. Genetic variation at different inter- and intra-population levels was evaluated. AMOVA and the results of structure analyses showed that there is a high genetic diversity within the populations studied. The Mantel test illustrated a significant correlation between genetic and geographic distances. Despite some morphological similarities between populations, a limited gene flow was observed. Based on the results of the Mantel test, it was found that with the increase in the geographical distance, the genetic distance in the populations of the two studied species increased. According to all the analyses and results obtained, the cause of the gene flow between the populations of the two species studied may be mutation or the impact of environmental factors. Based on the present study's findings on the genetic and molecular diversity of *A. fatua* and *A. sterilis*, it can be concluded that the applied methods and used ISSR markers are effective and efficient in distinguishing taxa.

189. Green Synthesis of Silver Nanoparticles using *Mentha spicata*

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In recent years, green chemistry principles have aimed to minimize environmental impact by reducing toxic waste and increasing efficiency. Therefore, in this research, we explored *Mentha spicata*, a native plant of the Mazandaran province, which is a rich source of polyphenols and thus possesses strong antioxidant properties. In this study, different extraction methods (ultrasound and Soxhlet) were investigated, with a 1:20 (g/mL) solid-to-solvent ratio. Ultrasonic extraction yielded

the highest efficiency. The synthesis of silver nanoparticles, indicated by a color change from colorless to brown during the experiment, confirmed the production of silver nanoparticles, and factors such as temperature, *Mentha spicata* extract concentration, were examined for the synthesis of silver nanoparticles (Ag-NPs). The optimal conditions were determined to be an extract concentration of 1 g/L and a temperature of 60°C. X-ray diffraction (XRD) analysis revealed the crystalline structure of the synthesized silver nanoparticles. Fourier-transform infrared (FT-IR) spectroscopy analysis was used to determine the functional groups involved in the nanoparticle synthesis process showed that the compounds in the nanoparticles produced by *Mentha spicata* plant are compounds such as phenols, which can reduce silver salt and synthesize silver nanoparticles.

190. Synthesis and Identification and of zinc oxide nanoparticles derived from (*Mentha Longifolia* L.) extract

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In the latest advancements in cutting-edge technology, nanomaterials and nanostructures are produced in accordance with green chemistry principles, which pay special attention to the environment, energy consumption, the health of the producer and consumer, and the reduction of production risks. Green synthesis using zinc oxide nanoparticles and plant extracts as reducing and capping agents has been the focus of numerous studies. The advantages of green synthesis of zinc nanoparticles include environmental compatibility, high reproducibility with stability, cost-effectiveness, and safety. All physical properties of the synthesized green nanoparticles (ZnO), such as size, morphology, and surface characteristics, were evaluated using various descriptive tools such as UV-Vis spectroscopy, X-ray diffraction (XRD), Fourier-transform infrared spectroscopy (FTIR), and scanning electron microscopy (SEM). According to the standards of gallic acid and quercetin, the phenol and flavonoid content in the plant (*Mentha*) were 0.089 mg/L and 3.283 µg/mL, respectively. XRD and UV-Vis analysis confirmed the synthesis of ZnO nanoparticles based on hexagonal images in SEM. The average crystal size was 77 nm, and the FTIR results also confirmed the presence of ZnO nanoparticles at the peak of 618 cm⁻¹. In this study, the techniques reviewed, FTIR, and the XRD and UV-Vis analyses confirmed the formation of ZnO nanoparticles with a hexagonal structure.

191. Measuring the content of phenolic, biochemical and physiological compounds of castor plant in response to different concentrations of multi-walled carbon

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Castor plant (*Ricinus communis*) belonging to the Euphorbiaceae family is a very important medicinal plant. Carbon nanotubes have unique properties and have wide applications in various industries. In this research, the effect of carbon nanotube concentrations on castor plant was investigated. Plants were grown in greenhouse conditions with solutions containing different concentrations of carbon nanotubes (0, 75, 100, 125, 250 and 500 µg [ml]⁻¹) as a weekly foliar spray and the desired samples The tissues of 45-day-old plants were taken and analyzed to measure biochemical and physiological parameters. Multi-walled carbon nanotubes had no significant effect on polyphenol oxidase activity. But a significant increase in the activity of guaiacol peroxidase and malondialdehyde and a significant decrease in the activity of phenylalanine ammonia lyase and phenol were observed. The highest amount of phenol was

observed in the control, the highest activity of guaiacol peroxidase in treatment 75, the highest activity of polyphenol oxidase in treatment 100, the highest activity of phenylalanine ammonia lyase and malondialdehyde in treatment 500, which is due to the different effect of carbon nanotubes in different concentrations. on biochemical and physiological parameters of castor plant. It can be concluded that low concentrations of nanotubes cause an antioxidant defense response against oxidative damage, but high concentrations of nanotubes cause high production of ROS, which leads to oxidative damage in cells.

192. The antioxidant capacity of the *Allium jesdianum* at two developmental stages

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The *Allium jesdianum*; is a plant belonging to the allium genus and the liliaceae family, which is found in the Zagros Mountains located in the west and southwest of Iran. This plant is extremely important in terms of traditional medicine and has been used for food and medicine since ancient times. Numerous studies have been conducted to investigate the secondary metabolites and antioxidant capacity of members belonging to the genus *Allium*, however, researcher have reported varying outcomes. For this purpose, this research was conducted in order to measure the antioxidant capacity of *A. jesdianum* in two developmental stages from the Kabirkoh habitat in Ilam province. After collecting the aerial parts of this plant in the pre-flowering and flowering stages, the samples were dried in the shade, and their extracts prepared by methanolic method. The antioxidant capacity of the extracts, was determined by measuring the reduction of radical capacity using the stable radical 2-2-diphenyl-1-picrylhydrazyl (DPPH); based on IC₅₀ values. The statistical analysis was conducted using SPSS software, and the comparison of averages was done using Duncan's test. The findings revealed a significant difference in the antioxidant capacity (IC₅₀) of the extract between two developmental stages ($p < 0.05$). A concentration of plant extract, in which 50% of the DPPH radicals are inhibited in the reaction environment, is referred to as IC₅₀. Lower IC₅₀ values indicate that extracts contain higher antioxidant activity. The obtained results indicate that the extract of the pre-flowering stage of this plant, with a value of 86.23 ± 5.82 , and the flowering stage, with a value of 94.64 ± 4.4 mg/ml, respectively, exhibits the lowest IC₅₀ value (the highest amount of antioxidant activity) and the highest IC₅₀ value (the lowest amount of antioxidant activity). It is important to understand the amount and type of chemical compounds in medicinal plants, as well as the appropriate time to harvest and collect them, because the presence of chemical compounds causes the plant's therapeutic effect. The results revealed that the highest level of antioxidant activity was observed during the pre-flowering stage, and it is recommended utilize this plant during this stage for collection and utilization.

193. Measurement of chlorophyll a, b and carotenoids in corn plants treated with green algae extracts *Ulva* sp. and blue-green algae *Nostoc* sp.

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Today, algae extracts are used as biological stimulants. These extracts can contribute to sustainable agriculture by increasing the rate of seed germination and promoting plant growth through improving soil fertility and increasing yield. In this research, the effect of *Ulva* sp algae extract.

and Nostoc sp. It was investigated on the photosynthetic pigments of corn plant. 1 gram of Ulva sp algae powder. It was extracted in 100 ml of distilled water and a 10% dilution was prepared. The amount of 0.5 grams of algae Nostoc sp. It was also extracted in 100 ml of distilled water and 50 and 100% dilutions were prepared. The resulting extracts were added to the soil weekly and after 4 weeks, the amount of photosynthetic pigments of the resulting plants was measured. The results showed that the amount of chlorophyll a in the concentration of 50 and 100% of Nostoc sp. and 10% of Ulva sp. increased by 28, 58 and 13% respectively compared to the control. Chlorophyll b in the concentration of 50 and 100% of Nostoc sp. and 10% of Ulva sp. It had 70, 116 and 40% growth compared to the control, respectively. Carotenoids in concentrations of 50 and 100% Nostoc sp. and 10% Ulva sp. It had 60, 80 and 40% growth compared to the control, respectively. The results show that the blue green algae extract Nostoc sp. and green algae Ulva sp. As a biological stimulant, it has a positive effect on increasing the photosynthetic pigments of the corn plant.

194. Identification of volatile compounds in seed, leaf and flower organs of *Heracleum persicum*

Desf. ex Fisch. species from Margoon waterfall in Iran

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The genus *Heracleum* L. or Golpar, with more than 100 species, is one of the largest genera of the family of Apiaceae, subfamily Apioideae and tribe Tordylieae. The species of this genus are widely distributed in the Northern Hemisphere and mainly in Eurasia. The fruits of some *Heracleum* species, especially those of *H. persicum*, are widely used as spices to enhance the flavor of food and make pickles in many parts of Iran. In Traditional Iranian medicine, the fruit and leaves of this plant named "Anjdan" are used to relieve stomach ailments and flatulence, digestive, as well as antiseptic, anthelmintic, diuretic, and analgesic agent. In this study, *H. persicum* was collected from the Margoon waterfall in Fars province, and after identification, it was kept in the Central Herbarium of Tehran University (TUH). In this study, *H. persicum* was collected from the Margoon waterfall in Fars province, and after identification, it was kept in the Central Herbarium of Tehran University (TUH). The extracts of three organs, seed, leaf, and flower were extracted by the methanol-acetyl chloride method and the components of volatile compounds in all three organs were identified and investigated using gas chromatography-mass spectrometry (GC-MS). The compounds identified in the respective extracts included terpenes, fatty acids, alkanes, hydrocarbons, fatty alcohols, carboxylic esters, phenylpropanoids, and isoflavonoids. The highest amount of compounds identified in seeds (70.01%) was related to terpenes, in leaves (81.49%) and flowers (62.29%) related to fatty acids. Considering the high amount of fatty acids and terpenes compounds in *H. persicum*, further studies are necessary to use these compounds in food, pharmaceutical, and health industries.

195. Identification of cis-regulatory elements of response to drought stress in the Wox gene family in sesame based on bioinformatics software

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Sesame (*Sesamum indicum*) is one of the oldest oilseed crops in the world, belonging to the Pedaliaceae family. This plant has been cultivated for thousands of years in tropical and subtropical regions. In recent decades, extensive research has been conducted on the identification of chemical compounds, biological properties, variety improvement, and increasing sesame yield. Studies show that the Wox gene family plays a vital role in regulating the developmental pathways and

cellular differentiation of the sesame plant. The Wox genes were first identified and studied in the Arabidopsis plant. The promoter sequences (1500 nucleotides upstream of the gene) were extracted from the NCBI database, saved in FASTA format in Notepad, and then analyzed using the PlantCare software. The results of the cis-elements were stored in an Excel file, and the data analysis was performed using the TBtools software, with the cis-elements visualized in a Heatmap graph. The results showed the positions of the cis-elements in the promoter sequence, with the highest number of cis-elements being TATA-box and CAAT-box, and the lowest being Box III, which can be distinguished in the resulting graph with separate colors. To determine the localization of the transcription factors (TFs) in the cell, the protein sequences downloaded from NCBI were analyzed using the WOLF software. The results showed that all the identified genes in sesame are located in the cell nucleus. Bioinformatics and experimental studies of the genes related to abiotic stresses contribute to a better understanding of the growth and development mechanisms of this plant.

196. Identification of Microproteins Involved in the Developmental Transition from C3 to C4 Photosynthesis in the *Halimocnemis mollissima* Bunge through Analysis of Long Non-Coding RNA Profiles

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Given the important role that C3 plants play in global food security, introducing the C4 photosynthetic pathway, which has higher photosynthetic efficiency, into C3 plants with lower photosynthetic efficiency is part of the strategies to combat climate change and promote sustainable development. Despite the complexity of the photosynthesis process, ancestral C3 plants have independently evolved into C4 plants over 60 times. This indicates that only relatively small genetic changes are required to establish a C4 photosynthetic pathway. Species with dual photosynthesis during their life cycle, such as *Halimocnemis mollissima* from the Caroxyleae tribe, which exhibits C3 photosynthesis in cotyledons and NAD-ME type C4 photosynthesis in subsequent leaves, serve as suitable models for studying the evolution of C4 from C3 and understanding regulatory mechanisms through comparative analysis due to the absence of phylogenetic noise. Examining C3 photosynthesis in cotyledons and its transition to C4 in the primary leaves appears to provide an opportunity to identify the molecular mechanisms involved in this transition. Although many candidate genes involved in the transition from C3 to C4 have been identified, the identification of new regulatory factors, such as gene sequences in non-coding regions like lncRNAs and the small peptides translated from them, remains unexplored. This study investigates the potential roles of small peptides by analyzing these peptide sequences in this species, within the regulatory pathways of photosynthesis.

197. Breaking the saffron dream in fresh hives

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Saffron dormancy period lasts between 4 to 4.5 months, depending on the water and climatic conditions of each region, starting from mid-April and continuing until October. Due to the sensitivity of saffron corms to environmental changes, it seems that if corms are placed in suitable temperature and environmental conditions, the possibility of breaking the dormancy period in them exists. This research was conducted with the aim of breaking saffron dormancy and the possibility of harvesting more than one flower per year. Therefore, by conducting an experiment in a controlled environment using the hydroponic method, the behavior of fresh saffron corms was

examined. On August 10th, 176 fresh saffron corms with different weights were collected. The corms were placed in darkness inside a cultivation tray at a temperature of 23 degrees and humidity above 80%. After 20 days (September 1st), they started to germinate. When the sprouts reached 3 to 4 centimeters in size, exposure to light began at a temperature of 17 degrees Celsius and humidity above 90%. Flowering was observed in October in corms weighing more than 10 grams. Lighter corms only had sprout growth. Therefore, based on this research, it can be said that if fresh corms are exposed to suitable environmental factors (temperature, humidity, light), their dormancy period can be eliminated.

198. Function of antioxidant enzymes in the cell suspension culture of *Matricaria chamomilla* under drought stress and nitric oxide

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German chamomile (*Matricaria chamomilla*) is a valuable medicinal plant belonging to the Asteraceae family. It has anti-inflammatory, antimicrobial, antiseptic, antispasmodic, and sedative activities due to the presence of valuable metabolites, including terpenoids, phenolics, and flavonoids in the plant extract. The technique of tissue and cell culture is one of the effective biotechnology methods for increasing medicinal metabolites and developing biological sciences. Cell suspension culture provides a suitable condition for studying cellular responses under stress. Drought stress is one of the most destructive abiotic factors that can cause osmotic stress, increase the accumulation of active oxygen radicals, and damage cellular macromolecules. Nitric oxide is a small signaling molecule, very penetrable in the membrane, and has different physiological roles. This molecule is lipophilic and is naturally synthesized in the chloroplast, peroxisome, mitochondria, and vacuole. Nitric oxide can modulate the stress. In this research, the effect of nitric oxide on the growth mechanism of cells through protein content and activity of antioxidant enzymes under drought stress was investigated. German chamomile seeds were cultured after sterilization in Morashig and Skok medium, and hypocotyl explants were cultured in a culture medium with 2,4-D = 1.5 mg/liter and Kin = 0.5 mg/liter. The obtained calli were transferred in the liquid culture medium to separate the cells. Cells were transferred to an MS medium with different concentrations of nitric oxide and polyethylene glycol. After 3 weeks of cultivation, the cells were harvested for physiological and biochemical analyses. The results showed that increasing the level of drought stress caused weight loss and nitric oxide treatment did not show a positive impact on the cell biomass. Drought stress decreased the amount of protein and nitric oxide treatment increased protein content. Drought stress increased the activity of antioxidant enzymes superoxide dismutase and catalase, but nitric oxide treatment decreased the activity of mentioned enzymes. It seems that the reduction of fresh weight and protein content under drought stress is related to the induction of active oxygen production and the defense mechanism of the cell was strengthened through increasing the activity of antioxidant enzymes. Nitric oxide treatment through the system of antioxidant enzymes could not induce defense metabo.

199. The reaction of *Hyssopus officinalis* to the inoculation of mycorrhizal fungi under drought stress

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Drought is one of the most important environmental stresses that reduce plant growth and production more than other biotic and abiotic stresses. The aim of study was to investigate to the

role of mycorrhiza symbiosis in increasing drought tolerance of *Hyssopus officinalis* L. A factorial pot experiment was conducted in the form of a completely randomized design with three replications in the research greenhouse of the Faculty of Agriculture of Urmia University in November 2023. The experimental treatments included drought stress caused by polyethylene glycol at three levels (0, 2 and 4% PEG 6000) as the first factor and the application of mycorrhizal fungus *Trichoderma harzianum* at two levels as the second factor and their combined effects. In our reports, we observed that the effect of inoculation with mycorrhiza on the content of soluble sugars in hyssop leaves was significant at the level of 5%. As the level of drought stress increased, total soluble carbohydrates accumulation increased. So that in the stressed plants at 2 and 4% PEG, this value increased by about 7 and 13%, respectively, compared to the control. In the mycorrhizal plants under PEG stress at 2% PEG, the content of soluble sugars in leaves increased by 4% compared to the control treatment. Mycorrhization with *Trichoderma harzianum* significantly increased the relative water content of hyssop leaves. Our results showed that PEG treatment reduced RWC in *H. officinalis*, with the highest reduction in 2% PEG (by about 4% compared to the control treatment). This trait in the inoculated plants and PEG induced water stressed plants at 2 and 4% PEG was about 8 and 9%, respectively, more than control plant. The highest amount of membrane ion leakage was obtained at 2 and 4% PEG (18.66 and 19%, respectively) and the lowest amount of this trait was obtained in the combined treatment of mycorrhiza and 4% PEG (11%). Increased level of proline in response to PEG may be an adaptation the purpose of which is to overcome the stress conditions. Proline accumulation in the inoculated plants was decreased. The maximum amount of proline with an average of 58.6 $\mu\text{mol/g}$ of fresh weight was obtained in 4% PEG-treated plants and the lowest in 4% PEG + mycorrhiza treatment with an average of 8.36 $\mu\text{mol/g}$ of fresh weight.

200. Phytochemical screening of ethanolic extract of *Aloe barbadensis* Mill.

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In recent years, due to the common use of chemical antimicrobial drugs in the treatment of infectious diseases, the prevalence of resistance to one or more antibiotics in human pathogenic microorganisms is increasing. For this reason, researchers are looking to discover new antimicrobial substances from natural sources such as medicinal plants, and phytochemical screening of plant extracts can provide great help in this field. Therefore, the aim of the present research is the phytochemical screening of the ethanolic extract of the leaves of *Aloe barbadensis* Mill. In this method, the leaves of *Aloe barbadensis* Mill. were collected and dried in suitable conditions and powdered by an electric mill and prepared using the ethanolic extract maceration method. Then, in order to identify the phytochemical compounds (secondary metabolites) in it based on the pharmacopoeia, existing methods such as Trease and Evans were used. Phytochemical screening of the ethanolic extract of leaves of *Aloe barbadensis* Mill. confirmed the presence of secondary metabolites such as phenols, terpenoids, quinones, saponins, tannins, sterols and phlobatannins. Each of these secondary metabolites, according to their chemical structure, can have various biological properties in terms of anti-cancer, antioxidant, anti-inflammatory, anti-wound, anti-bacterial, anti-viral, anti-fungal, etc. In general, according to these characteristics, it can be concluded that phytochemical compounds, in addition to having antimicrobial effects, the ability to overcome antibiotic resistance and being safe, can be a suitable alternative to antibiotics. Therefore, it is suggested to extract and purify phytochemical compounds for the production of antimicrobial substances by conducting further studies and additional tests.

201. Phytochemical screening of ethanolic extract of *Citrullus colocynthis* (L.) Schrad. harvested from Rafsanjan - Kerman

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Abujahl watermelon with the scientific name *Citrullus colocynthis* (L.) Schrad. belongs to the Cucurbitaceae family, which is native to Iran and can be found in the southern regions of the country, which is one of the most valuable medicinal plant species in desert and desert areas. Considering the importance and position of medicinal plants in the production of effective compounds needed for the pharmaceutical, cosmetics and health industries, and also because the discovery of high efficiency medicinal substances and low side effects in the treatment of diseases, especially cancer, is the main goal of research. In this regard, the aim of the current research is to screen the phytochemicals of the ethanolic extract of *Citrullus colocynthis* (L.) Schrad. harvested from Rafsanjan - Kerman. For this purpose, the fruits of *Citrullus colocynthis* (L.) Schrad. It was collected and dried in suitable conditions and powdered by an electric mill. In the next step, extraction was done with ethanol solvent using a Microwave-assisted extraction (MAE). Then, by using phytochemical tests, phytochemical screening was investigated qualitatively based on the pharmacopoeia. Phytochemical screening of ethanolic extract of fruits of *Citrullus colocynthis* (L.) Schrad. confirmed the existence of secondary metabolites such as flavonoids, quinones, terpenoids, coumarins, diterpenoids and resins. Hence, considering the variety of effective compounds in the ethanolic extract of fruits of *Citrullus colocynthis* (L.) Schrad. It can be concluded that the ethanol extract of this fruit can have significant effects in the treatment of some diseases and cancers. Therefore, in order to find the best effective combination in the next research, it is suggested to carry out additional tests in vitro and in vivo.

202. New technology for extracting silymarin with the highest amount from *Silybum marianum* (L.) Gaertn. seeds

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After stepping on the earth, man has widely used plants to meet his needs. Different aspects of using plants include edible, medicinal, spice, shelter, etc. Today, the use of medicinal plants for the production of plant-based medicines has received a lot of attention around the world. *Silybum marianum* (L.) Gaertn. (common name: milk thistle) is belong to Asteraceae family and is among the top 10 medicinal products that have been researched and tested from various aspects. According to the World Health Organization, 30% of people in the world suffer from chronic liver diseases. The effective ingredient of this plant is silymarin, which has the greatest effect on liver cells. The extraction of this substance is done in different ways, the best method is to use methanol as a solvent and ultrasonic waves to facilitate the process of extracting silymarin from ground seed particles. Since the major part of silymarin is in exocarp of the seed, a few of healthy seed was selected from one collected ecotype from Iran. After separating the exocarp from the seed albumen, 0.5 gr. of the exocarp was ground and silymarin was extracted by usual extraction method. Then the amount of extracted silymarin was measured by HPLC. In this research, the amount of 171.52 mg/g of silymarin was obtained from 0.5 gr. of ground seed exocarp. The advantage of this research compared to the existing research is that the most silymarin is extracted without using chemical solutions for defatting and spending a long time.

203. Preliminary report of vegetation of Sikash region, Siahkal district, Guilan province

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Floristic studies in each region have high value for various goals, such as ecosystem management, identification of biodiversity and vulnerable species. This study focuses on the primary report of the flora of Sikash, covering an area of 744 hectares, in Siahkal district of Guilan province. Plant samples were collected from various habitats during the spring and summer of 2024 and then taxa were transferred to the herbarium of Guilan University for identification after drying. Then, identification of taxa was done using botanical references. Based on this study, 125 species belonging to 100 genera and 42 families have been identified. Among these, 10 species belong to seedless vascular plants and 115 species belong to angiosperms. Among these, 19 species were tree and shrubby and 96 species were herbaceous. Based on this study, Poaceae, Asteraceae and Lamiaceae were the biggest families, each with 11 species. Furthermore, the genus *Trifolium*, with 7 species, was the largest genus in the region. Considering the forest cover of the area, tree and shrub species were the main elements of the Hyrcanian forests, some of the most important of these elements were *Parrotia persica*, *Ruscus hyrcanus* and *Ilex spinigera*.

204. Medicinal plant of *Thymbra spicata* L. a sensitive species for feeding snails in the conditions of greenhouse and field cultivation in the climatic conditions of Khorramabad city, Lorestan province-Iran

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The plant *Thymbra spicata* L., known as zofaii, in local belongs to the Lamiaceae family and grows in Iran, Syria, Iraq, and other parts of the eastern Mediterranean, as well as certain mountainous areas in Lorestan province. It contains important chemical compounds such as carvacrol and thymol. The leaves and essential oils of this plant are used for flavoring and possess antimicrobial and antifungal properties. It has been cultivated in the Zagros Botanical Garden in Lorestan province under greenhouse and field conditions. During a study conducted in 1402-1403, it was found that the white snail (*Helicella candaharica*) belonging to the Helicidae family and the Mollusca phylum affecting this plant in this place. This snail has been identified as a major threat to agricultural products in some parts of Iran. Snails are significant pests for greenhouse and garden crops. They cause damage to plant seeds, seedlings, underground tubers, leaves, and fruits. In many areas, land snails are known to be pests of crop leaves. The damage caused by this organisms can be quite destructive, especially in greenhouses. They can harm the roots and stems of plants and even cause the death of seedlings. All land snails require water and high humidity because they lack a protective layer to prevent their bodies from losing moisture. Therefore, they are more active at night and rainy days. Despite being pests, these organisms contribute to the health and fertility of the soil. Their body secretions contain organic substances that enrich the soil and provide an optimal environment for useful soil bacteria to thrive. When their population is high, control methods such as baiting or spraying may be necessary. However, if the damage is minimal, intervention may not be needed.

205. Foliar selenium application for improving drought tolerance of *Hyssopus officinalis* L

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Although selenium is not an essential element for plant growth, it has been reported to stimulate crop tolerance to drought conditions. This study was carried out to determine effect of foliar selenium application for *Hyssopus officinalis* drought tolerance. A factorial experiment was

conducted in the form of a completely randomized design with three replications in the greenhouse of the Faculty of Agriculture of Urmia University in 2023. The experimental treatments included drought stress caused by Polyethylene glycol (PEG) at three levels (0, 2 and 4%) as the first factor, sodium selenate treatment was foliarly applied at three concentrations (0, 20 and 40 mg l⁻¹) as the second factor and their combined effects. The results of the present study showed that the application of 20 and 40 mg l⁻¹ selenium in plants that were subjected to 2% PEG resulting in 16 and 17 % increased relative water content in comparison with stressed plants. The effect of drought and selenium factors and their mutual effect on the percentage of electrolyte leakage of hyssop leaves were significant at the level of 5%. The treatments of 2 and 4% PEG induced an increase in the percentage of leaf electrolyte leakage by 8 and 9%, respectively, compared to the control treatments, and selenium foliar application with concentrations of 20 and 40 mg L⁻¹ under drought stress condition at 4% PEG, 53 and 52% reduction respectively, compared to stressed plants with this PEG value. Therefore, sodium selenate was able to improve the structure of the cell membrane and reduce the amount of leakage. The results of analysis of variance of the data showed that the effect of drought and the mutual effects of drought and selenium on the amount of proline were significant. In drought stress conditions, foliar application with selenium caused the accumulation of proline in hyssop leaves. The highest amount of proline in leaves was related to plants stressed with 4% PEG that were sprayed with 40 mg L⁻¹ of selenium and the amount of proline in their leaves increased by 70% compared to the control plants. With increasing in the severity of drought, the soluble carbohydrates content in the leaves increased so that its amount increased by 13% compared to the control at 4%PEG. In general, the results of the present study showed hyssop's tolerance to drought stress.

206. Modeling the Factors Affecting Wheat Seeds Germination

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A low percentage of germination is an important factor influencing the yield of crop plants and depends on various genetic and environmental factors. The use of modeling methods in optimizing the germination process is very helpful, but due to the non-linear nature, there are only a few successful modeling efforts in this area. In the present study, the effect of the genetic factor (cultivar) (Ohadi, Baran, Sardari, and Hashtroud) and environmental factors (salinity and salicylic acid) on the germination percentage of wheat seeds was investigated. Modeling was performed using artificial neural networks with three layers. The input layer corresponded to the three variables under investigation (cultivar, salinity, and salicylic acid). The output layer corresponded to the germination percentage. The hidden layer was selected with 14 neurons based on the minimum mean squared error during the network training process. All normalized data were divided into three sections: training, evaluation, and network testing. After obtaining the appropriate neurons and epochs from plotting experimental and predicted data by the network, a logical correlation coefficient for the charts was obtained. The weight matrix obtained was used to calculate the importance and relative impact of each input variable on the germination percentage. All experimental variables were effective on the germination percentage, and none could be ignored. However, according to the network prediction, salinity had the most significant effect (44%) and the cultivar the least effect (23%) on the germination percentage. Therefore, the network prediction indicated a greater negative impact of salinity stress compared to the genetic factor and a positive impact of salicylic acid on the germination process, introducing it as a successful model.

207. Ethnobotany of *Achillea eriophora* DC. in Iran

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The family Asteraceae, comprising approximately 33000 annual, biennial and perennial species, has an extensive geographical distribution worldwide. Since ancient times, many of these species have been employed medicinally to treat ailments due to their diverse chemical compounds. Among the respondents, approximately, 68.42% were women, while the remaining 31.57% were men. Around 18.51% of the participants were single, with the majority being married. Among these, most of the participants in this study, resided in urban areas, whereas only 16% lived in villages. Education levels varied, with participants holding bachelor's and diploma degrees. The informants in our research highlighted the therapeutic uses of this plant. They reported using it to address stomach and intestinal infections, manage anxiety, regulate blood sugar, alleviate skin inflammation, weight loss, constipation, treat headache, kidney and liver ailments involved preparing herbal tea, decoction, and using the plant raw as a powder or fresh in salad. Based on the informers of this research, flowers, leaves, and stems were the most used plant part for diseases treatment. Some other informants combined sargol with other genera such as *Thymus L.*, *Mentha L.*, *Malva L.*, *Rosa L.*, and *Foeniculum Mill.* to cure diseases.

208. A review on the genus *Prunus L.* in Zanjan province with emphasis on the life form and chorotype

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The genus *Prunus L.* is one of the large genera of the Rosaceae family with more than 200 species in the world, especially in the temperate regions of the Northern Hemisphere and tropical and subtropical regions. According to the old classifications, this genus belongs to the subfamily Amygdaloideae (*Prunoideae*) and according to the new classifications, it belongs to the subfamily Spiraeoideae and it consists of 52 taxa in Iran. In the present study, a review on the species of this genus has been made in Zanjan province in the northwestern region of the country. The results of this survey confirm the presence of 13 species of this genus in this province, including *Prunus armeniaca L.*, *Prunus avium (L.) L.*, *Prunus cerasifera Ehrh.*, *Prunus cerasus L.*, *Prunus domestica L.*, *Prunus dulcis (Mill.) D.A. Webb*, *Prunus haussknechtii C.K. Schneid.*, *Prunus incana (Pall.) Batsch*, *Prunus lycioides (Spach) C.K. Schneid.*, *Prunus mahaleb L.*, *Prunus microcarpa C.A. Mey.*, *Prunus persica (L.) Batsch* and *Prunus spinosa L.* in microphanerophyte, mesophanerophyte and nanophanerophyte life forms. In terms of chorotype, these species belong to Irano-Turanian, European-Siberian and Mediterranean regions. Out of a total of 13 species, 7 species grow wild in Zanjan province and 6 species are cultivated.

209. The effect of UV radiation on some biochemical, anatomical characteristics, and PAL expression in a medicinal plant of *Dracocephalum moldavica L.* In the 4-6 leaf stage

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Ultraviolet radiation in nature is an important stress factor. Due to the need of plants to sunlight for photosynthesis, Ultraviolet radiation makes them more vulnerable to this kind of stress. Ultraviolet radiation stimulates the production of reactive oxygen species and oxidative damage. In the present study, the effects of UV radiation under 320 nm in different intensities in two stages of plant growth (2-4 leaf pair stage and 4-6 leaf pair stage) was studied on some growth parameters, biochemical, morphological characteristics and PAL gene expression on the *Dracocephalum*

moldavica. The results indicated that the enzymatic and non-enzymatic defense systems were stimulated at both growth stages in UV-exposed plants. Analysis of the activity of Phenylalanine ammonia lyase enzyme (PAL) in both growth stages showed an increase in the relative expression of PAL gene in a highly UV-treated plant compared to the control plant at 4-6 leaf pair stage. Morphological studies on the stems of control and UV-treated plants showed increased stem thickness at high intensities in the maturity stage, increased the enzymatic defense systems and amplified UV absorbance compounds as non-enzymatic defense systems at 4-6 stage. The relative increase in PAL gene expression was associated with increased activity of the enzyme and could increase the ligninization pathway and increase the stem thickness.

210. Studying the Effect of *Nizamuddinina Zanardinii* Brown Algae Extract on the Morphophysiological Parameters of Rice Plants Under Salinity Stress Conditions

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Salinity is one of the most important factors causing stress damage to the growth and metabolism of plants. Various biostimulants have been used to increase plant tolerance to salinity stress, which seaweed extract providing promising improvements on plant performance. It is necessary to investigate the effects of salinity stress on agricultural products and especially on rice cultivation. Therefore, in this study, the effects of *Nizamuddinina zanardinii* brown algae extract on the morphophysiological characteristics of rice plants under salt stress were investigated. Stress conditions were created for rice plants with concentrations of 100 and 150 mM of sodium chloride salt. Then, concentrations of 25, 50 and 100% of the extract of one gram per liter of brown algae were used to evaluate the growth indicators. The results showed that salinity treatment decreased hypocotyl height, radicle length and seedling weight compared to the control, and simultaneous salinity and extract treatment led to improvement of growth parameters. The highest amount of hypocotyl height, radicle length and seedling weight was observed in simultaneous treatment with 50% extract and salt concentrations. The hypocotyl height and seedling weight increased by 28% and 13% in 100 mM salinity which was treated with 50% extract, and 125% and 27% in 150 mM salinity which was treated with 50% extract, respectively. The radicle length also increased by 32% in 150 mM salinity which was treated with 50% extract. The results indicate that *Nizamuddinina zanardinii* extract can be effective in improving rice plant growth under salt stress.

211. Study of Some physiological and biochemical parameters of Okra plant (*Abelmoschus esculentus* L.) under salt stress in the presence of graphene oxide nanoparticles

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The most harmful abiotic stress is salt stress, which has a significant negative effect on plant growth and development. In this study, the effects of graphene oxide nanoparticles at one level 5 mg/L under salinity stress conditions (at one level of 100 mM) on biochemical and physiological indicators of okra (*Abelmoschus esculentus* L.) were studied. The experiment was conducted as factorial based on a completely randomized design in three replications. The results of variance analysis of the data showed that the effect of graphene oxide on fresh weight, dry weight,

chlorophylls, carotenoid, net photosynthesis rate in aerial and root parts was significant ($p < 0.05$). Comparison of average data showed that at salinity in the aerial and root parts, fresh weight and dry weight showed the most significant decrease compared to the control. Treatment with nanoparticles increased chlorophyll a, b and carotenoid were in leaves. Graphene oxide nanoparticles improved the negative effects of salinity.

212. Study of some physiological characteristics of mountain tea plant in two regions of Zanjan province

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The mountain tea plant with the scientific name *Stachys lavandulifolia* Vahl is one of the important medicinal plants in the mint family and it grows well in the mountainous and rocky areas of the country. Among the valuable properties of this plant, we can mention pain reliever and sedative, pain reliever, fever reducer, anti-inflammatory, appetite suppressant, digestive discomfort improver, and antimicrobial properties. In the present study, mountain tea samples from Tarom and Gheidar regions in Zanjan province were collected in three replicates and measured for chlorophyll a, chlorophyll b, total chlorophyll, carotenoids, total phenol and flavonoids. The results of the statistical analysis show a significant difference in the amount of photosynthetic main and secondary pigments and as well as flavonoids in plants of two regions. Tarom mountain tea samples contained higher amounts of chlorophyll a (16/78%), chlorophyll b (40/67%), total chlorophyll (25/38%), and carotenoids (10/69%), but on the contrary, the plants of Gheidar region had higher amounts of flavonoids (60/30%). The results of examining the amount of phenol did not show a significant difference in the plants of two regions. The plants in the Tarom region located in the northeast of Zanjan province and in the neighborhood of Gilan province with a wetter climate have produced more photosynthetic pigments, while the plants in the Gheidar region in the southwest of the province and in the neighborhood of Hamedan province with a drier and colder climate contain more flavonoids, which can be related to the defensive properties of these compounds.

213. Biosystematic studies of the genera *Kosteletzkya* and *Hibiscus* from Malvaceae family in Iran

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Kosteletzkya pentacarpa from Malvaceae family, firstly was separated from *Hibiscus* species by Linnaeus. This species is distributed in Spain, France, Azerbaijan, Georgia, Russia, Bermuda, Iran, but most of its populations grow in Europe, for this reason, this species is strictly protected under the Berne Convention. Although some morphological and cytological results and molecular phylogeny confirm the separation of this species from *Hibiscus* species, there are some ambiguities in determining the limits of these taxa. In this research, in order to compare the morphological and micromorphological features, studies have been conducted on the morphometry, anatomy of the epidermis and palynology of these taxa. SPSS software was used in the morphometric studies conducted on one species of *Kosteletzkya* and 6 species of *Hibiscus*. For anatomical studies on the epidermis, the leaf surface was examined by separating the epidermis and photographing it. Scanning electron microscope (SEM) was used for palynological studies on one species of *Kosteletzkya* and 3 species of *Hibiscus*. The results of morphological and anatomical studies using Ward's phenogram method, showed the closeness of *K. pentacarpa* with *H. trionum*. In

palynological studies, *K. pentacarpa* is distinguished from *H. trionum* by having rod-shaped sculpturing (baculite) in contrast to spinose. The results of this research determined that the palynological characteristics confirm the molecular phylogeny results and can be useful in the diagnosis of *Hibiscus* and *Kosteletzkyia* species.

214. Study of growth parameters of *Arthrospira platensis* in a cost-effective medium

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Zarrouk is the standard medium for *Arthrospira* growth. Although this medium offers optimal biomass production, it incurs higher costs due to the expensive components needed for concocting the medium. In this regard, developing a cost-effective alternative culture medium is necessary for the industrial-scale production of these microalgae. *Arthrospira* is used in all aspects of human life, such as food, medicine, and cosmetic industries. This study assessed the biomass and other growth parameters of *A. platensis* with a cost-effective culture medium compared with the Zarrouk medium. The cost-effective medium was formulated using a commercial di-ammonium phosphate (DAP) fertilizer as a source of two major nutrients for *A. platensis* growth with the proper concentration of sodium bicarbonate. The experiment was performed for 14 days. The use of various concentrations of DAP fertilizer affects differently on the specific growth rate, dry weight, and biomass productivity of *A. platensis*. *A. platensis* treated with 0.5 g L⁻¹ DAP and 8 g L⁻¹ of sodium bicarbonate has the highest specific growth rate, dry weight, and biomass productivity compared to control sample and other concentrations. The results showed that the mentioned parameters gradually decrease with increasing concentration of DAP. Overall, this study showed that a cost-effective medium could be used as an alternative and cheap medium to maximize biomass in *Arthrospira* species.

215. Taxonomic study of *Podonosma orientalis* (L.) Feinbrun based on micromorphological evidence in Iran

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According to Flora Iranica, the only representative of the genus *Podonosma* Boiss. In Iran, the species is *P. orientalis* (L.) Feinbrun. The aim of the study is to complete the information related to the micromorphology and taxonomy of *P. orientalis* (L.) Feinbrun. Quantitative and qualitative investigation of traits related to indumentum, pollen and nutlet was done using light and scanning electron microscope. In the study of the indumentum, the seta has a bubble-like base with two to three rows of cells, sometimes brown gland-like secretions are seen at the apex and along the seta. Short hairs that can be seen in two forms, simple and glandular at the apex. Indumentum is sparse on the leaf surface and dense on the marine, apical and midrib leaves. Orientation of the seta in the stem is erect. Stomata is level with epidermal cells and decorations of epidermal cells are Rugose-Steriate. Pollen grains are prolate and tricolporate with dense wart-like decorations was seen as granulate. Nutlet is oval with multi-row relief decorations and its apex is not curved. Surface cells of the nutlet are elongated polygonal with clear borders and the size of the areole is less than half of the nutlet. Phenotypic flexibility in traits is an effective mechanism for adapting to environmental changes, and micromorphological traits are reliable indicators that remain relatively stable in response to environmental changes. Surface ornamentation of nutlets, bubble-like base of the seta, density of indumentum and the length of areoles are crucial factors in distinguishing

species within the genus *Podonosma* Boiss. It is suggested to conduct molecular studies for different populations of this species in Iran.

216. Micromorphological study of epidermal structure in *Pycnocycla spinosa* in Semnan province

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Pastures are one of the most important and valuable national resources of the country, whose reform and restoration can play an essential role in preserving and protecting water and soil and meeting the needs of the country. *Pycnocycla spinosa* belongs to the genus *Pycnocycla* and the family Apiaceae; which has 20 species identified all over the world, and in Iran it has 3 species of permanent plants, of which 4 species are endemic. This plant is known as animal fodder due to the transformation of the leaves into thorns, and it is also considered as a medicinal plant, for example, its alcoholic extract can be used as a mouthwash to treat oral infections. The present research was conducted to investigate the micromorphology of the epidermis of this plant in Semnan province. Suitable samples of the studied species were collected and identified from an area in the west and northwest of Semnan. For scanning electron microscopy (SEM) studies, parts of the aerial parts of the plant, including leaves, stems, and inflorescences, were sent to Razi Metallurgy Center in Tehran. The stem and leaves of this plant have multi-layered and thick skin. The results showed that the epidermal cells are irregular and the anticlinal wall is smooth. The type of stomata in this species is anmocytic, the number and density of stomata on both sides of the leaf are almost the same. The average length of the stomata on the upper and lower part of the leaf varies between 1.23 and 2.49 micrometers and the average width of the stomata on both sides of the leaf varies between 0.48 and 1.2. This plant has many protective glandular trichomes in different vegetative parts. Microscopic images showed that the trichomes of this plant in different parts are of the long stem type, which have a raised and egg-shaped part in the upper part, on which many secretory glands can be seen. The comparison of the average length of long and dense filamentous trichomes in the covering tissues of this plant showed that the trichomes in the calyx of this plant are the longest trichomes with an average length of 18.42 micrometers; Having an opening with a small length and width, the presence of long trichomes, as well as the presence of many glands on the trichomes of the plant can be considered as a type of adaptation for the absorption of gypsum materials in the soil of this plant. Considering that no detailed study has been done on the gypsum plants of the study area, the data obtained from this research can

217. Micromorphological study of epidermal structure in *Dendrostellera lessertii* in Semnan province

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Due to suitable climatic conditions and other special geographical factors, many diverse plants grow in many parts of Iran, most of which have important therapeutic properties. *Siiiah Gineh* (*Dendrostellera lessertii*) is a bushy and perennial species of the family Thymelaeaceae that naturally grows in most of Iran's pastures, including Azerbaijan, Manjil, Hamadan, Yazd, Khorasan, Semnan and Saveh. It is published. This plant is the only species of the genus

Dendrostellera in Iran, which is a bushy plant with a height of 20-60 cm, with many branches, wooden branches, grooved and hairless and hairy in the young parts. The present research was carried out in order to investigate the micromorphology of the structure of the epidermis of this plant in Semnan province. For scanning electron microscope (SEM) studies, a piece of leaf, stem, and calyx was sent to Razi Metallurgy Center in Tehran. The leaf in this plant has a thick and multi-layered cuticle; The results showed that the epidermal cells are irregular and the anticlinal wall is wavy. The type of stomata in this species is parasitic, and the number and density of stomata were observed to be higher under the leaf than on its upper part. The average length of the stomata on the upper and lower part of the leaf varies between 1.3 and 2.2 micrometers and the average width of the stomata on both sides of the leaf varies between 0.68 and 0.87. This plant has protective and covering trichomes in different vegetative parts; The comparison of the average length of long and dense filamentous trichomes in the studied covering tissues of this plant showed that the stem of this plant with an average trichome length of 30.72 micrometers has the longest trichomes and the shortest trichomes with an average length of 14.72 micrometers corresponding to the upper part of the leaf. is; Having an aperture with a small length and width as well as long trichomes in this plant can be considered as a type of adaptation to the environmental conditions and soil type of this plant. Considering that no detailed study has been done on the gypsum plants of the study area, the data obtained from this research can provide basic information for more comprehensive research.

218. Micromorphological study of leaf and calyx epidermis on the selected species of the genus *Verbascum* L. in Iran

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Verbascum L. is one of the largest genera of the Scrophulariaceae family encompassing almost 400 species. This genus in Iran includes 44 species and a few hybrids, of which 21 of the 44 species are endemic. The distribution of this genus is in the northern temperate hemisphere, where the highest species diversity is reported in the Mediterranean region. In Iran, the greatest diversity center of *Verbascum* species is found in the Irano-Turanian area. Quantitative and qualitative micromorphological characteristics of leaf and calyx epidermis and calyx shape of 33 species were studied using both light and scanning electron microscopes. In this research, the epidermal cells of leaf and calyx have different shapes and various decorations such as Rugose, Smooth, Straight, etc., which seems to be especially diagnostic traits among the members of this genus. According to the results, the variety of sepal shape, leaf and calyx epidermis type, bract size, etc. can be considered as distinguishing features and have taxonomic value in the separation of species.

219. Studying the antioxidant activity of vegetative and reproductive parts of the medicinal plant, *Smyrniium cordifolium* Boiss.

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The plants are always exposed to environmental stress, such as oxidative stress. These plants always carry out reactions in themselves to prevent these oxidative stresses. Plants produce different amounts of antioxidant compounds that protect them against damage caused by reactive oxygen species. *Smyrniium cordifolium* is a food-medicinal plant belonging to the Apiaceae family, which grows in the western and southwestern regions of Iran. The purpose of this research is to determine the antioxidant activity of the vegetative and reproductive parts of the *Smyrniium*

cordifolium Boiss., collected from the Kabirkouh and Oshtorankouh. Ethanolic extract was prepared after drying in the shade. The antioxidant capacity of the extracts, was determined by measuring the reduction of radical capacity using the stable radical 2-2-diphenyl-1-picrylhydrazyl (DPPH); based on IC₅₀ values. The statistical analysis was conducted using SPSS software, and the comparison of averages was done using Duncan's test. The results showed that there was a significant difference in antioxidant activity between the methanol extracts of two developmental stages, as well as the habitats ($p < 0.05$). In two habitats of Kabirkouh and Oshtorankouh, the lowest amount of IC₅₀ was observed during the reproductive stage, with values of 0.61 and 0.79 mg, respectively. The highest values were related to the vegetative stage in Oshtorankouh and Kabirkouh, respectively, with values of 1.36 and 1.34 mg, which indicates a lower antioxidant capacity (higher IC₅₀ value). The higher values are attributed to the lower altitude and higher average temperature of Kabirkouh's habitat compared to Oshtorankouh, as well as the plant's production of a higher quantity of secondary metabolites in response to environmental stresses.

220. Floristic Study of Ghostin Lar in Qazvin Province

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Solving ecological problems and managing natural resources requires the study of vegetation. Knowing the vegetation of each area can be the foundation of other researches and leads to proper management of the area. Since the flora of each area shows the reaction of the biological factors against environmental conditions, it is important to know the habitats and environmental conditions. Therefore, for the first time, the plant species of Ghostin Lar village were collected and registered in the herbarium of Kharazmi University. Ghostin Lar village with an area of about 1503.5 hectares is located on the way from Qazvin to Alamut. The minimum and maximum altitude in the area is 1500 and 2548 meters, respectively. Floristic studies of this area included 33 families, 102 genera and 115 species. The largest number of species belongs to the Astragalus genus and the highest frequency was belonged to families Asteraceae, Fabaceae and Brassicaceae. The most of species was belonged to Irano-Turanian floristic elements.

221. Essential oil phytochemistry and chemotype of *Nepeta Baluchestanica* as a critically endangered species of Baluchestan area

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Nepeta species from the Lamiaceae family exhibit diverse pharmacological effects, including anti-inflammatory, analgesic, anticancer, antioxidant, and antimicrobial properties. The *Nepeta* genus also features two primary essential oil chemotypes. The initial chemotype is nepetolactone, while the second one consists of 1,8-cineole and/or linalool. *Nepeta baluchestanica* a perennial species, is native to Sistan and Baluchestan province in southeastern Iran, primarily found in rocky habitats.

In the present study, the chemical composition of *N. balouchestanica* essential oil (EO) as a critically endangered species (according to the International Union for Conservation of Nature, IUCN) was investigated by GC-FID and GC-MS instruments. Among the 29 compounds, the main constituents in EO were 1,8-cineole (16.05%), followed by caryophyllene oxide (12.92%) and bornyl acetate (8.01%). Additionally, these results indicate 1,8-cineole chemotype for this species. The proper chemotypes must be conserved and introduced into cultivation to prevent extinction. It is suggested that its habitat be conserved by the Forests, Range, and Watershed Management Organization, the number of livestock grazing in the region be reduced, and more sustainable use of habitats be made.

222. Phytochemical study (anthocyanins, phenolic and flavonoid compounds) of the medicinal plant *Jubertia aucheri*

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Secondary metabolites are a diverse group of molecules that help plants adapt to environmental stress conditions. A group of these compounds include phenolic compounds, flavonoids and anthocyanins, which, in addition to their protective role, are also effective in attracting pollinating insects and as molecular signals in the interaction of plants with the environment. Today, these compounds have received much attention in the world due to their many properties, such as antioxidant activity and various physiological properties, such as anti-cancer, anti-inflammatory, anti-allergic properties and prevention of heart artery blockage, cholesterol reduction and high blood pressure. The medicinal plant *Gaillonia aucheri* is a plant from the Rubiaceae and it is usually scattered in the south of Iran, which is called "Kartoos" and is used in traditional medicine as an antibacterial, antifungal and analgesic agent and as a medicine to treat blood pressure. In the present study, the flowering branches of the plant were collected from the plant habitat located in the city of Kohnuj (Kerman province). The quantitative measurement of phenolic compounds including phenolic compounds, flavonoids and anthocyanins by spectrophotometric method and qualitative measurement and identification of anthocyanins with HPLC were performed. The results showed that the amount of total phenolic compounds, flavonoids and anthocyanins in the plant is 192.12 ± 2.51 mg/g dry weight, 671.84 ± 4.22 microg/g dry weight and 8.70 ± 0.17 mg/100 g dry weight respectively. The analysis of HPLC chromatogram also showed that the only anthocyanin compound identified in this plant is Malvidin-3-O-glucoside.

223. Introducing the Brassicaceae family as one of the important attractive families for honey bees from Ilam province (Iran)

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Melissopalynology studies the pollen collected by honey bees. It is particularly important in identifying the flora of different regions, preserving native plants, producing high-quality honey, and increasing agricultural products. In Iran, during the past half century, several studies have been conducted in this field. This research was carried out in the west of Iran: Ilam: Abdanan: Murmori, Abtaf. At first, pollen samples were collected through field visits to plants of interest to honey bees and also by sampling from the frames and pollen traps of bee hives. The acetolysis method was used to study the pollen by light microscope (LM). Among the characteristics of Cruciferae (Brassicaceae) family pollen, it is small to medium size, prolate-spheroidal shape, tricolpate

aperture with reticulate ornamentation surface exine and yellow color. Also the plants of this family, including the species *Eruca sativa* Mill. Compared to other species, they have occupied the dominant herbaceous cover of the studied area, and they flower from the second half of February onwards. Cruciferae family is introduced as the most abundant and important attractive family for honey bees in terms of nectar and pollen. On the other hand, pollination especially by bees, helps a lot to preserve native species. It also causes an increase in crops such as Rapeseed (*Brassica napus* L.) with extensive planting in western and southwest regions. Therefore, it is very useful for beekeepers to identify attractive plants for honey bees in other tropical regions for wintering colonies.

224. Coping with salinity stress with mixed cultivation of *Suaeda fruticos* and lettuce

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Today, soil salinity in arid and semi-arid regions of the world is one of the major environmental factors that affects the production of crops and causes a decrease in their growth and performance. Many plants with high economic value are sensitive to salinity. In contrast to sensitive plants, there are salt-loving plants (halophytes) that have a high ability to produce crops in various conditions. Considering that many regions of Iran are exposed to salinity stress, in this research, mixed cultivation of Egyptian black salt plant (*Suaeda fruticose*) was done as a plant along with lettuce. The experiment was done factorially and in three levels of low salinity with EC=2-3, medium with EC=6 and very salty with EC=20. Lettuce and black salt with normal irrigation and lettuce with three levels of salinity were the control treatment. . Fresh and dry weight of root, stem and leaf and chlorophyll content were measured. The results of the research showed that in monoculture, lettuce does not tolerate high salinity and it dies, but in mixed cultivation with black salt, soil salinity is adjusted and lettuce survives. The highest growth and yield and the amount of chlorophyll were in the treatment with moderate salinity, which can be concluded that black salt plant plays an important role in absorbing solutes and reducing soil salinity, and due to high salinity tolerance, it can be mixed with sensitive plants. In addition to adjusting the salinity of the soil, it also benefits from its medicinal, food and fodder benefits.

225. Comparison of the Protective Effects of *Glomus intraradices* and Magnetic Water on Sunflower (*Helianthus annuus* L.) Under Supergalant Herbicide Stress

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An experiment was conducted in a completely randomized design with four herbicide concentration levels and three replications to investigate the comparative effects of mycorrhizal symbiosis and magnetic water in mitigating the effects of Supergalant herbicide on the morphological and biochemical indices responses, of sunflower plants. Approximately 50 grams of fungal inoculum was added to the soil of pots treated with mycorrhiza. These pots were irrigated with distilled water for the first two weeks of planting, followed by irrigation with half-strength Hoagland solution every other day from the third week onward. Pots treated with magnetic water were irrigated with magnetic water from the beginning of planting until the end, while control plants were irrigated with distilled water. At the 4-6 leaf stage, different concentrations of herbicide were sprayed onto the aerial parts of the plants. The effects of the herbicide on the measured parameters were quite evident in both control and treated plants. With an increase in herbicide concentration, the content of photosynthetic pigments, chlorophyll a and b, decreased in the leaves, but this decrease was less pronounced in mycorrhizal and magnetic water-treated plants compared to the controls. As herbicide concentration increased, the content of carotenoids and anthocyanins,

and the soluble sugar content in the aerial parts and roots increased, while total protein content in the aerial parts and roots decreased. Overall, the results indicated an improvement in the growth, physiological, and biochemical conditions of sunflower plants under Supergalant herbicide toxicity due to mycorrhizal symbiosis and magnetic water irrigation. These adaptive responses were more pronounced and effective in plants inoculated with mycorrhizal fungi.

226. Comparison of some photosynthetic traits in lemon and fig trees in the heat of July in Behbahan city in Khuzestan province

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Heat stress is considered one of the problems of agriculture in the world, which reduces the growth and performance of agricultural plants due to the extensive response of plants to physiological, morphological and biochemical changes. Lemon and fig trees that were more than 5 years old were selected for study and some photosynthetic traits were measured. The results showed that the photosynthetic index in figs was significantly higher compared to lemons, so that the photosynthetic index in figs increased more than 3 times compared to lemons. Also, the maximum performance of photosystem 2 in figs was 67.2% higher than in lemons. The number of chlorophyll meter was significantly decreased in figs compared to lemons, so it showed a 75% decrease in figs compared to lemons. In severe heat stress conditions, chlorophyll levels decrease due to peroxidation of chloroplast lipids and thylakoid membranes. When both figs and lemons are subjected to heat stress, the relative concentration of leaf chlorophyll decreases in them, but due to the greater surface area of figs, the decrease is greater, and the results of this research also indicate this issue. This research showed that in heat stress, more tolerant trees such as figs are less damaged in terms of photosynthetic traits compared to less tolerant trees such as lemons, and it is recommended to consider these things when planting trees in tropical areas.

227. Comparison of Stability of barberry (*Berberis integerrima*) anthocyanins in various fruit juices under varying conditions of temperature, heating and time of storage

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Anthocyanins are members of the flavonoid group of phytochemicals. The free-radical scavenging and antioxidant capacities of anthocyanin pigments are one of the important properties. Consumer concern over the safety of synthetic food colorants has increased the demand for natural food colorants. Anthocyanins are the best-known natural red colorant used in foods. Fruit juices (apple, grape, orange) and nectars (peach and pineapple) were color with barberry juice and stability of barberry anthocyanins in these matrices was studied during heating at 70, 80 and 90 °C and storage at 4 and 37 °C. During heating, barberry anthocyanins in apple and grape juices showed higher stability than those in citrus juices at 70 and 80 °C after 600 min. High stability was also obtained for the anthocyanins in peach nectar at these temperatures. Barberry anthocyanins were the least stable in orange juice during both heating and storage. During storage, degradation of anthocyanins was very fast at 37 °C, especially in pineapple nectar. Increase in stability of barberry anthocyanins was found in temperatures 4 °C after 180 days in all samples.

228. Comparison of phytochemical compounds of German chamomile (*Matricaria chamomilla* L) with hot and cold enfleurage extraction methods

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Chamomile herbal extract compounds are effective for some therapeutic activities. Chamomile essential oil has antimicrobial and antiseptic properties, which are also used in the treatment of diseases, due to the presence of effective compounds such as alpha bisobolol and camazolin. Choosing a suitable extraction method can increase the concentration of antioxidants related to the plant. In the present study, essential oil extraction was performed using two hot and cold enfleurage methods in order to better preserve the effective medicinal substances. The results of the analysis of essential oil components by GC-MS method of the main compounds of the essential oil of chamomile medicinal plant showed that the highest amounts of the main compounds of German chamomile in the hot enfleurage method α -Bisabolol oxide (31.80%) and (Z)-Tonghaosu (28.33%) And in the cold enfleurage method, these compounds were (Z)-Tonghaosu (25.70%) and α -Bisabolol oxide (16.30%). Based on the results of this research, the most significant chemical compound of chamomile plant essential oil was alpha-bisobolol, and the amount of this compound was found between 16-30% in different essential oil extraction methods. It seems that the extraction method with warm enfleurage has a higher performance for extracting the effective medicinal substances of German chamomile flowers.

229. Comparison of Morphology between Two Sections: *Epilobium* sec. *Chamaenerion* and *Epilobium* sec. *Epilobium* in the Onagraceae Family

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The family Onagraceae comprises 7 tribes, 16 genera, and approximately 652 species distributed worldwide. The genus *Epilobium* includes 6 sections with about 199 species, two of which, *Epilobium* sec. *Chamaenerion* and *Epilobium* sec. *Epilobium*, are found in Iran. In this study, morphological traits of 18 species from two sections of *Epilobium* were examined. For each species, measurements were taken from three randomly selected individuals. Mean quantitative and qualitative traits were used for statistical analyses. Species grouping and their geographical distribution were analyzed using CVA method. PCA was employed to identify distinguishing traits among species. Based on plotted diagrams, it was revealed that *E. dodonaei* and *E. stevenii* from the *Chamaenerion* section exhibit the closest affinity due to traits such as leaf width, stamen length, petal length, petal length to width ratio, seed length, and leaf arrangement. *E. angustifolium* from the same section is slightly distant from these two species. Within the *Epilobium* section, species like *E. parviflorum* and *E. rechingeri* are distinguished by their bract length and stem branching, *E. anatolicum* and *E. gemmascens* by flag leaf length and ratio of bract length to flag leaf length, and *E. roseum*, *E. minutiflorum* by petal length and width. *E. algidum*, *E. confusum*, and *E. lanceolatum* show closeness due to traits like stem crack shape and presence or absence of axillary buds. Among the species in this section, *E. tetragonum* diverges notably due to leaf length.

230. Comparison of the Morphology of Hairs in *Eriobotrya japonica*, *Olea europaea* and *Sonchus oleraceus* Using Light Microscopy

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Comparison of hairs is important for studying the evolution and relationships between plants, as well as understanding the role of hairs in ecological and physiological adaptations. The density and type of hairs are different among different species and even among the organs of the same plant, and they are divided into tuberous, non-tuberous, branched and non-branched hairs. The purpose of this research is to investigate and compare the morphology of hairs in *Eriobotrya japonica*, *Olea europaea* and *Sonchus oleraceus* using light microscope. For this purpose, cross-

sections of the stems and leaves of the target species were prepared and studied with the help of an optical microscope. Investigations showed that hairs were branched in olive, non-branched, unicellular and baseless and in loquat non-branched but multicellular and conical in spiny sowthistle. The shape, the density of the hair, the position of the hair in relation to the surface of the epidermis, the amount of curvature or bending of the observed hairs were different among the plants. Therefore, the evaluation of the morphological diversity of hairs showed that the presence and absence of hairs, the type and density of hairs can be a suitable diagnostic feature in the studied group and useful in identifying genera and some species.

231. Comparison of growth indices and content of phenolic compounds of *Marrubium vulgare* L. plant in perlite and rockwool substrates in hydrponic cultivation

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The *Marrubium vulgare* L. plant belongs to the Lamiaceae family. Considering the wide potential of this plant for medicinal use as well as the continuous discovery of its beneficial properties, there has been a lot of interest in *Marrubium vulgare* L. plant recently. This plant contains marrubiin and also hs complex compounds of phenolic metabolites. The hydroponic system in a controlled environment can produce high quality medicinal plants, away from the effects of factors such as wind, soil pollution and heavy metals in the soil. The purpose of this research is the effect of cultivation medium on the growth indicators and phenolic content of white this plant in soilless cultivation. This experiment was conducted in the form of a completely randomized design with 2 treatments and 3 replications in the research greenhouse of Al-Zahra University in Tehran. The treatments included perlite and rockwool beds, and the biggest difference in shoot growth was related to the rockwool bed, which showed a significant difference compared to the perlite bed. At the same time, no difference was observed on the relative water content. The highest amount of phenolic compounds was related to rockwool substrate, which was significantly different from other substrates. The overall conclusion shows that most of the quantitative and qualitative characteristics of the white frasion plant in hydroponic culture depend on its substrate, so that the best quantitative and qualitative characteristics of the *Marrubium vulgare* L. plant are obtained from the rockwool substrate.

232. Comparison of nutritional content and storage status of *Trigonella persica* seeds by changing light conditions during germination

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Trigonella persica is an herbaceous annual plant with medicinal properties from the legume family, whose seeds are rich in 25.5% protein, 45–60% carbohydrates, 20% mucilage, amino acids (4-hydroxyisoleucine), and vitamins. This study looked at the effects of LEDs in blue, red, and blue-red (1:1) on the protein and carbohydrate content of *T. persica* seeds during germination, comparing them to dark conditions as controls. Spectrophotometric evaluations revealed that roasted sprouts exposed to red light underwent a 50% decrease in total sugar content from the beginning to the end of the germination period. Meanwhile, in the middle of germination (48 hours after imbibition), the starch content under red light was significantly lower than under dark conditions (control group). The exposure to blue light resulted in a marked increase in total protein

levels. Scanning electron microscopy (SEM) demonstrated that the palisade and spongy parenchyma cells of the control group had a distinct shape, as shown by the presence of tiny particles on their surfaces. When exposed to blue light, the spongy parenchyma cells developed many holes and were devoid of substance. As a result, using various LED light wavelengths, particularly blue light, may help achieve optimum protein and carbohydrate concentrations in medicinal plant seeds, including *T. persica*.

233. Comparison of in vitro culture of chestnut (*Castanea sativa* Mill.) using stationary liquid and solid media

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Chestnut tree (*Castanea sativa* Mill) is one of the native species of Guilan province and belongs to Hyrcanian forest, which is in danger of extinction due to fungal diseases, animal grazing and high amount of unhealthy seeds. The purpose of this research was to evaluate the feasibility of establishing chestnut explants in spongy liquid medium and comparing it with solid medium. For the first time in this research, sponge was used as a substitute for agar, which is the most expensive part of the culture medium. Lateral buds of one-year-old *Castanea sativa* seedlings were created in laboratory conditions and used as the primary material of the experiment. After ensuring no contamination, the explants were transferred to solid and liquid culture medium (Murashige Skoog) MS sponge. This experiment was conducted in the form of a completely randomized design with two treatments (culture medium) and 5 replications. The independent t-test mean comparison results showed that there is no significant difference ($P \leq 0.05$), between the traits of stem length and number of leaves in solid and liquid medium. Therefore, the use of sponge liquid medium is recommended for students and commercial producers in order to reduce production costs.

234. Genetic engineering of safflower aiming to increase oil content by transferring LPAAT and WRI1 genes

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It is predicted that the world's population will reach two billion by 2050, leading to food insecurity. Oilseed crops have been identified as key players in addressing these challenges, as they produce and store lipids in the form of triglycerides, which can be utilized as a source of food, renewable fuels, and more. Significant progress has been made in enhancing oil content in seeds as well as in research efforts aimed at uncovering the regulatory pathways involved in fatty acid synthesis. Safflower is a unique oilseed crop. To investigate the transfer of the WRI1 and LPAAT genes, which are instrumental in increasing oil content in safflower, the expression constructs pBin19-LPAAT and pBin19-LPAAT, WRI1 were utilized. The WRI1 gene, derived from Arabidopsis, was cloned with a size of 1100 bp and is regulated by the specific promoter SBP. The LPAAT gene, sourced from rapeseed, was cloned at a size of 700 bp and is also regulated by the specific promoter SBP. In the combined construct, the WRI1 gene is under the control of the specific SBP promoter, while the LPAAT gene is regulated by the specific Napin promoter. Safflower seeds of the Padideh line were subjected to disinfection and appropriate explant generation, followed by inoculation with Agrobacterium strain EHA105. Subsequently, genomic DNA was extracted from the presumed transgenic plants, confirming the presence of the WRI1 and LPAAT genes. Furthermore, seeds from PCR-positive T0 generation seedlings were cultivated, and the selection of transgenic seedlings continued through to the T2 generation via PCR.

235. Mechanisms of Sesame Plant Defense Responations versus salinity stress using bioinformatical software

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Sesame (*Sesamum indicum* L.) is an oil product that known for having high protein content of 30-60% and significant amounts of essential amino acids HSFs are part of complex signaling networks that regulate responses to a wide range of abiotic stresses, including cold, high temperature, drought, hypoxia, and soil salinity. The purpose of this research is to investigate the different evolutionary stages of the HSF gene family in sesame. Analysis of HSF gene expression in sesame showed that HSF genes are involved in different developmental and tissue stages and HSF gene expression under drought stress conditions indicated that 90% of genes respond to drought. 1500 pairs of upstream coding area were extracted from the NCBI site and imported as promoter sequences in the Plantcare database. The results of the uploaded data were sent to email and the results were compiled in Excel. According to this data, 55 cis elements were identified. Data analysis was done in TBTOOLS software and the results were displayed as a Heatmap graph. The interpretation of the graph shows the placement of cis elements on the promoter sequence. And the results show that the highest number of cis elements are related to TATA box and CAAT-box, and the least number of them are related to CAG-motif and 3-AF1 binding site. To determine the location of genes in the cell, protein sequence analysis was performed in Wolf software and the results showed that except for SiHsfA5, which is located in the cytoplasm, the rest of the genes are located in the cell nucleus.

236. The effect of reproduction and feeding on the chemical and medicinal properties of some genotype of clover plant

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Clover is a plant from the Fabaceae family, the gum extracted from which has many uses in various industries. The gum of this plant is known as a substance rich in protein, in which there are two sugars, galactose and mannose. Clover seed contains parts called embryo, endosperm and shell, which is known as a rich source of galactomannan sugar. The purpose of this research is to investigate the effect of characteristics such as protein percentage, antioxidant compounds and the amount of substances present in this plant at different times of reproduction on clover genes. At first, two genotype, RGC1031 and RGC1066, were prepared. In this experiment, the samples were cultivated in the form of double-sliced plots in the form of random blocks at two different times. During irrigation, the seeds were placed at a distance of half a meter from each other and irrigation was carried out on them, and then the gum was separated in such a way that the seeds were soaked in water for 10 hours and due to shaking, The gum and other parts were separated. The amount of ash in this experiment was measured by burning the sample with indirect heat at a very high temperature. Also, to measure phenolic compounds, 1 cc of quercetin was mixed with 5 cc of folin reagent which was diluted to a suitable ratio and then incubated at 25 degrees and finally calcium carbonate was added to it and allowed to complete the necessary reaction. Then, the absorbance of its wavelength was measured by a spectrophotometer and ethanol was used to check its medicinal and chemical properties. Finally, the observations showed that different irrigation methods and cultivation time had an effect on all medicinal and chemical properties. It was also

found that among the genotype tested, the RGC1066 genotype has the highest amount of protein and antioxidant compounds.

237. Cellular symptoms of manganese toxicity in *Lamium album* plant

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Manganese (Mn) is an essential element for higher plants. A high availability of Mn²⁺ (MnII), as the consequence of soil flooding or low pH, leads to enhanced root uptake and causes toxicity to plants. Mn toxicity symptoms are categorized as symplastic (chlorosis) and apoplastic (leaf spots or brown speckles) symptoms. The apoplastic symptoms are generated by the accumulation of MnO₂ (MnIV) or oxidized polyphenols. In this work, Mn toxicity and accumulation was studied in *Lamium album*, which is usually exposed to Mn²⁺ toxicity in acid soils of its natural habitat. The rooted cuttings were treated with 800 μ M Mn (pH 5.8) and grown for four weeks under these conditions. The young leaves showed chlorosis (symplastic toxicity) while the mature leaves were characterized by development of dark-brown speckles (apoplastic toxicity) that could not be removed by hot ethanol suggesting that the localized browning are caused by MnO₂ accumulation not polyphenols. Microscopy observation confirmed the accumulation of MnO₂ in the walls of epidermal cells. Unexpectedly, the apoplastic symptom was associated with even lower activity of peroxidase, polyphenol oxidase and H₂O₂ level. These results implied that lower entry into the leaf symplast and higher cell wall binding capacity was the main reason for development of apoplastic symptoms in the mature leaves. After eight weeks growth under these conditions, the old leaves accumulated Mn at 2.3 mg g⁻¹ DW, which was lower than the criterion for Mn hyperaccumulation, but growth data showed a high tolerant to Mn toxicity in this species.

238. The role of cytosolic free Ca²⁺ in the regulation of putrescine-induced lignan production in *Linum album* cell culture

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Polyamines are nitrogenous compounds that play important roles in regulating the growth, development and defense responses of plants. Previous studies showed that polyamine putrescine increases the production of lignans in *Linum album*. This study was conducted to investigate the mechanism by which putrescine regulates lignans production in *L. album* cell culture. For this purpose, the cells were treated with optimal concentrations of putrescine and extracellular Ca²⁺ chelator (EGTA), and the desired factors were measured at different time points. Fluorometric assay results showed that putrescine increases cytosolic free Ca²⁺ concentration rapidly and transiently, while pretreatment of cells with EGTA inhibited this increase. Also, putrescine led to an increase in the contents of hydrogen peroxide (H₂O₂) and salicylic acid (SA) up to 24 h after treatment, which further analysis showed their sensitivity to pretreatment of cells with Ca²⁺ chelator. The results obtained from HPLC and RT-qPCR revealed that the content of podophyllotoxin and the expression level of key gene involved in its production, pinorsinol-laricirsinol reductase (PLR), also increased in response to putrescine, while the co-treatment of cells with putrescine and EGTA led to a significant decrease in their levels compared to the samples treated with putrescine alone. Therefore, it can be concluded that putrescine can induce the expression of PLR by initiating Ca²⁺ signaling pathway in *L. album* cells, probably through a H₂O₂- and SA-dependent pathway, and thereby increase the production of podophyllotoxin.

239. The Role of MicroRNAs in Trans-kingdom Interactions of Rice and the Blast Fungus *Magnaporthe oryzae*

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Rice (*Oryza sativa*) is prominent among cereals because it is a primary staple food for 50% of the world's population. One of the biotic stresses that threaten rice production is the rice blast disease caused by the hemi-biotrophic fungus *M. oryzae* (*Magnaporthe oryzae*). Rice blast disease results in yearly crop losses amounting to billions of dollars, sufficient to provide food for 60 million individuals. MicroRNAs are a group of short non-coding RNA molecules (18–22 nt) that regulate gene expression at post-transcriptional levels and play critical roles in RNA silencing. Recent studies have shown that these molecules also play a role in cross-kingdom communication between hosts and pathogens. For the first time in this study, the bioinformatics methods and software explored the possible Cross-kingdom miRNA interaction of rice and its fungal pathogen (*M. oryzae*). The results show that 13 rice known microRNA families including, mir171, mir172, mir319, mir394, mir396, mir398, mir160, mir162, mir164, mir166, mir167, mir168, and mir169 target *M. oryzae* transcripts related to viability and pathogenicity. All these miRNAs were up-regulated in rice compared to control during *M. oryzae* infection. Key biological pathways of *M. oryzae* that possibly are regulated by host miRNAs are energy production, metabolic regulation, cellular signaling, Pyruvate Metabolism, the Citrate Cycle (TCA Cycle), The cAMP-dependent protein kinase A, and the MAPK Signaling Pathway. These findings help to understand the mechanisms of plant biological interactions and have applications for disease management strategies.

240. The impact of salinity on enhancing the therapeutic qualities of the *Salicornia*.

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Beyond elucidating the resistance mechanisms of the halophyte *Salicornia persica* in response to salinity stress, the secondary metabolites of this species hold significant medicinal value. This research aimed to explore the antibacterial properties of *Salicornia* under salt stress. Initially, the seeds were sterilized, and after a germination period of four days, each pot containing five seedlings was irrigated with Hoagland's solution supplemented with 50, 200, and 400 mM NaCl. Following a growth period of approximately 60 days, three replicates from each treatment group were randomly selected for evaluation of their antimicrobial activity against five bacterial species: *Escherichia coli*, *Staphylococcus aureus*, *Bacillus subtilis*, *Pseudomonas aeruginosa*, and *Klebsiella pneumoniae*, utilizing the Kirby-Bauer disk diffusion method. The findings indicated a significant difference in antimicrobial activity against *E. coli* and *S. aureus* compared to the other microorganisms examined. The most pronounced antimicrobial effect observed for *E. coli*. Notably, the largest inhibition zone was recorded in plants treated with 400 mM NaCl, exhibiting a diameter of zone inhibition nearly 50% greater than that of the control group. Furthermore, as the salt concentration in the environment increased, the antimicrobial efficacy of *Salicornia* against *B. subtilis*, *P. aeruginosa*, and *K. pneumoniae* also intensified. The diameter of zone inhibition increasing by more than fivefold at the highest salt concentration. These physiological responses of *Salicornia* to salinity stress suggest that the enhanced antimicrobial activity may be associated with elevated levels of phenolic compounds, anthocyanins, carotenoids, and antioxidant activity under saline conditions.

241. Application of chitosan-coated cysteine nanoparticles to reduce the negative effects of cadmium stress in grapevine (*Vitis vinifera* L.) cv. Perlette

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In recent decades, the rapid growth of urbanization, the expansion of cities, and the industrial revolution have caused the accumulation of various pollutants such as cadmium in the environment. Consequently, increasing the concentration of these pollutants in the environment reduces the growth and yield of crops, including grapevine. Nowadays, nanotechnology is one of the new ways to overcome the adverse effects of heavy metal toxicity. Therefore, in the current research, chitosan-coated cysteine nanoparticles was used to increase the tolerance of grapevine (*Vitis vinifera* L.) cv. Perlette against cadmium stress. The present research was performed as a factorial experiment in a completely randomized design with five treatments and three replications under greenhouse conditions. The purpose of this study was to investigate the effects of different levels of cadmium stress and the application of treatments containing cysteine and chitosan on the growth and biochemical parameters of grapevine. Research treatments included cysteine 50 mg/L, chitosan 0.1%, chitosan-coated cysteine nanoparticles in two concentrations (25 and 50 mg/L), and three levels of cadmium (0, 100 and 200 mg/kg of soil) stress. The results showed that although plant growth and photosynthetic pigments decreased with increasing cadmium stress concentration, the use of treatments containing cysteine and chitosan improved these parameters. Therefore, increased photosynthetic efficiency, resulting in increased plant tolerance to stress conditions. The improved parameters of grapevine and the increase in plant resistance to cadmium stress by treatments containing chitosan and cysteine can be due to the rise in the activity of antioxidant mechanisms and the decrease in H₂O₂ and MDA content. In general, foliar spraying of chitosan-coated cysteine nanoparticles was the best treatment among the other treatments to reduce the negative effect of cadmium stress on grapevine plants.

242. Association of two species *Astragalus semnanensis* and *Astragalus fridae* in the gypsum soils of Semnan

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Gypsum soils are widely distributed in certain areas in the western and northwestern parts of Semnan, which contain many chalk-loving and chalk-tolerant plants. Many plants of special ecosystems, such as ecosystems with chalk, limestone and saline soils, have some morphological adaptations that lead to limited transpiration and water retention in the plant. The studied area is in the gypsum habitats west of Semnan city and in the northern strips of the famous desert of Iran called Dasht Kavir between three areas west of Mommen Abad with geographical coordinates 35°32' 38.96" North and 53° 17' 36.64" East, North and East Lasjard is located at the coordinates of 35° 26' 27.33" North and 53° 05' 2.8" East and in the south of Aftar with the coordinates of 35° 35' 54.63" North and 53° 7' 18.63" East. In addition, the northern parts of Sorkheh city, which is located between Lasjard and Mommen Abad, were also studied. This region has a hot and dry climate and the dominant cover of gypsophyte. *Astragalus fridae* can be seen in 80% of the plates from the chalk area. This species is in all places with a higher abundance than other chalk species. The high abundance of this species compared to other chalk-loving plants in the region shows its adaptability to chalky soils. *Astragalus semnanensis* is found in 68% of the plateaus and with a lower frequency than the chalk and in most of the northern and eastern slopes. These two species

were observed together in 64% of the plots. The presence of gypsum in the soil has provided the ecological conditions for the species of *A. fridae* and *A. semnanensis*, are native species of the gypsum regions west of Semnan and are exclusively gypsophyte species that grow only in areas with high chalk and with appropriate adaptability to the height and the ratios of calcium to magnesium ion concentrations and Potassium and sodium grow compatible in gypsum-limestone soils. The abundance of *A. semnanensis* in the surrounding areas of Lasjard is more than Momenabad and Aftar. *A. semnanensis* shows a good association with *Acantholimon cymosum* especially in the areas around Lasjard.

243. The Iranian endemic *Salvia majdae* taxonomic status based on floral ontogeny

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Since the first description of *Salvia majdae* (syn.: *Zhumeria majdae*) in 1967, Based on recent molecular phylogenetic data, two defensible opinions on its status have been proposed. we studied floral development using scanning electron microscopy to resolve this ambiguity. The aspects of floral symmetry, furthermore, are studied. Like species of *Salvia* and representative genera of Lamiaceae, the initiation sequence of sepals and stamens is unidirectional from adaxial to abaxial and reverse, respectively. The flowers show temporal overlaps in the initiation of petals and stamens. Unlikely, bidirectional initiation of the petals in *S. majdae* is reversed, starting with the abaxial middle petal, followed by two adaxial ones, and then finally ending with two lateral ones. The filaments of sterile stamens are elongated and exposed as staminodes in developmental stages. We concluded that the subequal growth of the calyx lips, weak cochlear aestivation and bidirectional initiation of petals and well-developed sterile stamens primordia are responsible for weak floral asymmetry in *S. majdae*. Based on these data, *S. majdae* shows significant differences with *Salvia*.

244. The status of Chicory family (Asteraceae) medicinal plants in the herbal markets of Karaj city

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Medicinal plants have been valuable to humans since the past. This text is the result of a research during the years 2018 to 2021 by studying and preparing plant samples in the herbal markets of Karaj city. These plants are often used in the form of seeds, powder, sweat, fruit and leaves. In this process, about 215 samples of medicinal plants were prepared from 33 herbal market in 12 regions of Karaj. Among the examined medicinal plants, three genera of Asteraceae and Lamiaceae together with 20 species and Fabaceae with 19 species had the highest number. Here, as an example, we examine one of the most important families, namely Asteraceae. In the Chicory family, the most important medicinal species or genera in Karaj Attaries are listed below: Bumadaran (*Achillea*), Aghergherha (*Anacyclus pyrethrum*), Babuneh badal (*Anthemis cotula*), Baba adam (*Arctium lappa*), Gol-e bimarg (*Helichrysum graveolens*), Tarkhun (*Artemisia dracunculus*), Berenjasf (*Artemisia vulgaris*), Gol-e hamishe bahar (*Officinalis calendula*), Golrang (*Carthamus tinctorius*), Bahman sefid (*Centaurea behen*), Gol-e gandom (*Centaurea depressa*), Kasni (*Cichorium intybus*), Kangar farangi (*Cynara cardunculus*), Shekar tighal (*Echinops cephalotes*), Kangar (*Gundelia tournefortii*), Kahoo (*Lactuca sativa*), Stevia (*Stevia rebaudiana*), Gol-e jafari (*Tagetes erecta*), Ghasedak (*Taraxacum*), Babuneh (*Matricaria*

chamomilla). The chicory family is generally antioxidant, blood purifier, antipyretic, lung tonic and effective in treating digestive problems, diabetes and nerves.

245. Assessment of Total Phenol Content of Walnut (*Juglans regia* L.) in Southern, Central, and Western Regions of Iran

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The walnut is a type of nut fruit with the scientific name *Juglans regia*, belonging to the Juglandaceae family. In the present study, to investigate the impact of habitat on total phenol content, leaf samples were collected from walnut trees with a trunk diameter of more than one meter, at least 100 meters apart, with five replicates from Kohgiluyeh and Boyer-Ahmad (elevation 2018 meters), Isfahan (elevation 2362 meters), Fars (elevation 2227 meters), and Kerman (elevation 2029 meters) provinces. Ethanolic extraction was carried out from dried walnut leaves, and the total phenol content was measured using the colorimetric Folin-Ciocalteu method. Total phenol concentrations were calculated using the gallic acid standard curve as mg/g leaf-dried weight. The highest and lowest amounts of phenolic compounds in walnut leaves were observed in samples from Kohgiluyeh and Boyer-Ahmad (97.04 mg/g DW) and Isfahan (45.25 mg/g DW), respectively. The results of this study indicated that the effect of elevation on total phenol content is significant, with an inverse relationship. Given the amount of phenolic compounds obtained, walnut leaves can be introduced as a substitute for synthetic antioxidants.

The Fourth International Conference on Animal Biology

Oral Presentation

1. Wnt signaling in cell Physiology: Its critical role in neurodegeneration

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Wnt signaling pathway plays major roles in regulating cell proliferation and differentiation. Wnt ligands are a family of 19 secreted glycoproteins that mediate their signaling effects by binding to Frizzled and LRP5/6 receptors. Signal transmission is either through b-catenin and its entry into the nucleus in the conventional pathway (canonical) or through a series of other proteins in a non-canonical pathway. Due to the complex interaction between Wnt signaling and other signaling pathways, the Wnt pathway plays critical roles in cell and organ physiology. Therefore, any dysfunction in this pathway leads to many diseases in a wide arrays of organs. The involvement of the Wnt signaling pathway in diseases such as cancer and neurodegenerative diseases has made the proteins of this pathway a therapeutic target. However, possible risks following stimulatory and inhibitory treatments should be considered. This would be possible by improving the current knowledge about the involvement of Wnt signaling pathway in cellular processes, as well as its interaction with other pathways.

2. L-Arginine prophylaxis has a protective effect on memory impairment in Alzheimer's disease rat model caused by intra-CA1 injection of A β 13

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A β 13 (A β) damages CA1, which has high levels of nitric oxide synthase (NOS). We investigated the protective effect of NO precursor L-arginine on memory recall in Alzheimer's model using a novelty seeking (NS) task that relies on learning memory. Wistar rats were anesthetized and cannulated at CA1 (AP: -3.8, L: \pm 2.2 mm, V: 3 mm) through which they received a single injection of A β (1–200 μ g/rat). A reference group exclusively received beta amyloid (β A) 2 μ g/rat, and a control group received only saline. After a week of recovery, they experienced NS task with habituation, confinement, and testing phase. A β -treated rats were injected L-arginine (0.05-25 μ g/rat), intra-CA1, prior to testing. L-NAME, a NOS inhibitor, was administered before L-arginine effective dose. At the end, after rat euthanasia, the hippocampal sample was collected on ice and evaluated by c-Fos immunohistochemical staining. All data were analyzed using ANOVA. Both β A and A β 13 caused the animal to stop on the unrestricted (novel) side. L-arginine restored memory recall deficit, which was inhibited by L-NAME. CA1 had no necrotic changes, but β A plaque accumulation was observed. L-Arginine prophylaxis has a protective effect on memory in Alzheimer's rats due to NO.

3. A Stereological study of ovarian tissue in rat with polycystic ovary syndrome (PCOS) treated with sitagliptin

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Polycystic ovary syndrome (PCOS) is the most common endocrine disease in women, which is associated with increased glucose and insulin resistance. Therefore, the effect of the antidiabetic drug, sitagliptin, on tissue changes of the ovary was investigated. Forty adult rats (200-220gr) were selected, and induced PCOS by gavage letrozole within 35 days except control group. After ensuring the induction of this syndrome, PCOS rats were grouped into untreated, metformin-treated and sitagliptin-treated groups at 40 and 80(mg/kg bw) by gavage (35 days). Finally, blood

was taken, and slides were prepared from the ovary tissue with the standard stereological protocol. By studying the photomicrograph, and using the optical dissector method, the types of ovarian follicles were counted, and the diameter of the egg, corpus luteum and the thickness of the layers were measured with Image analysis software. After the statistical analysis of data, Insulin and glucose in PCOS groups increase significantly compared to the control, and decreased with the use of metformin and sitagliptin. The tissue changes in the ovary included an increase in cystic and atretic follicles, and a decrease in antral and graafian follicles, as well as a decrease in the size and number of corpus luteum and ovum in the PCOS group, which improved significantly in the groups treated with both drugs ($p < 0.05$). The effect of sitagliptin 80mg/kg bw was similar to metformin, and stronger than the lower dose of sitagliptin. It seems that sitagliptin has improved the process of folliculogenesis in PCOS by reducing glucose and insulin.

4. Effect of trans-cinnamic acid on forebrain neuroinflammation and fetal hippocampus cell damage in preeclampsia model rats

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Pre-eclampsia (PE) can cause brain damage before birth. However, its mechanism is not clear. The present study shows the effect of cinnamic acid (CIN) on the expression of inflammatory cytokines of the forebrain and neuronal damage in the hippocampus of PE model fetuses induced with l-NAME. 25 pregnant female rats were randomly divided into 5 groups: control group (no treatment), PE+NS group (daily injection of 250 mg l-NAME from embryonic day (ED) 15 to 20 to induce PE and then one hour later normal saline gavage), PE+CIN25, PE+CIN50 and PE+CIN100 groups (CIN gavage with doses of 25, 50 and 100 mg, respectively, one hour after l-NAME injection). On the ED21, after cesarean section, the fetal brain was dissected. The content of tumor necrosis factor alpha (TNF- α), interleukin 6 (IL-6) and interleukin-1 beta (IL-1 β) in the forebrain and cell density in the CA1 and CA3 regions of the fetal hippocampus were measured. A significant increase in TNF- α , IL-6 and IL-1 β in the forebrain along with a decrease in neuronal density in the CA1/CA3 regions was seen in the PE+NS group compared to the control group ($p < 0.05$). While in the groups receiving CIN, they showed a significant decrease in TNF- α , IL-6 and IL-1 β in the forebrain and an increase in CA1/CA3 neuronal density compared to the PE+NS group ($p < 0.05$). CIN improved the inflammation and reduced cell damage in the hippocampus of PE model fetuses through modulating the level of anti-inflammatory cytokines in the fetal forebrain.

5. Network Pharmacology-Based Identification of Target Genes and Signaling Pathways of Quercetin on the Aging of Human Mesenchymal Stem Cells

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As aging progresses, there is a reduction in the quantity and functionality of bone marrow mesenchymal stem cells (BM-MSCs), which is linked to diminished bone formation and inflammatory responses. Quercetin is a plant-based flavonoid which known for its antioxidant and anti-inflammatory properties. The aim of this study was to investigate the pathways leading to the activation of the target genes and signaling pathways of quercetin using network pharmacology analysis. The GSE35959 dataset was obtained from the Gene Expression Omnibus (GEO). Differentially expressed genes (DEGs) in senescent BM-MSCs were normalized using GEO2R with $P\text{-Value} \leq 0.05$ and $-1 < |\log FC| < 1$. Quercetin-related targets were extracted from PharmMapper Server and overlapped with DEGs using Venn diagram on the molbiotools website and common genes were identified. The protein-protein interaction (PPI) network of 44 common

genes of quercetin and DEGs was done by using String database and Cytoscape software. The common potential genes were involved in Viral carcinogenesis, Chemical carcinogenesis and Purine metabolism. Additionally, among these common genes, 10 hub genes were identified based on MCC score, such as AURKA, PDGFRB, CDK6, PGR, SRC, JAK2, CYP19A1, CHEK1, RHOA and ESR1. This research provides new insights into the molecular mechanisms underlying aging of BM-MSCs. However, further studies are required for verification.

6. The effect of DNA fragmentation on XRCC2 gene expression and fertilization outcomes in men participating in artificial fertilization (ICSI)

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Examining sperm DNA fragmentation is a valuable diagnostic tool in the evaluation of male infertility, but its clinical importance in predicting the consequences of artificial insemination is unclear. Considering the conflicting results regarding the effect of sperm DNA fragmentation index (DFI) on the rate and quality of fertilization, the present study was conducted. For this purpose, after measuring DFI by chromatin dispersion method in 60 infertile men participating in artificial fertilization (ICSI), they were categorized into three DFI ranges of less than 15%, between 15 to 30%, and more than 30%. After fertilization, the fertilization rate and the number of the resulting embryos were determined. The obtained data were analyzed using appropriate statistical tests and the correlation of DFI with fertilization outcomes was evaluated with multivariate Regression (backward method). The obtained results showed that the XRCC2 gene expression decreased significantly with the increase in sperm DFI ($p=0.001$), and the correlation test showed a significant and direct relationship ($p<0.001$ and $r=0.77$) between this gene expression and the rate of fertilization, but no significant correlation was observed between DFI and number of embryos ($p=0.001$ and $r=0.29$). Also, inverse correlation was observed between DFI and fertilization rate ($r=-0.83$) and the number of resulting embryos ($r=-0.35$), at a significant level ($p<0.0001$). Based on these results, the DFI increase has a negative effect on the chance of male fertility, and embryo formation in artificial insemination, even in the intracytoplasmic sperm injection (ICSI). Therefore, DFI measurement in artificial insemination is recommended.

7. An Introduction to the Research Centre for Emerging and Re-emerging Infectious Diseases at the Pasteur Institute of Iran and Its Research Activities on Zoonotic Diseases

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This presentation introduces the Research Centre for Emerging and Re-emerging Infectious Diseases at the Pasteur Institute of Iran. This centre was established with the aim of identifying, studying, and controlling infectious diseases caused by emerging and re-emerging pathogens transmitted from wildlife. The activities of this centre include scientific research on diseases such as plague, tularemia, Q fever, Bartonella, Rickettsia, and Brucella. These studies contribute to identifying risk factors, patterns of transmission, and prevention strategies for these diseases. In addition, international collaborations and the organization of training workshops to enhance the knowledge of researchers and specialists in the field of emerging and re-emerging diseases are also among the activities of this centre. The results of this research can significantly aid in health policy-making and the promotion of public health in the country. This review examines the challenges

and opportunities in research related to zoonotic diseases and emphasizes the importance of inter-organizational collaboration.

Posters

8. The use of microsatellite markers to investigate the degree of inbreeding within the population of the Buteo wild bird in East Azarbaijan province

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Today, wild birds are at risk of extinction due to illegal hunting. The Buteo hunting bird belongs to the order of falcons and the family of Ghoshians, one of the birds targeted by hunters, even though its meat is forbidden. In the present study, to investigate the genetic diversity and the degree of inbreeding, blood samples were taken from a total of 10 birds taken from predators (previously captured), and blood was collected from the wing vein in vacuum tubes in the amount of 1cc and salt buffer according to the optimized instructions. DNA was extracted. Then, from the source article of Loaf et al. (2019), 5 Bbu microsatellites (30, 34, 49, 17, and 33) that had the most polymorphisms were selected and amplified with the Touch Down thermal gradient PCR program, and in 8%, Metaphor gel and Ethidium bromide staining were seen. Then molecular indices and descriptive statistics were calculated using the POPGen program, and the fis index was used to calculate the level of inbreeding. In summary, the obtained results showed a high level of inbreeding in the captive bird population. As a scientific summary, microsatellite markers can be used to make conservation decisions for this bird and determine the current situation. We suggest using many primers and expanding the sample size and volume for future research.

9. Evaluation of the Delaying Effects of Piroxicam on Seizure Onset in the Pentylenetetrazole-Induced Seizure Model in Wistar Rats

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Piroxicam, commercially known as Feldene, is a non-steroidal anti-inflammatory drug (NSAID) recommended for the treatment of pain and inflammation. Due to its reducing effect on prostaglandin levels and the impact of this inflammatory factor on increasing neuronal excitation, the present study investigated the anticonvulsant effects of piroxicam. In this experimental study, the anticonvulsant effect of piroxicam was examined using the pentylenetetrazole (PTZ)-induced seizure model in Wistar rats. Different doses of piroxicam (5 and 10 mg/kg) were administered intraperitoneally, half an hour before PTZ induction. The motor behavior of each group of rats was recorded for thirty minutes after PTZ injection with a camera, and the delay in seizure onset was observed at stages 1, 3, and 5 of the Racine scale by another researcher. Differences between the data were considered significant at $p < 0.05$, and data analysis was performed using GraphPad Prism software. Administration of a 10 mg/kg dose of piroxicam significantly increased the delay in seizure onset at stages 1, 3, and 5 ($p < 0.0001$, $p < 0.01$, and $p < 0.01$, respectively). The results of this study indicate that piroxicam significantly delayed the onset of seizures. These findings suggest a positive effect of piroxicam in improving the condition of epileptic patients.

10. The effect of different egg colors and bco2a gene expression level in kutum (*Rutilus frisii*) on the egg carotenoid content and some of reproduction normative

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Our research aimed to understand how the expression of the bco2a gene and food carotenoid affected the carotenoid content and color of Kutum (*Rutilus Frisii*), fish eggs. We also investigated the impact on the behavior and survival of their larvae. Egg coloration in Kutum is economically and evolutionarily significant, yet the underlying genetic mechanism is unknown. The study was performed in 2 phases. In the first phase, 15 female Kutum in autumn were collected from the Caspian Sea before they started their reproduction season, and then their intestine carotenoid content, gene expression, and egg carotenoid content were tested. The second phase was in spring at the Bony Fish Hatchery Complex (Rasht, Iran) from December to May, in which 40 Kutum females with green eggs and orange eggs were collected and fertilized. Kutum egg carotenoid and their bco2a gene expression in the liver have been tested. Reproduction normative such as egg fertilization rate, eyed egg rate, and hatching rate along with egg survival rate were estimated for different egg colors during the incubation period. The results indicated that Kutum with orange eggs had higher gene expression and egg carotenoid content than those with green eggs ($P \leq 0.05$). In determining egg color and carotenoid content, the study also discovered an important correlation between gene expression and dietary carotenoid levels ($P \leq 0.05$). Furthermore, there was a significant difference in the

11. Investigating the effect of D2 receptor antagonist on the biochemical of heart tissue of rats under physical and mental stress

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Sulpiride is a selective antagonist for D2 dopamine receptors, whose antagonistic effect is mostly through presynaptic inhibition of dopamine receptors. This drug is one of the new antipsychotic drugs used to treat psychosis. The purpose of this research is to investigate the D2 receptor antagonist on the biochemical effects of the heart tissue of rats under physical and mental stress. Materials and methods: 42 adult male Wistar rats weighing 190 ± 10 grams were divided into saline control, physical stress and psychological stress groups. Induction of mental or physical stress by placing the rats in insulating chambers or conductors of electric current (0.5 Hz, v40, mA2) which were adjacent to each other daily for 60 minutes (twice per minute for ten seconds) After 14 rats were dissected and the hearts of 5 rats were evaluated for biochemical tests (superoxide dismutase). Physical or psychological conditions led to a significant decrease in this parameter compared to the saline control group ($p < 0.05$). Administration of sulpiride to healthy rats caused a significant decrease in the studied index compared to the saline control ($p < 0.05$). While the administration of Sulpiride to rats under physical or mental stress caused a significant decrease in this index compared to the control groups under physical or mental stress ($p < 0.05$). Sulpride alone or together with physical or mental stress significantly (in most cases) reduces anxiety and depression, increases heart tissue damage, and aggravates oxidative stress.

12. Investigating the antidepressant effects of sulpiride in the suspension test of rats under physical and mental stress

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Sulpiride is one of the new antipsychotic drugs that is used in the etiology and treatment of various neurological and mental disorders such as anxiety and depression. The purpose of this study is to

investigate the antidepressant effects of sulpiride in the suspension test of rats under physical and mental stress. 42 adult male Wistar rats weighing 190 ± 10 grams were divided into saline control, physical stress and psychological stress groups. Induction of mental or physical stress by placing the rats in insulating chambers or conductors of electric current (0.5 Hz, v40, mA2) which were adjacent to each other daily for 60 minutes (twice per minute for ten seconds) After 14 days, the tail suspension test was conducted. In the control group, the level of mobility was higher than in the control group ($p < 0.05$). Saline was increased compared to sulpiride control ($p < 0.05$). In the physical stress group, the mobility was significantly increased compared to the sulpiride physical stress group ($p < 0.05$). Sulpiride's physical activity was increased ($p < 0.05$). In the group under saline and sulpiride, this index of mobility and immobility did not show a significant difference ($p > 0.05$), but showed that sulpiride improved depression and mobility.

13. Comparative study of red blood cells of *Pseudocerastes* genus vipers in Iran plateau

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In Iran's plateau, there are two species from false horned viper category, named "*p.persicus*" and "*p.urarachnoides*". Comprehensive hematological studies haven't been conducted on the genus "*pseudocerastes*". Our study helps in protection these species by investigating the features of RBCs. The aim of this study is to investigate red blood cells in *pseudocerastes* species and the relationship between environmental factors and its morphological variables. 12 samples of "*p.urarachnoides*" species and 12 samples of "*p.persicus*" species from both males and females were analyzed morphologically. After sampling, hematology studies were performed according to scientific protocols. Blood cells were counted using neobar slides and blood characteristics of two species were analyzed. Examination of blood parameters showed that in addition to the similarities between the two studied species in the same geographical area, there are also differences: The shape of red blood cells in *p.persicus* is oval, while in *p.urarachnoides* species, most of the nuclei were oval, nucleus with irregular shapes with borders were also identified. Also, the number of healthy red blood cells in male *p.urarachnoides* species is more and *p.persicus* species has the lowest number of defective cells and the highest number of healthy cells, which has not been studied in this field so far. Studies by other researchers show that the number of red blood cells in males is higher than in females. It is suggested to check the blood parasites of two species based on genetic data.

14. Measurement of BDNF gene expression in male Wistar Alzheimer's model rats treated with Pycnogenol

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Alzheimer's disease is one of the most common causes of dementia. Various treatment methods have been proposed to treat Alzheimer's disease. However, herbal compounds such as polyphenolic compounds have stronger therapeutic effects than chemical drugs. This study examined the measurement of BDNF gene expression in male Alzheimer's model Wistar rats treated with Pycnogenol. 21 Male Wistar rats (200–220 g) were randomly divided into three groups: control group, Alzheimer rat and Pycnogenol rat. In Alzheimer's and Pycnogenol groups, mice were first anesthetized by intraperitoneal injection of ketamine/xylazine according to the weight, and then by induction of beta amyloid in CA1 region of hippocampus, they were made Alzheimer's using stereotaxic surgery method. The Pycnogenol group (40 mg/kg) was fed with Pycnogenol solution and the control group with phosphate-buffered saline in an amount of 0.5 ml

for 21 days. Passive memory was assessed using the shuttle box test and BDNF gene expression using the Real-Time PCR method. Pycnogenol led to a reduction in Alzheimer's effects in the Pycnogenol group compared to the control group in the shuttle box test. In addition, Pycnogenol increased the expression of the BDNF gene (p -value <0.001). Our results showed that Pycnogenol can reduce memory and molecular disorders caused by Alzheimer's disease in male Wistar rats. In addition, the level of BDNF gene expression in the brain of the pseudo-Alzheimer model should be significantly increased. Considering that reducing the effects of Pycnogenol may be a useful herbal agent to relieve or treat the symptoms of Alzheimer's disease.

15. The effect of neonatal stress on the serum levels of oxytocin and oestrogen

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The neonatal phase can have a significant influence on long-term development. The female reproductive system can be adversely impacted by early life adversity and other circumstances, including maltreatment, and maternal deprivation. Maternal deprivation (MD) during early childhood has an impact on the way the body responds to stress during adolescence and maturity, namely in the neuroendocrine system. The MD groups involved removing all female litters from their home cages every day for 180 minutes. After random division, the animals were divided into four groups ($n = 6$): 1) The young MD group consisted of female rats (8-10 weeks of age), 2) the aged MD group consisted of female rats (20 months of age), 3) the young control group consisted of female rats (8-10 weeks of age), 4) the aged control group consisted of female rats (20 months of age). The effect of MD stress on female reproductive systems was evaluated (Gene expression assessment and hormone levels). The impact of MD stress was investigated on the OXT-R gene expression surveys indicating a significant increase in the MD groups (young and old). It was observed that both the young MD and aged MD groups experienced a significant decrease in serum levels of oxytocin and estrogen hormones. In conclusion, it can be suggested that exposure to neonatal stress disturbs sex hormone levels.

16. The effect of neonatal stress on the cardiovascular system in aged female rats

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Early-life environmental conditions affect offspring's development. Maternal deprivation (MD) can induce persistent changes that lead to the development of chronic conditions in late adulthood, including cardiovascular diseases. However, the molecular signaling mechanisms by which stress causes worse effects on the heart are unknown. The purpose of the present study is to investigate the impact of exposure to stress at the beginning of life and the permanent changes caused by it on the aging process of the heart and blood vessels. Female offspring of Wistar rats were subjected to 3 h of daily MD during postnatal days 1–14. Serum IGF-1 level was measured by the ELISA method. The expression level of genes was determined by qPCR (quantitative PCR). The serum lipid profiles were also evaluated. MD group had a lower serum IGF-1 level. A significant decrease was observed in the expression of IGF-1 and an increase in IGF-1R and IGF1BP mRNA (in heart and aorta tissues) in MD-aged rats. Also, a significant rise in the level of MDA was observed. Lipid profile factors were also changed in this group. The results showed that neonatal stress

caused tissue changes in the aorta and the heart of old female rats. Our results suggest that MD induces. However, long-lasting alterations that accelerate the aging process in the cardiovascular system of stressed animals.

17. Effect of transcranial photobiomodulation on infarction volume and cerebral edema in animal model of stroke

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Stroke is the third leading cause of death worldwide, triggering neurological defects and disability in human society. There are various therapeutic options to prevent the progression of ischemic injuries in brain, but they have not been effective enough, so far. It was reported that Transcranial photobiomodulation (tPBM) also known as low level laser therapy (LLLT) can induce neuroprotection through controlling inflammatory signaling pathways and apoptosis. Hence, it was selected as a therapeutic candidate. The present study was designed to evaluate the effects of near-infrared (NIR) laser light on ischemic volume and cerebral edema. The rats were divided randomly into three main groups. In the sham group, rats were only subjected to ischemic surgical stress without occluding the cerebral artery by filament. In the control group, the rats underwent 60 min of right middle cerebral artery occlusion (MCAO) surgery without receiving any treatment. In treatment group, the rats were subjected to ischemic surgery (MCAO). After surgical recovery, NIR laser spot delivered to their head on the cortex three times for 2 min per session. In this study, we have used the Photino PBM Device (model PBLSA), the laser wavelength is 810nm, and the power value set 7.5 mW. After 24 h, neurological deficit scores (NDS), infarct volume (IV), and brain edema in cortex, striatum, and piriform cortex-amygdala areas of rat brain were assessed. The present results indicated that NDS was increased in control group compared to sham group ($P<0.01$), while treatment group with LLLT indicated a significant reduction in NDS of the motor part in comparison with control group ($P=0.12$). In addition, the cortical infarction volume of LLLT group significantly attenuated compared to control group. Also, the statistical analysis between experimental groups showed that cerebral edema decreased in cortex area of LLLT group in comparison with control group ($P<0.001$). Conclusion: According to the results of the present study, NIR photobiomodulation therapy is a non-invasive promising modality to reduce the associated neurological deficits by alleviating ischemic volume and cerebral edema.

18. The effect of increased water temperature on the sperm quality of Marsh frog (*Pelophylax ridibundus*): the role of global warming in amphibian reproduction

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Global warming is considered one of the most significant environmental factors affecting reproduction in all animal species. This study investigated the effect of varying water temperatures on sperm release timing, sperm motility, and sperm morphology in the Marsh frog (*Pelophylax ridibundus*). For this purpose, 12 male frogs were placed in two different water temperature treatments of $17\pm1^{\circ}\text{C}$ and $21\pm1^{\circ}\text{C}$. To stimulate sperm release, they were injected with 7.5 units of Human Chorionic Gonadotropin (HCG) per body weight, and were assessed every half hour for response. Sperm was collected from the cloacal region using a sampler, and its motility was evaluated using a phase-contrast microscope. For morphology analysis, 10 microliters of sperm were stained with 10 microliters of 5% eosin, and abnormalities were assessed at 40x

magnification using a microscope. The results showed a significant difference between the two temperature treatments ($p \leq 0.001$), with frogs treated at 21°C exhibiting the lowest response 33.33% to hormone injection. At this temperature, the overall sperm motility was $67.08\% \pm 5.82$ and the rate of abnormalities was $39.58\% \pm 7.17$. In contrast, at 17°C, 91.66% of frogs produced sperm, with an average overall sperm motility of $85.41\% \pm 4.98$ and a rate of abnormalities of $16.41\% \pm 2.53$. These findings highlight the relationship between temperature and reproduction. It is evident that optimal temperature has a significant impact on sperm quality, which can ultimately influence fertilization success. This study demonstrates that increasing global temperatures may have negative effects on the reproduction of aquatic animals.

19. Acrolein-induced biochemical changes in mouse testis

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Acrolein (ACR) as an environmental pollutant is generated by cellular metabolism via lipid peroxidation and the oxidation of amino acids. ACR can be generated from overheated vegetable and animal fats. It is highly water soluble and can rapidly enter bodily tissues. It is known to rapidly form conjugates with cellular glutathione. ACR is considered both a product and an initiator of lipid peroxidation. Oxidative stress (OS) is an imbalance of free radicals and antioxidants in your body that leads to cell damage. The OS is a key mechanism for environmental pollutant-induced toxicity. To counter oxidative damage, the organism's body is well-equipped with antioxidant compounds (enzymatic and non- enzymatic). In the present work, we recorded the biochemical changes in the testes of ACR-treated mice. Mice were divided into control, sham, and experimental groups (receiving doses of 0.1, 0.2 and 0.4 mg/kg b.w. of ACR via IP, every other day for 21 days). The changes in levels of ROS, glutathione peroxidase (GPx), and carbonyl proteins (CP), with total antioxidant capacity (TAC) value were recorded in homogenate of testes. Our results showed that under ACR treatments, the levels of ROS, GPx, and CP were markedly augmented, but TAC value remained constant, dose-dependently. Briefly, ACR exposure was linked to the induction of OS status and testis dysfunction in mice.

20. IC87201: A Novel Approach for Protecting Hippocampal Neurons After Stroke

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The process of excitotoxicity due to increased NMDA receptor activity is one of the main mechanisms of neuronal death in stroke. Tissue damage to the hippocampus, particularly in the CA1 and CA3 regions, is also a common consequence. In this study, IC87201, as a novel inhibitor of PSD95/nNOS interaction in the NMDA receptor signaling pathway, was examined and its effects were compared with Dextromethorphan Hydrobromide (DXM) as an NMDA receptor antagonist. In this study, 24 adult male Sprague Dawley rats underwent one hour of cerebral ischemia using the Middle Cerebral Artery Occlusion (MCAO) technique. The animals were randomly divided into Sham, MCAO, MCAO+DXM, and MCAO+IC87201 groups, and after ischemia, intraperitoneal injection of solvent, DXM, and IC87201 was administered in the respective groups. Neurobehavioral function were assessed for seven days using the mNSS test and then, brain tissues were prepared for stereological evaluation. Results showed that Neurobehavioral deficits significantly decreased in the drug-treated groups compared to the ischemic group. Stereological evaluations indicated a reduction in neuronal numerical density in the CA1 and CA3 regions after ischemia, which was improved only in the presence of IC87201. Furthermore, although the numerical density of dead neurons decreased in both treatment groups, IC87201 was significantly more effective than DXM in both CA1 and CA3 regions. According to

this research, IC87201 significantly reduced tissue and behavioral damage following cerebral ischemia. Therefore, this molecule may be considered as a novel therapeutic approach in future research.

21. Bioinformatic analysis of miRNAs involved in human leukemia diseases and their regulatory role on lncRNAs as target

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Leukemia is a blood malignancy caused by the mass proliferation of abnormal lymphoid or hematopoietic cells in the bone marrow or lymphatic system. Non-coding RNAs, including microRNAs and long non-coding RNAs (lncRNAs), have been identified as critical regulators of various biological processes through epigenetic regulation, transcriptional regulation and post-transcriptional regulation. Evidence shows that dysregulation and activation of non-coding RNAs with tumor angiogenesis is a necessary process for tumor growth and metastasis and a major cause of cancer-related mortality. This study aimed to identify the most important miRNAs and lncRNAs related to hub genes in different types of leukemia. 31 downregulated and 25 upregulated genes were detected using TAC, Venn diagram, string, and Cytoscape. Then, the Mirnet database was used to identify miRNAs and lncRNAs and their interactions. The networks were analyzed using the Cytoscape to find hub miRNAs and lncRNAs. At last, the CeRNA network was constructed for each up and down-regulate genes. Hence, 6 common miRNAs include has-mir-146a-5p, has-mir-181a-5p, has-mir-17-5p, has-mir-20a-5p, has-mir-155-5p, has-mir-106b-5p; and 9 lncRNAs include PVY1, KCNQ1OT1, NORAD, EBLN3P, HELLPAR, XIST, NEAT1, MALAT1 AND HDG18 were defined and validated by different references. For instance, EBLN3P or KCNQ1OT1 plays roles in apoptosis, proliferation and cell cycle, has-mir-146a-5p plays role in angiogenesis and decreasing differentiation in T-cell lymphocytes, has-mir-155-5p causes leukemogenesis impacting MAPK signaling, PVT1 influences cell cycle and migration and has-mir-20a-5p decline apoptosis in AML. Focusing on these RNAs will be useful for therapies.

22. Antioxidant effect of essential oil Satureja rechingeri on oxidative stress in an animal model of ischemic stroke in male rats

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According to statistics, cerebral ischemia has a high rate among the types of stroke, which can be considered as the type of global disabilities. Changing the amount of blood flow is a factor for ischemia, which in turn reduces oxygen supply to the brain, so effect on the cerebral oxidative system and can disturb its balance and cause irreparable damage. Fortunately, Iran's ecosystem has large sources of antioxidant plants that can improve the disease and reduce the costs it. The purpose of using Saturej rechingeri Jamzad in this research is to introduce its antioxidant properties on the oxidative stress and investigate its neurological defects. In this study, by middle cerebral artery occlusion (MCAO) model in 36 male Wistar rats, which were randomly divided into 3 groups (n=12): sham group (no treatment and induction of ischemia), control (with induction of ischemia), treatment group (receiving 15 μ l of Rechingeri and induction of ischemia). Rats were treated with receiving 15 μ l doses of drugs by subcutaneous injection two hours before induction of stroke. Each of the groups was divided into 4 subgroups (n=3) and was analyzed the stroke volume, the cerebral edema, the blood-brain barrier permeability (Evans blue concentration) and the superoxide dismutase (SOD) enzyme concentration in them. Also, behavioral neurological deficits were evaluated in each subgroup. The data obtained from this research showed that the group of essential oil reduced the total stroke volume (P=0.03), cerebral edema in the piriform-amygdala

and striatum respectively ($P=0.01$, $P=0.003$), reduced the concentration of Evans Blue in different areas ($P\leq 0.05$) and increased the strength of the blood-brain barrier and increased the concentration of superoxide dismutase enzyme in the piriform-amygdala, striatum and cortex respectively ($P=0.002$, $P\leq 0.0001$, $P\leq 0.0001$). Also, the improvement of movement and sense reflexes was evident in the behavioral analysis of the rats. The conclusion of this research showed that the essential oil prepared from the Rechingeri plant contain the carvacrol compound with the help of GC-MS method with high antioxidant properties can improve the defects neurological, increase the activity of SOD enzyme and balance oxidative-antioxidative caused of ischemic complications and reduce economic costs it pre-ischemic significantly.

23. Healing effect of earthworm extract on open skin wound in diabetic mice

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Wounds healing is a complex physiological response to tissue injury in which connective tissue is repaired. Diabetes mellitus may affect approximately 170 million people worldwide, and will be projected to double by the year 2030. In the wound of diabetic animal models, an increase in the number of inflammatory cells and absence of cellular growth have been recorded. Recently, magic bio-active molecules with healing power (from animal/plant extracts) are being used to replace and/or improve various substrates in the wound healing process. The current study assessed the healing effect of red earthworm (*Lumbricus rubella*) extract on skin collagen turnover and blood reactive oxygen species (ROS) level in diabetic mice with open skin wounds. Diabetes was induced by IP injection of STZ. The groups of diabetic balb/c male mice were as: positive controls (wound+silver sulfadiazine), pseudo-control/sham (wound+normal saline), and experimental (wound+earthworm extract). On 8th and 16th post wounding day, the level of hydroxyproline (HP) as a marker of collagen turnover in urine, and plasma ROS level using a fluorescent spectrophotometer were determined. In the tested mice, up-regulated level of HP (collagen turnover) in urine along with down-regulated level of ROS in blood plasma as a biologic fluid were recorded. According to results, earthworm extract could improve wound healing with increase in collagen production, and inhibit oxidative stress with decrease in ROS level. Briefly, the earthworm extract represents a good candidate in the process of skin wound healing in diabetic animal models.

24. Effect of a Combination of Saffron, Fenugreek, and Ginger on the Reproductive System of Male Mice for Enhancing Sexual Potency

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Considering the population growth and the imperative to augment it in Iran, this study investigates the effects of saffron, fenugreek, and ginger on the fertility and sexual potency of male Syrian mice, to enhance human fertility and sexual function. Medicinal plants are employed as natural stimulants in traditional medicine, offering fewer side effects and thus serving as suitable alternatives to chemical drugs, which often present multiple adverse effects. In this experiment, the animals were divided into control and treatment groups. The control group received standard mouse food, while the treatment group was administered food mixed with the three plants. After a 7-week period, the mice were anaesthetized, and the epididymis were excised. The epididymis was placed in phosphate-buffered saline (PBS), and sperm counting was performed using a hemocytometer to ascertain the total number of sperm. One-way ANOVA analysis revealed a significant difference in the mean sperm count between the control and treatment groups ($p<0.05$). The statistical results indicated that sperm count in the treatment group was 3.7 times higher than

that in the control group. This study demonstrates that this combination significantly enhances sperm count in male Syrian mice. These plants may act as natural, low-risk alternatives to chemical drugs in the improvement of fertility. Further research on humans and molecular mechanisms is recommended to comprehensively evaluate the efficacy and safety of these compounds.

25. Effects of Castor Bean on the Reproductive System of Male Mice for Animal Population Control

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When the population of a species exceeds the habitat's carrying capacity, overpopulation occurs. Factors such as resource availability and reduced mortality rates contribute to this process. In urban environments, the use of medicinal plants as cost-effective and efficient contraceptive is essential for controlling the population of stray domestic animals. In this study, animals were divided into control and treated groups. The control group received standard rodent food, while the treated group was fed food mixed with castor bean seeds. After a 7-week period, the mice were anesthetized, and their epididymis were removed. The epididymis was placed in phosphate-buffered saline (PBS), and sperm counting was performed using a hemocytometer to calculate the total number of sperm. One-way ANOVA analysis indicated a significant difference in the mean sperm count between the control and treated groups ($p < 0.05$). Statistical analysis revealed that the treated group exhibited a significant reduction in mean sperm count compared to the control group. Specifically, the average sperm count in the treated group was reduced by approximately 89.48% relative to the control group. The findings of this study highlight the potential of castor bean seeds as a natural contraceptive agent. Further research with larger sample sizes and varying environmental conditions is necessary to evaluate long-term effects. Collaboration with health and environmental organizations is recommended to develop appropriate strategies and policies.

26. The effect of zinc chloride on the lipid profile of male rats exposed to gamma irradiation

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Oxidative stress caused by ionizing radiation may alter the metabolism of liver fat and serum lipoproteins. Based on the findings on the harmful effects of gamma radiation and the antioxidant and anti-inflammatory role of zinc, the present study was conducted to investigate the effects of zinc chloride on the lipid profile of male rats under the influence of gamma radiation. 30 male Wistar rats (200 ± 20 g) were obtained from the animal house of the Faculty of Sciences of Urmia University and adapted for one week. Rats were divided into six groups: receiving saline (Sal), receiving 27 mg/kg $ZnCl_2$ (Zn), receiving gamma radiation (single dose of 5 Gy) for 20 minutes, and then saline for 14 days (GS), recipient of gamma radiation (single dose of 5 Gy) for 20 minutes and then 27 mg/kg $ZnCl_2$ for 14 days (GZ), recipient of 14 days of saline and then gamma radiation (single dose of 5 Gy) for 20 minutes (SG) and received 14 days of $ZnCl_2$ (27 mg/kg) and then gamma radiation (single dose of 5 Gy) for 20 minutes (ZG). The results indicated that the amount of cholesterol and triglyceride (TG) in SG group was significantly reduced compared to the other groups ($p < 0.05$). The amount of TG increased significantly in ZG treatment compared to the control ($p < 0.05$). The amount of LDL and HDL showed a significant increase in GZ treatment ($p < 0.05$). As a result, $ZnCl_2$ leads to improvement of serum lipid profile of gamma-affected rats

27. The effect of simvastatin on cholinergic, apoptotic, and neutrophil infiltration indices in trimethyltin-induced neurotoxicity model

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Trimethyltin (TMT), an organotin compound with neurotoxicant effects, selectively damages limbic system, especially the hippocampus. TMT-induced neurodegeneration enhances adult hippocampal neurogenesis both in mice and in rats. Previous reports suggested that simvastatin presents ameliorative effects in the progression of cognitive disease. The simvastatin is a lipophilic statin and can cross the blood-brain barrier. This study was done to assess the effect of simvastatin on cholinergic, apoptotic, and neutrophil infiltration indices in trimethyltin-induced neurotoxicity model. In this experimental study, 40 male Wistar rats (200-250g) were randomly divided into 5 groups: control, control treated with Simvastatin at dose of 30 mg/kg, TMT, TMT treated with Simvastatin at doses of 10 or 30 mg/kg. Five groups of animals, each consisting of 8 rats were tested by activity of caspase 1, caspase 3, myeloperoxidase (MPO) and acetylcholinesterase (AChE). Trimethyltin was administered i.p. (8 mg/kg, once) and simvastatin was daily given p.o. 1 h after TMT for 3 weeks at doses of 10 or 30 mg/kg. The hippocampal damage was assessed in various tests. Data analysis was conducted using one-way ANOVA and Tukey post-test with $p < 0.05$ to be significant. Administration of simvastatin to TMT group at a dose of 30 mg/kg significantly and partially decreased cholinergic, apoptosis and neutrophil infiltration indices. While TMT leads to a significant increase in the activity of these factors. Our results suggested that simvastatin may be useful to prevent hippocampal damage due to neurotoxicants such as TMT.

28. The Anticonvulsant Effect of Flunixin Meglumine Against the Pentylentetrazol Model of the Seizures in the Male Wistar Rats

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Epilepsy is a neurological disorder characterized by recurrent seizures. The cause of this disease is primarily unknown. This research aims to investigate the effect of non-steroidal anti-inflammatory drug flunixin meglumine (FM) on seizures induced by the injection of pentylenetetrazol (PTZ) in male Wistar rats. In this experimental study, 24 male Wistar rats (weighing between 200-250 g and aged 8 weeks) were prepared and randomly divided into 4 groups of 6. The treatment groups received different doses of the drug (1.1 and 2.2 mg/kg) via intraperitoneal (I.P.) injection, except for the control and the PTZ groups, which were treated with physiological saline. After half an hour, the animals were challenged with PTZ at a dose of 60 mg/kg via I.P. injection. Based on the Racine scale, seizure behavior was observed for 30 min. The results of the study indicated that pre-treatment with FM significantly prolonged the stages and delay of seizures compared to the PTZ group ($P < 0.05$) and notably reduced the duration of generalized tonic-clonic seizures ($P < 0.05$), as well as decreased the number of myoclonic jerks and seizures ($P < 0.05$). Based on the results of this research, the FM injection can effectively delay and reduce seizure behavior in treated rats. It is suggested that since Flunixin is an anti-inflammatory drug in this study, inflammatory and molecular pathways should also be investigated to strengthen the research.

29. Antidepressant effect of Cuminaldehyde in animal model of cerebral ischemia/reperfusion

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Cerebral Ischemia stroke, occurs when blood flow to a part of the brain is suddenly reduced or stopped. Post-stroke depression (PSD) in particular emerges is known as the most common psychiatric sequelae of stroke. Unfortunately, due to side effects of antidepressants, limits the use of these drugs. Cuminaldehyde is the main component of the essential oil of Cumin seeds, which has many pharmacological effects such as antioxidant activity, anti-inflammatory, anti-depressant effects. Therefore, in the present study, we investigate the effects of cuminaldehyde on the behavioral indicators of depression in the cerebral ischemia model of rats. In this study, 36 male Wistar rats were placed in 3 groups of control, I/R and I/R+Cumin. Cuminaldehyde (20 mg/kg) were orally fed to rat for 14 days. Then, on the 15th day, all groups except the control group underwent I/R surgery. 24 hours after I/R induction, all rats were subjected to tail suspension (TST) and forced swimming test (FST) to investigate depression-like behaviors. Our results showed that the vertical movement index in FST in I/R group compared to the control group decreased significantly ($p < 0.0001$), while the duration of immobility in the FST and TST compared to the control group has increased significantly ($p < 0.001$). On the other hand, pretreatment with Cuminaldehyde significantly increased the vertical movement index in the forced swimming test ($p < 0.001$) and decreased the duration of immobility in the FST and TST. Overall, these findings suggest that pretreatment with Cuminaldehyde attenuate the I/R-induced depression-like behaviors.

30. The effect of hydro-alcoholic extract of Khosharizeh (*Echinophora platyloba* L.) on the increase in locomotor activity induced by morphine in male mice

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Morphine, when administered in high doses, can increase locomotor activity in laboratory animals. The role of dopaminergic, GABAergic, and opioid systems of the brain in modulating locomotor activity caused by morphine is well-defined. The extract of Khosharizeh has alkaloid and terpene compounds that are known to be effective on the opioid and GABAergic systems of the brain. Thus, this study aimed to investigate the possible effects of the hydro-alcoholic extract of Khosharizeh on the increase in locomotor activity caused by morphine. In this study, 112 male mice with an average weight of 24-28 grams were used. The mice were randomly divided into 14 groups. Then, they were treated with Khosharizeh extract (25, 50, and 75 mg/kg, intraperitoneally) or morphine (1, 5, 10, and 20 mg/kg, subcutaneous). Control groups received saline. In the final part of the experiment, the remaining four groups, one hour before the administration of the morphine (40 mg/kg), received Khosharizeh extract or saline. A high dose of morphine (40 mg/kg) significantly increased the locomotor activity of mice. Also, the administration of Khosharizeh extract alone caused a decrease in motor activity in all doses. Finally, the administration of Khosharizeh extract before morphine significantly inhibited the increase in locomotor activity induced by morphine. Probably, the extract of Khosharizeh can interfere with the locomotor-stimulating effects of morphine through the opioid and GABAergic systems of the brain.

31. The influences of hydro-alcoholic extract of *Melilotus officinalis* on blood liver enzymes in adult male rats under the chronic stress.

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The liver enzymes are the liver health indicators in which their increase uncovers the liver damage. This experimental research was designed to examine the hydro-alcoholic extract' effect of *M. officinalis* plant on blood liver enzymes in the adult male rats, under the chronic stress. To do so, 40 male Wistar rats were randomly classified into the control, sham, and three experimental groups that received chronic stress and treated with dosages of 25, 50 and 100 (mg/Kg) of *M. officinalis* extract. To induce chronic immobility stress, animals were daily placed in the restraint device for two hrs during 21 days. The plant extract was injected intraperitoneally to the animals 30 minutes before the chronic stress induction. After the deep anesthesia and blood sampling from the animals' hearts, the blood serum samples were taken to evaluate the liver enzymes' level. The levels of AST, ALT and ALP in the serum significantly increased in the sham group compared to the control. Administering *M. officinalis* extract with a dose of 50 mg/kg significantly decreased AST and ALP enzymes compared to the sham group; while it decreased ALT enzyme compared to both sham and control groups. By using doses of 25 and 100 (mg/Kg) of the extract, ALT enzyme significantly decreased compared to the control group. However, applying other two enzymes brought about no significant difference compared to the sham group. As a conclusion, the medium dose of *M. officinalis* extract could reduce high level of the liver blood enzymes in this type of stress.

32. The Effect of Metanolic Phoenix Dactylifera Pollen Extract on Spermatogenesis in Doxorubicin Treated Male Mice

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Doxorubicin is used as an antitumor agent in cancer treatment. Due to its potent anti-tumor activity (the production of free radicals and oxidative stress), side effects and reproductive disorders, the use of this drug in chemotherapy is challenged. Since studies have shown that palm pollen extract due to the presence of antioxidant compounds and reduction of oxidative stress has therapeutic properties, in this study, methanolic extract of pollen dates to reduce the effects of doxorubicin degradation on spermatogenesis. After extraction of pollen with maceration method and methanol solvent, doses of 0.05, 0.1, 0.2, 0.4 were injected intraperitoneally to different groups of mice for 4 weeks, after these 4 weeks, the left testis of the mice was used to count the spermatogonia, primary spermatocytes, spermatid and spermatozoa cells after tissue slicing and staining. Then, the most effective dose of palm pollen extract 0.2 mg/ml and doxorubicin (3 mg/kg) were injected to animals and the left testis of the mice was used for cell counting. The results of statistical Analysis were used to examine the significant difference between the experimental and control groups by using ANOVA and TUKEY posttest, decreasing primary spermatocytes, spermatid and spermatozoa cells in doxorubicin-treated group compare to control group, increasing these cells in pollen palm extract with dose of 0.2 mg/ml compared to doxorubicin-treated mice and rising these cells in doxorubicin and palm pollen extract treated group compare to doxorubicin-treated group . Based on the results, it can be concluded that methanolic extract of pollen can be effective in reducing the damaging effects of doxorubicin on spermatogenesis that can be antioxidant effects of pollen palm.

33. Effect of Magic Mushroom (*Psilocybe Azurescens*) on passive avoidance memory and working memory in rats

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Magic mushroom contains psilocybin, which turns into psilocin after consumption, has psychoactive properties. Due to the increase in the number of consumers of magic mushrooms around the world and the effects of its consumption on the central nervous system, and also considering that so far very few studies have investigated the effects of long-term use of this mushroom on cognitive functions, so the aim of this study was to investigate the effects of magic mushroom on passive avoidance memory and working memory in male Wistar rats. For this purpose, rats were randomly divided into four groups: control (treatment with normal saline), 10, 100, and 250 mg/kg doses of magic mushroom. Rats received different doses of magic mushroom for two weeks (every other day) by gavage. Shuttle box test was used to evaluate passive avoidance memory and Y-maze test was used to evaluate working memory. The results of the shuttle box test showed that short and long-term passive avoidance memory in rats treated with 250 mg/kg of magic mushroom had a significant decrease compared to the control group. But the results of the Y-maze test did not show a change in the working memory of the animals after taking different doses of magic mushrooms. In general, the findings of this study showed that long-term administration of high dose of magic mushrooms impairs passive avoidance memory in rats. Examining the molecular mechanisms involved in cognitive functions is proposed as the suggestions of this study.

34. Protective effect of garlic juice on reduction of hydrogen peroxide in epididymis of streptozotocin (STZ)-induced diabetic male rats

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Diabetes mellitus is associated with injury to male reproductive system function and infertility. Chronic hyperglycemia in diabetes increases the production of reactive oxygen species (ROS) such as hydrogen peroxide (H₂O₂) and then oxidative stress. Oxidative stress plays an important role in the complications of diabetes, including male reproductive injury. Medicinal plants contain a lot of antioxidants that can reduce oxidative stress. Garlic (*Allium sativum* L) is a perennial herb from the Amaryllidaceae family, which has antioxidant properties. In this study, we investigated the effects of garlic juice on the level of H₂O₂ in the epididymis of diabetic rats. Twenty-four male Wistar rats were divided into 4 groups (n=6): Control group (c), Diabetic group (D) (Diabetic with STZ dose of 60 mg/kg), Diabetic group receiving 0.5 ml/100g bw of garlic juice (G) (D+G0.5), Diabetic group receiving 1 ml/100g bw of garlic juice (D+G1). The results showed that the level of H₂O₂ in the D and D+G0.5 groups increased significantly compared to the control group (p<0.001). Treating rats with garlic juice, a significant decrease in the level of H₂O₂ was observed in D+G0.5 and D+G1 groups compared to D group (p<0.05 and p<0.001). Therefore, the present study showed that garlic, as an antioxidant, can reduce the amount of ROS and oxidative stress in the epididymis of diabetic rats and subsequently the reproductive injury caused by diabetes.

35. The effect of sleep deprivation on neurogenesis and synaptic plasticity in rat hippocampus

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Sleep is defined as a complex physiological process during which consciousness is reduced and the body enters a state of deep rest. Lack of sleep is recognized as a global public health challenge that has various effects on human health. The hippocampus and its associated memory are vulnerable to the consequences of chronic sleep deprivation. The aim of this study was to evaluate the expression of factors involved in neurogenesis (Nestin, Ki67 and DCX) and factors involved in synaptic plasticity (Rest, Synaptophysin and BDNF) in the hippocampus of sleep-deprived rats. For this purpose, rats were divided into 3 groups: 1) control: rats without sleep deprivation. 2) Sham: rats placed on a metal plate located on the columns of apparatus. 3) Sleep deprived: rats placed on the columns of apparatus. In order to induce the sleep deprivation model, the multiple platform device containing 14 columns was used. Rats were placed on the columns of the apparatus for 21 days from 4pm to 10am. Western blot technique was used to measure the expression of factors involved in neurogenesis and synaptic plasticity. The results showed that chronic sleep deprivation leads to a decrease in neurogenesis and synaptic plasticity factors in the hippocampus of sleep-deprived rats. Examining the level of factors involved in oxidative stress and apoptosis in the hippocampus is proposed as the suggestions of this study.

36. Effects of Melatonin on Unconditional Place Preference in Depressed Female Syrian Hamster

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Previous studies have shown that melatonin alters conditional place preference in depressed rodents. There is no study to investigate effects of melatonin on unconditional situations. In this study, I investigated the effects of melatonin on the preference of Syrian hamsters to move toward the corners and the center of the test box in an unconditioned situation. 22 female Syrian hamsters (*Mesocricetus Auratus*) were divided into a control group and a test group that received 0.01 mg of oral melatonin (0.1 mg / kg) daily for 30 days. All hamsters were kept separately to induce social depression. On day 31, each hamster was placed in the rectangular test box, which had 2 parts with equal area: the sum of the 4 corners, and the center. A five-minute video record used to determine the amount of time each hamster spent in each part. I tested the effects of place parts and melatonin treatment using a mixed model analysis in SPSS. The preference for corners was significantly higher than that for the center in both groups ($P < 0.001$). No differences were observed between the test and control groups in the preference for corners ($P = 0.711$). No differences were observed in the preference for center either ($P = 0.769$). My results suggest that melatonin at an oral dose of 0.01 mg has no effect on place preference in depressed Syrian hamsters. Based on the results, the administered dose appears to be lower than the median effective dose (ED50) and a supraphysiologic dosing is required for the treatment of 30-day isolation.

37. The effect of educational levels on the biological health of chemical veterans

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The long-term complications of sulfur mustard (SM) exposure (occurred in wars) could arise from the cumulative physiological 'wear and tear' systems that are known as allostatic load. In this cross-sectional study (part of a prospective cohort project in West Azarbaijan province) using the biological health score (BHS), the relationship between chemical veterans' health status and education levels was investigated. For this purpose, the biological health score of 189 individual chemical veterans exposed to mustard gas with different educations (low, intermediate, and high) was compared to the control group (55 individuals). A blood sample was prepared from all participants. To estimate BHS, 18 blood-derived biomarkers. These biomarkers included dehydroepiandrosterone sulfate, prolactin, luteinizing hormone, testosterone, hemoglobin, high-density lipoprotein cholesterol, low-density lipoprotein cholesterol, total cholesterol, triglycerides, systolic diastolic blood pressure, pulses, C reactive protein, transforming growth factor beta, alanine transaminase, aspartate transaminase, gamma-glutamyltransferase, and creatinine; which the increase of this index is a sign of the deterioration of individual health. Overall, the BHS of individuals exposed to mustard gas (7.5 ± 0.2) (out of the education) was significantly higher than the control group (5.8 ± 0.31) ($P < 0.01$). In both groups of exposure (2.85 ± 0.037) and control (1.90 ± 0.024), the individuals with high education have a significantly lower biological health score ($P < 0.01$). The data of this study showed that mustard gas severely endangered biological health and higher education can always improve biological health in healthy and veteran individuals.

38. The effect of Naringin on cognitive functions, oxidative stress, cholinergic activity and hippocampal cell damage in rat offspring with intrauterine growth restriction

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Intrauterine growth restriction (IUGR) caused by induction of uteroplacental insufficiency (UPI) causes delay in neurodevelopment. The present study evaluates the effects of Naringin on memory and learning, cholinergic activity, oxidative stress and hippocampal cell damage following UPI in rat neonates. 20 pregnant Wistar rats were randomly divided into 4 groups: control, surgical sham, UPI+NS (UPI+normal saline) and UPI+Nar (UPI+naringin). In order to induce UPI, permanent occlusion of the anterior uterine vessels was performed on the embryonic day (ED) 18. Naringin and normal saline were administered orally from the ED15 to ED21. Behavioral evaluations of infants (working memory, avoidance learning and anxiety-like behavior) were performed at postnatal day 21. Then, the hippocampal activity of cholinesterase (AChE), catalase (CAT), superoxide dismutase (SOD), antioxidant capacity (TAC) and malondialdehyde (MDA) and the density of apoptotic neurons in the CA1 and CA3 regions of the hippocampus were measured. Memory impairment, significant decrease in hippocampal activity of CAT, SOD and TAC along with significant increase in AChE, MDA activity, density of hippocampal apoptotic neurons and anxiety-like behavior were seen in the UPI+NS group compared to the control group ($p < 0.05$). While the Naringin treated rats showed an improvement in working and avoidance memory, a significant increase in CAT, SOD, TAC and a significant decrease in AChE, MDA, density of apoptotic neurons and anxiety-like behavior compared to the UPI+NS group ($p < 0.05$). By

strengthening the antioxidant system and improving cholinergic activity in the brain of UPI offspring, Naringin prevents hippocampal neuronal damage, memory and learning disorders, and anxiety.

39. The effect of Naringin on cognitive-behavioral functions, neurotrophin factors and hippocampal neuron density in monosodium glutamate-induced obesity model.

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Obesity and overweight have increased rapidly in the world in the last few decades and cause a wide range of disorders including cognitive deficits. The present study evaluates the effect of Naringin on memory and learning, anxiety behavior, brain-derived neurotrophic factor (BDNF), nerve growth factor (NGF) and neuronal density of hippocampal CA1/CA3 regions in monosodium glutamate (MSG)-induced obese rats. 40 male Wistar rats were randomly placed in 4 groups; control, MSG, MSG+Nar50 and MSG+Nar100. MSG (4 gr/kgBW) was administered subcutaneously in the cervical area from postnatal day (PND)2 to PND10 and Naringin (50 mg/kgBW and 100 mg/kgBW) was administered orally from PND30 to PND42. After the treatment period, cognitive tests (Morris blue maze and Y maze) and anxiety tests (elevated pluse maze and novelty suppressed feeding) were performed. Then, the hippocampal level of BDNF and NGF was measured by ELISA technique and neuronal density in CA1 and CA3 areas of hippocampus was measured by stereology method. Compared to the MSG group, Naringin treated rats showed a significant increase in spatial-working memory, amelioration in anxiety behaviors, and a significant increase in hippocampal levels of BDNF and NGF. On the other hand, treatment with Naringin resulted in a significant increase in neuronal density in the CA1/CA3 areas of the hippocampus. Naringin ameliorated cognitive functions and reduced anxiety in MSG-induced obese rats through the modulation of neurotrophin factors and neuroprotective effects in the hippocampus.

40. Effect of copper oxide nanoparticles on free radical and lysozyme levels in skin mucus of goldfish (Carassius auratus)

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Due to these peculiar physicochemical features, nanoparticles (NPs) could have a potentially adverse influence on organs, tissues, and cells. The increasing production and use of NPs have raised concerns regarding the potential toxicity to human and environmental health. Various aquatic pollutants such as NPs induce reactive oxygen species (ROS), which may lead to oxidative stress. Copper-based nanoparticles have been used for industrial purposes, electrical equipment, nanofluids, antimicrobial agents etc. The global production of copper oxide nanoparticle (n-CuO) will reach to 1600 tons by 2025. They can pass the plasma membrane due to ion channels, transporter proteins, and endocytosis. Fish skin mucus contains innate immune components and act as a barrier between fish and its immediate niche. In current study, we assessed the effects of n-CuO on ROS level and lysozyme (LZM) activity in the skin mucus of goldfish (Carassius auratus) under laboratory conditions. According to calculated 96 h LC₅₀ of n-CuO (≥ 6 mg/L), fish were treated with sublethal concentrations of 1/20th, 1/10th and 1/5th of LC₅₀ for 14 days. Then, changes in ROS level using DCFH-DA probe along with LZM activity by microplate method were measured in skin mucus of goldfish. Results revealed that n-CuO could increase ROS level ($p < 0.05$) and augment LZM activity ($p < 0.05$) in the skin mucus of tested fish. Briefly, n-CuO, as an antigenic agent, caused increased LZM activity and provoked innate immunity via increase in ROS level and induction of oxidative stress in goldfish.

41. The effect of hesperidin on motor-cognitive disorders, oxidative damage and cholinergic activity in the hippocampus of Parkinson's disease model rats

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Parkinson's disease (PD) is a neurodegenerative disease in which oxidative stress plays an important role in its pathophysiology, and antioxidant agents can be useful in reducing the rate of neuronal destruction. This study aimed to evaluate the effect of hesperidin on hippocampal antioxidant and cholinergic function and memory recovery and neuroprotection in reserpine (RES)-induced PD model rats. 40 male Wistar rats in 5 control groups, receiving hesperidin solvent (normal saline; NS) + receiving reserpine solvent (VR+NS), receiving reserpine (1 mg/5 days/intraperitoneal) + normal saline (RES +NS), receiving hesperidin (100 mg/21 days/oral) + reserpine solvent (HES+VR) and receiving reserpine + hesperidin (RES+HES) were divided. After the treatment, catalepsy and memory tests were performed. Then, hippocampal activity of catalase (CAT), superoxide dismutase (SOD) and glutathione peroxidase (GPx) were evaluated by ELISA method, malondialdehyde (MDA) by thiobarbituric acid method and acetylcholinesterase (AChE) activity were evaluated in hippocampus by Elman method. Finally, the measurement of neuronal density in the CA1 and CA3 subareas of the hippocampus was performed using stereology. The results showed a significant decrease in cataleptic behavior, AChE activity and MDA level along with a significant increase in CAT, SOD, GPx, CA1 and CA3 neuronal density, working memory and avoidance memory in the RES+HES group compared to the RES+NS group. Also, hesperidin prevented RES-induced AChE increase in the hippocampus. Hesperidin prevents RES induced motor-cognitive disorders by amelioration of hippocampal antioxidant capacity, modulating cholinergic activity and protecting hippocampal neurons.

42. Oxidative stress effects and histological changes in acrolein treated-earthworms

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Acrolein (ACR) is a common dietary and environmental pollutant and is also generated by cellular metabolism. ACR is released by combustion of fossil fuels, biodiesel, plastics, tobacco smoke, and also by overheated vegetable and animal fats, charred foods by Millard reaction. ACR causes increase in oxidant levels by decrease in activity of antioxidant enzymes and expression of antioxidant regulator-Nrf2. ACR toxicity promotes aging process, and activates intracellular ROS and nitric oxide production via NF-kB and AP-1 pathways. Most of the environmental pollutants find their way into the surrounding soils. In the current study, the oxidative stress effects and histological changes in acrolein treated-earthworms were evaluated. Earthworms *Eisenia fetida* as animal model were treated with low concentrations of ACR viz. 0.5, 1, and 2 mg/kg dry soil for 14 days. Then, in earthworm's homogenates the level of hydrogen peroxide (H₂O₂) (as a ROS) and catalase (CAT) activity as an antioxidant enzyme were measured compared to related controls. Histological analyses were also carried out. Data revealed that in acrolein-treated earthworms, the level of H₂O₂ (ROS) and CAT activity as oxidative stress biomarkers were markedly augmented. Meanwhile, histological analyses showed damages in the epidermis and muscle layers in earthworm's body wall particularly at high concentrations of ACR. Collectively, ACR oxidative could induce stress and cause tissue damage in earthworm's body.

43. The effects of pre-treatment and post-treatment of zinc chloride on serum levels of calcium and magnesium in male rats affected by gamma radiation

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Today, diseases caused by radiation are very important challenge. Reactive oxygen species are the main mediators of radiation damage. Zinc acts as an antioxidant by different mechanisms and reduces the production of reactive oxygen species. In this study, 30 male rats weighing 200 grams were used. The rats were randomly divided into 6 groups (the names of the groups are in parentheses): receiving saline (Control), receiving 27 mg/kg of zinc chloride (Z), receiving gamma radiation as a single dose of 5 Gy for 20 minutes, and then, receiving saline (GS) or 27 mg/kg of zinc chloride (GZ) for 14 days (post-treatment groups), receiving saline (SG) or 27 mg/kg of zinc chloride (ZG) for 14 days, and then, receiving gamma radiation as a single dose with an intensity of 5 Gy for 20 minutes (Pre-treatment groups). The solutions were administered to rats by gavage. According to the results, calcium serum levels did not change significantly in different groups. But magnesium serum levels increased significantly in a short period after gamma radiation (SG) compared to the control group ($P < 0.05$). Treatment with zinc chloride (ZG) had no significant effect on adjusting this index ($P > 0.05$). Also, serum levels of magnesium were still at significantly higher levels compared to the control group ($P < 0.05$). Treatment with zinc chloride (GZ) did not significantly change this index ($P > 0.05$). Therefore, gamma radiation can cause disturbances in the serum levels of some electrolytes, including magnesium. Pre-treatment or post-treatment with chloride did not significantly improve this disorder.

44. Effects of prolonged administration of escitalopram on Spatial memory in the hippocampal CA1 area of rats under predictable and unpredictable chronic mild stress.

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Exposure to chronic stress impairs memory. Also, escitalopram's impact on memory remains paradoxical. Therefore, this study examined how prolonged escitalopram administration affects spatial memory in the hippocampal CA1 region in rats that underwent predictable and unpredictable chronic mild stress (PCMS and UCMS, respectively). 49 male rats were randomly assigned to different groups of control (Co), sham (Sh), PCMS, and UCMS (PSt and USt, respectively; 2 h/day, for 21 consecutive days), escitalopram (Esc; 10 mg/kg, i.p., for 21 days), as well as PCMS and UCMS with escitalopram (PSt-Esc and USt-Esc, respectively). The distance traveled and the latency to enter the escape chamber in the CA1 area of the hippocampus was evaluated using the Barnes test. Results: The distance traveled and the delay in entering the escape room in the Barnes Maze showed a significant increase in the predictable and unpredictable stress groups compared to the control group. In addition, the variables mentioned above showed a significant decrease in the escitalopram group of predictable stress compared to the predictable stress group. Conclusion: Exposure to chronic stress has been shown to cause delays in learning and impair spatial memory consolidation. Chronic stress weakens the antioxidant system, leading to increased brain inflammatory factors, apoptosis, and behavioral disorders. Under chronic stress conditions, nerve pathways and neurotransmitters may be involved differently in spatial and cognitive memory.

45. Treatment effects of the tolafenamic acid on behavioural functions in a model of seizures in the male Wistar rats

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Seizure is an abnormal behavior or movements. A seizure is a sign of simultaneous, abnormal and intense neuronal activity in the brain, which can manifest as changes in mental status, level of consciousness, tonic and clonic movements. Tolfenamic acid (TA) belongs to the family of non-steroidal anti-inflammatory drugs (NSAIDs) and has analgesic, anti-inflammatory and antipyretic properties. The present study investigates the anticonvulsant potential of TA on the pentylenetetrazol (PTZ)-induced seizure model in rats. Rats were randomly divided into 4 groups, each group containing 5 rats (200-250 g); Healthy control, control without treatment (PTZ) who received PTZ 30 min after receiving saline, and two treatment groups received TA with doses of 10 and 50 mg/kg. After 30 min, they received 60 mg/kg of PTZ intraperitoneally. Seizure behavior was recorded according to the Racine scale during 30 min. The results showed that TA drug significantly reduced seizure duration and intensity compared to PTZ group ($P < 0.05$). Also, the injection of different doses of the drug was able to significantly reduce the duration of generalized tonic-clonic seizures compared to the PTZ group ($P < 0.05$). These findings show that TA drug can be effective in reducing the incidence of seizures. It is suggested that since the drug TA in this research is an anti-inflammatory drug, the inflammatory and molecular pathways should also be investigated to strengthen the research.

46. Effect of high fat diet with corn oil on PGC-1 α and UCP1 gene expression in adipose tissue of Sprague-Dawley rats

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Excessive dietary fat consumption plays an important role in health and body weight gain. PGC-1 α is a transcriptional coactivator and it plays an important role in the control of cellular energy metabolism. Reduced PGC-1 α gene expression in adipose tissue have been associated with insulin resistance. In the present study, a high-fat emulsion diet with corn oil was used to evaluate its effect on insulin resistance, PGC-1 α and UCP1 gene expression in male Sprague-Dawley rats. Sixteen male rats were divided into normal control group (NC) (n=8) and high fat group (HF) (n=8). The control group received a standard diet. The high fat group received a standard diet and received a high fat emulsion diet containing corn oil by gavage daily for six weeks. After this time, blood samples were collected for measurement of biochemical parameters. Liver histological tests with H&E staining were performed to evaluate fat accumulation in liver. Adipose tissue was collected for measurement of gene expression by Real-time PCR. The level of lipid profile, insulin resistance (HOMA-IR), TNF- α , in serum significantly increased ($P < 0.05$) in HF group. Liver sections of high fat group displayed obvious fat droplets and steatosis. The level of PGC-1 α and UCP1 gene expression decreased in HF group compared to the NC group. Our results showed that high omega-6 PUFA in diet are associated with reduction of PGC-1 α and UCP1 gene expression in adipose tissue. Hence, PGC-1 α may be considered as a target for treatment of NAFLD.

47. The genotoxic effect of zinc oxide nanoparticles on goldfish (*Carassius auratus*)

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Today, nanotechnology plays an important role in various industries, and due to the many applications, the speed of using nanoparticles is increasing day by day. Among the different types

of nanoparticles, ZnO NPs have received special attention in recent years due to their numerous applications in various aspects of human life. The present study was conducted with the aim of investigating the effects of ZnO NPs in the red blood cells of goldfish. In this research, ZnO NPs were first synthesized and their physicochemical characterization was done with different spectroscopic methods. Then, 45 pieces of goldfish with an average weight of 6 ± 1 grams were selected. The fish were exposed to 10 and 20% of the median lethal concentration (10 and 20 mg/L) of ZnO NPs along with the control in three replications. Sampling of fish blood was done on the 10th day of exposure. Then the blood smear was prepared on the slide and the slides were stained with Giemsa 10% for 15 minutes and the slides were examined by an optical microscope with a camera. The results of this research showed that nanoparticles led to various abnormalities such as micronucleus, blebbed nucleus, notched nucleus and cytoplasmic vacuoles. Also, the amount of abnormalities observed increased with increasing the concentration of ZnO NPs. According to the observed damages, the use of ZnO NPs can cause genotoxic damage in goldfish.

48. Effects of nicotine on dyslipidemia in a rat model of cholestasis and hepatic fibrosis

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Dyslipidemia means abnormal changes in the level of lipids in the bloodstream. Among the various factors that can lead to this disorder, are liver diseases and smoking. Considering that the liver is the main site of the metabolism of lipids, liver damage is associated with impairment of lipid metabolism. This study aimed to investigate the effects of nicotine administration on dyslipidemia in the animal model of cholestasis. The bile duct ligation (BDL) approach was used to establish a rat model of liver fibrosis. Nicotine was administered in high (10 mg/kg) and low (1 mg/kg) doses intraperitoneally. The amounts of triglyceride (TG), cholesterol (Chol), low-density lipoprotein (LDL), and high-density lipoprotein (HDL) were measured using a standard colorimetric kit (Pars Azmoon). The results demonstrated that the administration of nicotine alone in healthy rats leads to a significant increase in the level of TG, Chol, and LDL and a decrease in HDL. Also, liver fibrosis causes a substantial increase in TG, Chol, and LDL levels and decreases HDL compared to healthy controls. Administration of nicotine in BDL rats leads to a further decrease in HDL and an increase in TG level but does not affect Chol and LDL. BDL-induced liver fibrosis leads to dyslipidemia in rats. Continuous exposure to nicotine in both healthy controls and BDL rats leads to more changes in the serum level of blood lipids. Therefore, it is recommended to prevent exposure to nicotine to control dyslipidemia in people with liver diseases.

49. Assessment of indene-induced oxidative stress effects in earthworms

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Indene is a kind of important polycyclic aromatic hydrocarbon (PAH) that is extracted from coal tar and has important applications in industry. Coal tar is an organic mixture dominated by aromatic hydrocarbons, containing more than 10,000 compounds and uses in industrial production of plastics and some pesticides. In the processes of production and utilization, indene is easy to enter the soil and produce toxic effects on the soil or organisms. The earthworm is an important organism in the promotion of soil fertility. The objective of this study was to evaluate the toxicity of indene in compost earthworms (*Eisenia fetida*). Earthworms were treated with various concentrations 0.5, 1, and 2 mg indene/kg dry soil for 4 days and then earthworm's homogenates were made. The changes in the levels of reactive oxygene species (ROS), malondialdehyde

(MDA), activity of cellulose (energy expenditure) in homogenates, along with total antioxidant capacity (TAC) value in coelomic fluid were measured spectrophotometrically. Results revealed that in indene-treated earthworms, the level of ROS and MDA content were elevated but the TAC value and cellulase activity were found to be lowered. Collectively, indene-induced oxidative stress could cause physiological and behavioral disorders in earthworms leading to lowered adaptation to the surrounding environment.

50. Evaluation of ESR1 and FTH1 genes expression in ferroptosis pathway in seizure's model of male Wistar rat: A molecular and bioinformatics study

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Seizure is a neurodegenerative disorder and ferroptosis can play a role in its occurrence. Ferroptosis is a type of iron-dependent cell death, if dimercaprol is injected 15 minutes before iron consumption, it will have a protective effect against iron poisoning. Esr1 and Fth1 genes play a role in ferroptosis and increase and decrease respectively after seizures. The aim of the upcoming molecular and bioinformatics study is to investigate the effect of dimercaprol on convulsions in the ferroptosis pathway on Esr1 and Fth1 genes. Esr1 and Fth1 genes were selected using bioinformatics approaches by DisGeNET and NCBI databases. In this study, 24 male Wistar rats were divided into 4 groups of 6. Control group (0.5 ml normal saline), control group (60 mg/kg PTZ), experimental group 1 (60 mg/kg PTZ+5 mg/kg dimercaprol), experimental group 2 (60 mg/kg PTZ+10 mg/kg dimercaprol). Findings: In the patient group, the relative expression of Esr1 gene was significant compared to the healthy control group. In the groups treated with dimercaprol along with PTZ, the relative expression of this decreased. In the patient group, the relative expression of Fth1 gene showed a significant decrease compared to the healthy control group. In the groups treated with dimercaprol along with PTZ, the relative expression of this gene showed a significant increase. Conclusion: It seems that dimercaprol can inhibit the ferroptosis pathway and improve seizures by affecting iron and Esr1 and Fth1 genes.

51. Evaluation of neuroprotective potential of human recombinant bone morphogenetic protein-2 in maximal electroshock-induced seizures in ovariectomized mice

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Frequent and drug-resistant seizures are among the characteristics related to the condition of postmenopausal women with epilepsy. There is a cross- talk between recombinant human bone morphogenetic protein-2 (rhBMP-2) and estrogen receptor signaling pathways. In this study, we investigated the effect of rhBMP-2 maximal electroshock-induced seizures in short-term (7 days) ovariectomized (OVX) adult mice as a model of recently menopausal women. The effect of rhBMP-2 (0, 5, and 50 µg/kg i.p.) on hind leg extension (HLE) duration in maximal electroshock (MES)-induced seizure was measured in female mice one week after ovariectomy. In addition serum gonadotropin hormones (FSH and LH) and vitamin D3 (VD) as well as transforming growth factor-beta (TGF-B) levels and lysyl oxidase (LOX) activity were determined in hippocampal homogenate by ELISA kits. The results show that rhBMP-2 had a reducing effect on onset of seizures and duration of HLE following MES in OVX compared with control mice. Also, pretreatment with rhBMP-2 improved VD, FSH and LH levels in serum of OVX mice after maximal electroshock induced seizures. In addition, the change in LOX activity and TGF-B levels in the brain of OVX + MES group significantly ($p < 0.01$) inhibited. Conclusions: Our data provide new insight into the anticonvulsant potential of rhBMP-2 and a novel therapeutic intervention for tonic-clonic seizures in the absence of reproductive steroids.

52. Experimental Evaluation of Employing *Drosophila melanogaster* as a Research Model for Stroke

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In this study, we aimed to model ischemic stroke in *Drosophila melanogaster* by creating ischemic conditions at various time intervals and then conducting specific assays at designated times after returning the samples to normal conditions. The objective was to introduce *Drosophila melanogaster* as a model for stroke research. Male flies aged 0 to 5 days were divided into two groups for each test: ischemic and control (n=10). The ischemic groups were subjected to controlled ischemic conditions while maintaining environmental parameters. They were then evaluated for navigation impairments using the negative geotaxis behavioral assay and for cognitive impairments using the mating assay. After recording and analyzing the performance of the control and ischemic groups in both assays, we observed a significant decline in performance in the geotaxis assay at the 4 and 6 ischemic intervals ($P<0.05$) and a delay in recognizing the female and executing mating-related behaviors ($P<0.05$) compared to the control group. The results indicate that ischemic conditions induced cognitive and motor impairments in this model of induced ischemia in *Drosophila melanogaster*. Given the high metabolic rate of the nervous system, ischemia in this model is likely to lead to functional damage in the nervous system, resulting in conditions similar to stroke. Consequently, *Drosophila melanogaster* under controlled ischemic conditions could be considered a suitable model for global stroke studies.

53. Toxicity evaluation of copper oxide bulk and nanoparticles in liver of goldfish (*Carassius auratus*)

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During the last decades, application of nanoparticles and the need for scientific reports regarding their possible toxicity is increased. These particles are routinely used in fish aquaculture for nanofiltration and food packaging. This study proposes to compare the biochemical changes in the goldfish (*Carassius auratus*) liver under the exposure of copper oxide bulk (b-CuO) with nanoparticles (n-CuO), upon laboratory conditions. The 96 h median lethal concentration (LC50) of b-CuO and n-CuO were ≥ 10 and ≥ 6 mg/L, respectively. Regardless of gender, fish were exposed to b-CuO and n-CuO at the sublethal concentrations of 1/20th, 1/10th and 1/5th of LC50 for 14 days. Following exposure time, the changes in the oxidative stress biomarkers (ROS, LPO, TAC) in the liver homogenates were evaluated. The levels of aminotransferases (ALT & AST) in the blood plasma were also assessed. Our findings revealed that b-CuO and n-CuO exposures induced oxidative stress expressing as elevated ROS and LPO, with lowered TAC in liver samples. Meanwhile, the level of ALT and AST were increased. Overall, we conclude that the exposures of b-CuO and n-CuO could exert biochemical alterations via induction of oxidative stress resulting in hepatotoxicity. The n-CuO showed relatively more potent adverse physiological effects on fish than b-CuO.

54. From East to West: Genetic Insights into the Distribution and Evolution of the Gray Dwarf Hamster in Iran

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The gray dwarf hamster, *Nothocricetulus migratorius* (Pallas, 1773), a nocturnal rodent is characterized by five morphological and three genetic lineages throughout its vast distribution in Palearctic. Despite its extensive range in the Iranian plateau, the species gain a little attention. This

study examines Iranian populations' genetic diversity and phylogenetic relationships using the mitochondrial cytochrome b (cytb) gene. Four genetic lineages were identified with geographical associations: Qurama from Uzbekistan, Eastern Palearctic, Western Palearctic, and Southern Iran. In Iran, the eastern lineage, including populations from Tehran, Semnan, and Khorasan, is attributed to *N. m. migratorius* which aligns with topotypes from Kazakhstan. The western lineage, comprising haplotypes from Ardabil, East Azerbaijan, West Azerbaijan, Kurdistan, Hamadan, Zanjan, Lorestan, and Isfahan, corresponds to *N. m. phaeus*. A new lineage from the Hezar Mountains in southern Iran was identified for the first time which need further taxonomic assessments. Considering that there are no significant physiogeographical barriers between the eastern and western lineages in Iran, it is likely that the grey dwarf hamster entered Iran from both directions independently. According to the haplotype network analysis, it is possible that the southern population of Iran originated from the western lineage during past climatic fluctuations. Much like other small mammals—such as jirds, shrews, brush-tailed mice, and forest dormice this population may have survived in a putative refuge along the central Iranian massif.

55. Adolescent stress exposure impacted memory formation in a streptozotocin-induced Alzheimer's rat model

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Alzheimer's disease (AD) is a neurodegenerative disease linked to significant physical, cognitive, and social impairments. Intracerebroventricular (ICV) injection of streptozotocin (STZ) in rats is an animal model of AD to investigate the cognitive and physiological disorders associated with sporadic AD. Considering that lifestyle during adolescence may affect the development of this disease in later life, the present study examines how exposure to various stresses during adolescence influences the effects of STZ on memory formation. Juvenile rats (90-100 g) were exposed to unpredictable chronic stress, including wet cage, tilting cage, circadian rhythm change, cold cage, small cage, and food/water/sleep deprivation for five weeks. After becoming adults (200-220 g), they were unilaterally cannulated into the lateral ventricle using a stereotaxic apparatus to receive STZ (1 and 3 mg/kg/10 μ l) or artificial cerebrospinal fluid (CSF). A step-through passive avoidance task was used to assess memory formation. Intra-ICV microinjection of STZ at a dose of 3 mg/kg, but not 1 mg/kg, impaired memory formation in a step-through passive avoidance learning task, indicating an amnesic effect of STZ. Exposure to various stresses affecting intellectual, physical, and social activities during adolescence potentiated the response of an ineffective dose of STZ (1 mg/kg), leading to memory impairment in adult rats. It can be concluded that adolescent exposure to various stresses can increase susceptibility to memory impairment induced by a lower dose of STZ in adulthood. This highlights the potential long-term impact of adolescent lifestyle on the development of cognitive disorders like Alzheimer's disease.

56. Social defeat stress and environmental enrichment modulate neuronal morphology in the amygdala of maternally deprived rats: a potential adaptive mechanism for conserving fear memory retrieval

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Early-life stress and social experiences can impact emotional responses by altering emotion processing circuits. This study explored the combined effects of maternal deprivation, adolescent social defeat, and enriched environment on fear memory and the morphology of basolateral amygdala (BLA) neurons in male Wistar rats. Pups were subjected to control conditions or maternal deprivation (PND 1-21) for 3h/h, followed by social defeat (PND 35-38). Rats from recent group were housed in either enriched or standard cages (PND 60-83). Fear memory retrieval

was assessed through a passive avoidance test (PND 98-99), and BLA neuronal morphology was analyzed using Golgi-Cox staining (PND 100). Interestingly, while maternal deprivation and social defeat did not alter fear memory, dendritic branching and complexity was increased in BLA neurons. Notably, enriched housing partially mitigated these morphological changes. These findings suggest that BLA structural alterations may underlie compensatory mechanisms preserving fear memory stability in response to early-life stress and adolescent social defeat.

57. Improved Growth Performance and Antioxidant Defense in Juvenile Shrimp (*Litopenaeus vannamei*) through Dietary Garlic Extract (*Allium sativum*) Supplementation

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This study evaluated the effects of dietary garlic (*Allium sativum*) extract supplementation on the growth performance, feeding parameters, and antioxidant status of Juvenile Shrimp (*Litopenaeus vannamei*). Juvenile shrimp were fed diets containing 0%, 0.5%, 1%, or 1.5% garlic extract for 60 days. Growth performance, survival, feed utilization, and antioxidant enzyme activities in the hepatopancreas were assessed. Shrimp fed the 1% garlic extract diet exhibited significantly higher final body weights, average daily gains, and better feed conversion ratios compared to the control group. Survival rates were numerically improved in the garlic-supplemented groups, although not statistically significant. The activities of the antioxidant enzymes superoxide dismutase (SOD) and catalase (CAT) were significantly elevated in the 1% garlic group, indicating enhanced antioxidant defense mechanisms. These findings demonstrate the beneficial effects of dietary garlic extract supplementation on shrimp aquaculture. The growth-promoting and antioxidant-enhancing properties of garlic suggest it as a promising natural feed additive to improve the productivity and resilience of shrimp farming operations. Further research on the optimal inclusion levels and long-term effects of garlic supplementation is warranted to maximize its practical application.

58. First report of blood parasites in Caspian bent-toed gecko (*Cyrtopodion caspium*) in the north of Iran

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Reptiles are hosts for a wide variety of parasites, especially for diverse groups that parasitize blood cells. These blood parasites may be intra- or extracellular organisms that range from protozoan kinetoplastids, bacterial parasites, and apicomplexan parasites. Apicomplexan parasites are the most protozoan parasites infecting a variety of hosts, among which are many reptile species. They usually have an indirect life cycle involving merogony and the formation of gametocytes in the circulatory system and/or visceral tissues of a vertebrate host, and gamogony proper and sporogony within the gut of an invertebrate vector. In this study, blood parasites were investigated in the Caspian bent-toed gecko, *Cyrtopodion caspium* in the north of Iran. Sampling was carried out during spring. Blood smears for each individual were prepared immediately, air-dried, and stained using the standard Giemsa staining method; then they were randomly examined using a 100 oil immersion lens. In a result, 2 out of 6 individuals were infected by blood parasites. The parasites were some small inclusions that were found infecting red blood cells. No extracellular parasite detected. Molecular analysis is needed to identify these blood parasites. This report is the first survey of haemoparasites in the Caspian bent-toed gecko. It revealed a high diversity of lizard haemoparasites and highlighted the need to understand their impacts on hosts.

59. First record of the genus *Stillabothrium* (Cestoda Rhinebothriidae) from genus *Maculabatis* from Persian Gulf and Gulf of Oman with exploring six new species

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The order Cestoda are parasites of the digestive system of vertebrates. Nine of the 19 orders only infect elasmobranchs. The members of the order Rhinebothriidea are specifically considered parasites of batoids. So far, 13 species of the genus *Stillabothrium* have been reported from the Eastern Atlantic Ocean (Senegal coast) and the Eastern Pacific Ocean (Vietnam, Borneo, and Australia). Still, they have not been documented from the Persian Gulf and Oman Sea. The members of this genus differ in the arrangement and number of transverse and longitudinal septa of the bothridium and the anatomy of the proglottid. As a result of bycatch fishing, 65 individuals from four species of *Maculabatis arabica*, *M. gerrardi*, *M. randalli*, and *Himantura leoparda* were obtained from the waters of Bushehr and Bandar Abbas in the Persian Gulf and Djod in the Oman Sea. 1106 parasites of *Stillabothrium* were isolated from their spiral intestines. The samples were stained to check the diagnostic traits, and a permanent slide was prepared. The results indicate the presence of six taxa of *Stillabothrium* in hosts that have not been described before and are reported for the first time from the Persian Gulf and Oman Sea. The examined hosts are also introduced as new records for this genus. The prevalence and mean intensity at the genus level for *M. arabica*, *M. randalli*, and *H. leoparda* were 38.9, 51.3, and 100%, and 12.6, 20.4, and 31.7, respectively. No parasite was found in the only specimen of *M. gerrardi*. It seems that more host species examination will discover more new species of *Stillabothrium* from the region.

60. First report of *Rhipicephalus appendiculatus* and *Haemaphysalis concinna* Ticks species from Hedgehog (*Erinaceus concolor*) in central of Iran

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Ticks from Ixodoidea order belong to Achanida, Acari are parasitic arachnids (Parasitiformes). They are external parasites (ectoparasites), living by feeding on the blood of mammals, birds, and sometimes reptiles and amphibians that consume blood to satisfy all of their nutritional requirements. They are obligate hematophages, and require blood to survive and move from one stage of life to another. Ticks can fast for long periods of time, but eventually die if unable to find a host. So far, 900 species from 18 genera of them are known in the world. In this study two collected ticks species from hedgehogs body are recorded first time in central of Iran, Markazi Province. Trapped hedgehogs at night from the grass were taken to the laboratory. Stuck ticks around their ears and the other parts of the body were carefully removed with pincers and placed and fixed in labeled vials containing 7% glycol alcohol and then hedgehogs were released in environment. Morpho-biometrical studies were done using light microscopy method. They were identified by available keys and references and their illustration and description were prepared. Results showed a hard tick *Rhipicephalus appendiculatus* Neumann species and a common rodent *Haemaphysalis concinna* C. L. Koch species that both belong to Ixodida, Ixodidae family

61. Betanin can exert a protective effect against hydrogen peroxide- induced PC12 Cells cell toxicity.

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The production of reactive oxygen species (ROS) by oxidative factors such as H₂O₂ is associated with the destruction of neurons and cell death by activating the genes involved in the internal

apoptosis cascade. The factors mentioned above are the sum of cellular events that lead to neurological deficits in Alzheimer's disease (AD). Betanins are one of the groups of betacyanin pigments in betalains from red beetroot which can scavenge ROS by having phenolic and cyclic groups in their structure. Here, we studied the protective effects of betanin against H₂O₂-induced cell death in PC12 cells. PC12 cells were pretreated with betanin (5-50 μ M) for 24h and then exposed to H₂O₂ (150 μ M) for 4h. At the end, we assay the cell viability, intracellular ROS production, and cell apoptosis using analysis AlmarBlue, 2', 7'-dichlorodihydrofluorescein diacetate (DCFH-DA) and propidium iodide (PI) staining and flow cytometry. betanin (10-50 μ M) could decrease H₂O₂ (150 μ M) toxicity and showed a significant difference compared to the H₂O₂ group ($P < 0.05$). Plus, after exposure of cells to H₂O₂ (150 μ M), betanin (5-50 μ M) considerably decreased ROS ($P < 0.05$ and $P < 0.01$). On the other hand, cell apoptosis was significantly elevated to 68.3% after exposure of cells to H₂O₂. compared to control (8.8%). Whereas, pretreatment with the betanin at 10-50 μ M decreased the percentage of apoptotic cells (13.5%, 10.05%, and 12.75%). Our finding showed that betanin can delay or prevent cell death caused by H₂O₂ by attenuating free oxygen species. Betanin also exhibits neuroprotective effects with a declining percentage of apoptotic cells. Thus, it may be considered a possible candidate for dealing with pathological agents in AD.

62. Evaluation of the Effect of *Lactobacillus fermentum* on the Expression of the Inflammatory Cytokine Gene Interleukin-6 in Alzheimer's Model Rats

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Lactobacillus fermentum is a commonly used probiotic that plays a significant role in enhancing the host's immune system, improving food digestion, and reducing metabolic disorders. Oxidative stress caused by diseases such as Alzheimer's is a key factor in the associated disorders. IL-6 is an inflammatory cytokine, and reducing its levels can potentially aid in improving such conditions. This study aimed to evaluate the effect of *Lactobacillus fermentum* on the expression of the IL-6 gene in an Alzheimer's rat model. In this experimental study, 30 male Wistar rats, weighing approximately 250 grams, were randomly divided into five groups: control, Alzheimer's, and three treatment groups. Alzheimer's was induced by injecting streptozotocin at a dose of 5 mg/kg in a volume of 5 microliters into each lateral ventricle of the rats using the stereotaxic method. In the treatment groups, alongside STZ injection, the probiotic was administered intraperitoneally at doses of 10^6 CFU/ml, 10^7 CFU/ml, and 10^8 CFU/ml for 21 days. After 21 days, the rats were anesthetized with ketamine and xylazine, and RNA was extracted from hippocampal tissue. Following cDNA synthesis and RT-PCR, changes in IL-6 gene expression were analyzed. The data were compared using ANOVA statistical analysis. The results indicated that IL-6 gene expression significantly decreased in the group that received the probiotic at 10^8 CFU/ml compared to the negative control. This suggests that the probiotic may be effective in reducing oxidative stress and inflammation due to its antioxidant and anti-inflammatory properties.

63. Effect of Red Wiggler Worm Meal (*Eisenia fetida*) on Growth Performance and Body Composition of Nile Tilapia (*Oreochromis niloticus*) Fingerlings

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The red worm *Eisenia fetida* is the most common worm used for composting and can consume a wide range of food materials, live in dense populations, and produce nutrient-rich compost. Nile tilapia (*Oreochromis niloticus*) is one of the most widely cultured species, contributing to food

security and providing affordable fish for low-income individuals. The objective of this study was to investigate the effect of replacing fish meal with *E. fetida* meal on the growth performance and body composition of Nile tilapia fingerlings. In this experiment, seven diets were prepared for Nile tilapia fingerlings, containing different levels of fish meal replaced with *E. fetida* meal. The diets were pelleted and dried, and the fish were fed these diets for 60 days. The chemical composition of the diets was determined using AOAC methods. The *E. fetida* worms were collected from a laboratory and fed a protein-rich vegetable waste. The pre-treatment included composting and inoculation with *E. fetida*, which led to improved biodegradation and nitrogen supply. 1500 healthy monosex Nile tilapia fingerlings were reared in fiberglass tanks. Water quality parameters remained within the recommended range. The use of *E. fetida* meal as a replacement for 15% to 20% of fish meal in the Nile tilapia fingerling diet has yielded very promising results. Studies show that this level of worm meal inclusion in the diet has led to a significant improvement in growth performance indices, feed conversion ratio, and protein efficiency ratio of the fish. Additionally, the fat, energy, and mineral contents of the fish flesh have also increased. In contrast, the use of 30% worm meal in the diet resulted in a decrease in these parameters. Only the fish fed the diet containing 20% *E. fetida* meal showed a higher condition factor compared to the control group. These results indicate that the partial replacement of fish meal with worm meal can be done without negatively affecting the growth and body composition of the fish. This can be considered as a suitable approach to improve the production efficiency indices and enhance the nutritional composition of the fish flesh.

64. Investigating the antioxidant effect of Citrus aurantium flowers aqueous-alcoholic extract with Ames test

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Orange blossom has been recognized as a medicinal plant in traditional medicine. The protective effect of some plants against the risk of developing some diseases such as cancer has been shown. In this regard, the present study aimed to investigate the antioxidant and anticancer properties of aqueous-alcoholic extracts of Citrus aurantium flowers against the mutagenic agent sodium azide using liver microsomes and the Ames test. In this experimental study, after preparing aqueous-alcoholic extracts of Citrus aurantium flowers, the ability to inhibit mutagenesis was evaluated based on the Ames test. This test involved using a mutant strain of Salmonella and the carcinogen sodium azide, in the presence of mouse liver microsomes. The results showed a decrease in the number of mutant colonies in the presence of the extract. Specifically, the aqueous-alcoholic extract exhibited a 59% reduction in mutagenicity. The difference in the average number of revertant colonies per plate in relation to the mutagen was analyzed using SPSS software and one-way analysis of variance. This study demonstrated the anticancer effects of Citrus aurantium flowers extract, which can be attributed to the presence of antioxidant compounds such as flavonoids.

65. Evaluation the effect of exosomes derived from adipose tissue mesenchymal stem on the proliferation of Wistar rat spermatogonial stem cells

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According to the World Health Organization report, the infertility is a main challenge in the world. Mesenchymal stem and progenitor cells within the microenvironment of stem cells are responsible for the regeneration of organs and tissues throughout the lifetime of an organism. These cells can use to reconstruct the lost tissue and organs due to their self-renewal ability. Studies have shown

that exosomes isolated from mesenchymal stem cells are capable of complex regulation of intracellular pathways and therapeutic control of diseases such as cancer and neurodegenerative diseases. The purpose of this experiment is to investigate the potential of spermatogenesis stem cell proliferation using exosomes derived from fat stem tissue. The CD markers of adipose stem cell exosomes were characterized using flow cytometry, and the size of exosomes was assessed by DLS assay. MTT assay showed that the viability of spermatogonial stem cells didn't change under exposure with exosome derived from fat tissue mesenchymal stem cell (10-50 $\mu\text{g/ml}$). RT-PCR analysis revealed that with an appropriate doses of exosome, the expression level of Dazl gene involved in the proliferation of spermatogonial stem cells was increased.

66. Investigating the effect of platelet-rich plasma exosomes (PRP-Exos) on the level of LH and FSH hormones in a mouse model of polycystic ovarian syndrome (PCOS)

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One of the new and effective treatment agent for PCOS is platelet-rich plasma. Platelet-rich plasma (PRP) contains high levels of growth factors. The presence of these growth factors makes PRP useful in medicine because it stimulates cell proliferation, differentiation and angiogenesis. Exosomes derived from platelet-rich plasma (PRP-Exos) are Extracellular vesicles (EVs) with 40-100 nm in diameter. PRP-Exos carry various proteins and act as carriers of mRNAs, microRNAs and bioactive proteins. The aim of this research is to investigate the effects of platelet-rich plasma exosomes on the level of LH and FSH hormones in the PCOS mouse model. For this purpose, we collected the heart blood of healthy NMRI mice and PRP by two-stage centrifugation. We obtained PRP-Exos using the exosome extraction kit from serum and biological fluids and identified PRP-Exos with the methods mentioned in the kit. Intraperitoneal injection was given to mice in the treatment group and the levels of LH and FSH hormones were measured by ELISA. Our findings revealed a significant change in blood serum hormone levels compared to the PCOS group ($p \leq 0.05$), which means the effectiveness of PRP-Exos in improving PCOS symptoms.

67. Investigating the effect of fennel seed powder (*Foeniculum vulgare*) and cumin (*Cuminum cyminum*) separately and in combination on MDA and body weight in testicular tissue of rats

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Medicinal herbs are used as protective strategies in many disorders such as diabetes and cancer. Also, some healthy people consume these herbs to prevent illness. But they may have side effects. Herbs are able to exert a pro-oxidant effect, including the formation of reactive oxygen species (ROS). ROS causes the peroxidation of lipids and the formation of malondialdehyde (MDA). We studied the effects of cumin and fennel alone and in combination for 14 days on the testes of normal rats to see if their toxicity exists alone or synergistically. In this study, 32 male rats (220-240 g) were divided into 4 groups: The control group (C), the group treated with cumin seed powder at a dose of 250mg/kg (Cu250), the group treated with fennel seed powder at a dose of 500mg/kg (F500) and the group treated with the combination of fennel and cumin seeds powder to order with doses of 250 and 125mg/kg (F250+Cu125). At the end of the test period, body weight and MDA were measured. Administering fennel and cumin powder separately and in combination caused an increase in body weight compared to the C group. Testis MDA concentration in F500 group increased significantly ($P < 0.05$) compared to C group. Also, F250+Cu125 and Cu250 groups had an increase, but they were not significant. The combined use of these two plants with half the

individual dose had the same effect as cumin. But the consumption of fennel alone caused an oxidative state, which is probably due to its pro-oxidant role.

68. Investigating the Effect of Tetrathiomolybdate on Nitric Oxide Transporter Activity in Polycystic Ovary Syndrome in Wistar rats

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Polycystic ovary syndrome (PCOS) causes disruption of sex hormones in the ovaries of women of reproductive age. Many factors, especially oxidative stress (OS), contribute to the development of PCOS. Nitric oxide (NO) is actually a cellular messenger and activates downstream inflammatory pathways, which also leads to increased OS. Tetrathiomolybdate (TTM) is a substance that inhibits the pathway OS. The aim of this study is to investigate the effect of TTM on OS in polycystic ovary syndrome in the Wistar rat PCOS model. In this study, estradiol valerate (EV) was used to induce PCOS. 25 adult female Wistar rats with an approximate weight of 150 to 185 grams were used. Rats were randomly divided into five experimental groups (5 rats in each group) as follows: group 1: control (received olive oil), group 2: EV 0.3 mg/kg and saline, group TA, TB and TC were treated with TTM. Doses of 5, 10, 20 mg/kg respectively. In order to induce PCOS, animals received a single dose of EV. After 28 days, they were treated subcutaneously with TTM for 14 days. Then the activity status NO in rats with PCOS and healthy group was checked by ELISA method. The activity level NO in the groups treated with TTM and also in different doses of TTM decreased significantly compared to the PCOS control group ($P < 0.05$). TTM is effective in controlling polycystic ovary syndrome by inhibiting OS and reducing inflammation, and it can be used to treat this disease in the future, although it needs more research and study.

69. Investigating the effect of temperature on the macrobenthos of the Caspian Sea

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Temperature is one of the important ecological parameters, which affects the physical and chemical properties of water, thus affecting marine ecosystems and the structure of their communities. Temperature increase, climate change, decrease in diversity of animal species, including macrobenthos, are the consequences of climate change. This study was conducted with the aim of investigating the effect of temperature on the macrobenthos of the Caspian Sea. The current research was conducted on ten stations in Caspian combined cycle power plant in Mazandaran. For this purpose, macrobenthic samples were collected 3 times in summer and winter using Grab sampler with an area of 0.25 square meters. In the studied area, 19 families of crustaceans were isolated and identified. The highest frequency percentage of the dominant groups of macrobenthic organisms during the sampling was related to Ostracoda 25.34%, Bivalvia 43% and Polychaeta 32.25% respectively. Also, the results showed that the highest average number of species is related to station number 5 (station affected by hot water) with 8.56 ind/m(2). As a result, climate change and global warming are growing phenomena in recent years that have disturbed the ecological balance of nature. Therefore, the earth is warming, and following this process, the temperature of the earth will increase by 34 degrees in the next hundred years. Probably, an increase in water temperature of 1 degree due to global warming can affect the structure, diversity and abundance of macrobenthos in the Caspian Sea and increase their abundance in the next century.

70. Investigating the effect of effective doses of curcumin and coenzyme Q10 on neuroprotection and movement disorders in an animal model of Parkinson's disease induced by 6-hydroxydopamine toxin

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Parkinson's disease is one of the most common types of neurodegenerative diseases characterized by movement disorders such as: slowness of movement, lack of movement, muscle stiffness, resting tremors and masked face. The main cause of the disease is the destruction of dopaminergic neurons in the dense part of the substantia nigra in the midbrain and a decrease in the concentration of dopamine in the terminals of the striatum. This study was conducted to investigate the effect of curcumin on the animal model of Parkinson's disease induced by 6-hydroxydopamine toxin. In order to create a mouse model of Parkinson's disease, 6-HDOP toxin was injected into the nucleus of the substantia nigra in adult male NMRI rats at a dose of 5 µg/kg of mouse weight. The correctness of creating a Parkinson's model in mice was confirmed by using catalepsy and turning tests caused by apomorphine. One week after the surgery, the parkinsonian rats were treated for two weeks with water (curcumin solution) and doses of 10, 20 and 30 curcumin and coenzyme Q10, with doses of 25, 50 and 100, and the dose of 30 curcumin and 50 coenzyme Q10 as doses were determined to be effective. Then, the mice were subjected to behavioral tests and the number of neurons was counted in their substantia nigra nuclei. Our results show that timaretvam with effective doses of curcumin 30 and coenzyme 50 significantly Reduction of immobility time in the catalepsy test and forced swimming test, which resulted in the treatment of the animal's depression, and also increased motor activities in the maze, which shows the reduction of anxiety in the animal Curcumin provides protective effects against damage caused by Parkinson's disease.

71. Investigating the Effect of Sodium Diclofenac on the Serum Level of Total Oxidant Status in Rat Models with Polycystic Ovary Syndrome

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Polycystic Ovary Syndrome (PCOS) is the most common worldwide hormonal disorder in women of reproductive age. Oxidative stress is closely related to the onset and progression of PCOS, leading to chronic low-grade inflammation in these individuals. Diclofenac sodium (DIC) is a non-steroidal anti-inflammatory drug. Total oxidant status (TOS) refers to the total amount of oxidants in the sample, including free oxygen species or nitrogen. This study aims to determine the effect of DIC on the level of oxidant factor in the serum of PCOS model rats. In this study, 25 adult female Wistar rats with an approximate weight of 180 to 200 grams were examined. To induce PCOS in animals, estradiol valerate (EV) was used. Rats were randomly divided into five experimental groups (5 rats per group) as follows: group 1 (control, received olive oil), group 2: EV (0.3 mg/kg) and saline, groups 3, 4, and 5 received 2.5, 5, and 10 mg/kg DIC doses, respectively. Animals received a single dose of EV and after 28 days, were treated with DIC for one week. Then, the TOS was evaluated in rats with PCOS and the control group. TOS in the groups treated with different doses of DIC significantly decreased comparing to the PCOS control group ($P < 0.05$). The results show that the exposure of PCOS groups to different doses of DIC can affect the reduction of inflammation.

72. Investigating the anti-inflammatory effect of pomalidomide in the PTZ-induced seizure model in male rats

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Pomalidomide has shown strong anti-inflammatory effects by inhibiting the production of tumor necrosis factor alpha. Its potential therapeutic applications in the treatment of various neurological disorders are being investigated. In this study, 30 male rats weighing 200 ± 20 grams were divided into six groups: a healthy control group, a group with PTZ-induced seizures, and three treatment groups that received intraperitoneal injection of pomalidomide with doses of 25, 50, and 100 mg. received per kilogram. All procedures were performed in accordance with animal ethics and relevant guidelines. Finally, the anti-inflammatory effects of pomalidomide on improving cognitive performance were investigated through statistical analysis of behavioral and biochemical tests of oxidative stress markers. Treatment with pomalidomide led to a significant increase in the level of STL (dark entry delay) in the groups receiving pomalidomide and a significant decrease in the group receiving PTZ. Pomalidomide also increased the levels of GPx, SOD, while decreasing the levels of MDA. This study shows that pomalidomide, with its ability to cross the blood-brain barrier, can be a promising solution in reducing inflammation and cognitive problems caused by seizures. More studies are needed to investigate its effectiveness and safety for long-term use.

73. Investigating the effect of hydroalcoholic extract of fig leaves (*Ficus carica* L.) on the contractions caused by potassium chloride in the isolated intestine of male rats

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Figs are one of the plants used in traditional medicine for a wide range of diseases. Different parts of figs are used medicinally against various diseases, including disorders of the digestive system. The present study was conducted in order to investigate the hydroalcoholic extract of ficus carica leaves on the mechanical activity of isolated rat ileum. Rats were randomly divided into two groups of five. Rats were anesthetized with ethyl ether and their ileum was separated. The isolated ileum was divided into two 1 cm pieces. One of the pieces was randomly selected as the control group and the other pieces as the experimental group. The pieces were placed in an organ bath containing oxygenated Tyrode solution with a temperature of 37°C and $\text{pH} = 7.4$. Their mechanical activity was recorded by a force transducer connected to the Powerlab system. By adding KCl, stable tonic contractions were created in the tissue and their mechanical activity was recorded after adding different concentrations of extract and solvent. The data was analyzed by SPSS software and ANOVA, Independent samples T-Test and paired samples T-Test considering the significance level of $P \leq 0.05$. The results showed that the hydroalcoholic extract of ficus carica leaves with a concentration of 0.27 mg/ml reduces the contractions caused by KCl, which was not seen in its solvent. In the scope of the present research, it can be concluded that the hydroalcoholic extract of ficus carica leaves reduces the mechanical activity of the ileum.

74. Effect of hydroalcoholic extract of *Levisticum officinale* on plasma level of Malondialdehyde in diabetic rats

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Levisticum officinale has antioxidant and antidiabetic properties. This study aimed to examine the effect of *Levisticum officinale* hydroalcoholic extract on Malondialdehyde (MDA) level in plasma

of streptozotocin-induced diabetic rats. In this experimental study, 24 adult male rats were divided into four groups (n=6). A group of normal rats received distilled water (0.5 ml) individually by gavage for 14 days and the others were made diabetic by the injection of streptozotocin (STZ; 70 mg/kg, i.p.). The second, third and fourth diabetic groups received, distilled water (0.5 mL), 500 mg/kg L.officinale extract and 20 mg/kg glibenclamide by gavage for 14 days, respectively. After treatments, rats were sacrificed and plasma level of MDA was evaluated by spectrophotometry. Administration of L.officinale extract in diabetic rats for 14 days significantly decreased plasma level of MDA in comparison with diabetic ones ($p<0.05$). Conclusion: It can be concluded that hydroalcoholic extract of L.officinale attenuate the oxidative stress and lipid peroxidation via free radical trapping in the course of diabetes mellitus.

75. Investigating the effect of clove hydroalcoholic extract (*Syzygium aromaticum*) on folliculogenesis in mouse ovarian tissue

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The normal function of ovary is vital and essential for natural pregnancy and ovarian function is dependent on normal development and preservation of ovarian follicles. Considering the antioxidant properties of the clove plant, in the present study, the effect of the hydroalcoholic extract of this plant was investigated on the ovarian tissue of adult NMRI mice. 48 female mice with an average weight of 22-25 g were randomly divided into six groups. Injections were done intraperitoneally for 21 days. Control group: without any treatment, Sham group: received normal saline, the third, fourth, fifth and sixth groups received doses of 25, 50, 100 and 200mg/Kg of hydroalcoholic extract of the clove plant respectively. Finally, the ovaries were removed for histological examination and stained with H&E and primordial, primary, secondary, preantral and antral follicles were counted by light microscope. The data were analyzed by One Way Anova and Tukey test in SPSS software. Secondary follicles in the 50 dose group and pre antral and antral follicles in the 25 and 50 dose groups showed a significant increase compared to the control group. The above results showed that the clove plant due to its antioxidant properties can have positive effects on the ovarian tissue of adult mice and improve folliculogenesis.

76. The Effect of Hydroalcoholic extract of *Trachyspermum copticum* seeds on Pituitary-gonadal Axis Hormones in Adult Male Rats Exposed to a High Dose of Clomid

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The *Trachyspermum copticum* plant, due to its antioxidant compounds, has several medicinal properties. Clomiphene citrate (Clomid) is an effective non-steroidal oral medication that affects the hypothalamic-pituitary-gonadal axis. The aim of this study is to investigate the effect of hydroalcoholic extract of *Trachyspermum copticum* seeds on the hormonal axis of the pituitary-gonadal system in adult male rats exposed to a high dose of Clomid. In this experimental study, 24 male Wistar rats weighing approximately 200-250 grams were completely randomly divided into four groups of six (2 treatment groups, a control group, and a sham group). The control group received no treatment other than water and food, while the sham group received normal saline, treatment group 1 received Clomid at a dose of 5 mg/kg, and treatment group 2 received Clomid at a dose of 5 mg/kg plus hydroalcoholic extract of cumin seeds at a dose of 100 mg/kg for 28 days via intraperitoneal injection. At the end of the period, blood samples were taken from the rats, and the levels of testosterone, LH, and FSH hormones were measured using the ELISA method. The data were analyzed using SPSS statistical software and ANOVA test along with Tukey's test.

According to the results of this study, the level of testosterone hormone in treatment groups 1 and 2 showed a significant decrease compared to the control group ($P \geq 0.01$), but no significant changes were observed in the levels of LH and FSH hormones in the treatment groups compared to the control group ($P \leq 0.05$). Overall, the findings of this study indicate that the high dose of the drug likely has a negative impact on the hormones of the hypothalamic-pituitary-gonadal axis, but the hydroalcoholic extract of cumin, due to its antioxidant compounds, may partially modulate the effect of the drug.

77. The effect of *Lactobacillus fermentum* on TNF α gene expression in rats under immobility stress

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Lactic acid-producing bacteria such as *Lactobacillus fermentum* are the most commonly used probiotics that play an important role in protecting the host against harmful microorganisms, strengthening the immune system, improving food digestibility, and reducing metabolic disorders. Stress, including mental disorders. It is known as century disease due to its spread in different forms among all ages. In this research, 30 male Wistar rats were divided into 5 groups (control, negative control and 3 treatment groups). In order to induce immobility stress, the rats were They were placed in a special holder for 20 minutes daily for 15 days. In the treatment groups, at the same time as stress was induced, the probiotic *Lactobacillus fermentum* was injected intraperitoneally with doses of 6-10 cfu/ml, 10-7 and 8-10 for this purpose. *Lactobacillus fermentum* was cultured and centrifuged after bacterial growth. This suspension was dissolved in 0.5 mmol PBS and optical absorption was measured with an optical spectrophotometer. After 15 days, liver tissue was sampled to check possible tissue changes, which later The passage and staining of the slides were examined in different groups. The data were compared and examined with the help of ANOVA statistical analysis. The data showed that in all groups receiving probiotics, TNF α gene expression was significantly reduced compared to the negative control group ($P < 0.001$). Therefore, probiotics are probably effective in improving the effects of stress due to their antioxidant and anti-inflammatory effects.

78. Investigating the effect of sleep deprivation on motor functions in male Wistar rats

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Sleep is a state of reduced mental and physical activity in which a person is not conscious. Adequate and quality sleep plays an important role in maintaining movement functions and coordination between movements. Sleep deprivation is the inability to fall asleep or staying awake too long during the night. One of the most common stress that has become a concern in modern societies is lack of sleep. The aim of this study was to investigate the effect of sleep deprivation on motor functions in male Wistar rats. In this study, rats were divided into 3 groups: control (rats without sleep deprivation), sham (rats placed on a metal plate located on the columns of apparatus) and sleep deprived (rats placed on the columns of apparatus). In order to induce the sleep deprivation model, the multiple platform device containing 14 columns was used. Rats were placed on the columns of the apparatus for 21 days from 4pm to 10am. Beam and Rotarod tests were used to evaluate movement disorders. Beam test results showed that the start time of the test in the sleep-deprived group increased compared to the control group, but no significant difference was observed in the total test time. The results of the Rotarod test also showed that the sleep-deprived group spent less time on the apparatus than the control group. In general, this study showed that

long-term sleep deprivation can affect motor functions. Studying the molecular mechanisms involved in movement disorders caused by sleep deprivation is suggested as a study proposal.

79. Investigating the effect of sleep deprivation on anxiety in male Wistar rats

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Sleep is a natural and repeated state of mental and physical rest, in which the person's awareness of the surrounding environment decreases. During sleep, many biological changes, such as heart rate regulation, memory enhancement, and hormonal system regulation, occur in the body. One of the most common types of sleep disorders that has become a concern today is sleep deprivation. The aim of this study was to investigate the effect of sleep deprivation on anxiety in male Wistar rats. In this study, rats were divided into 3 groups: control (rats without sleep deprivation), sham (rats placed on a metal plate located on the columns of apparatus), and sleep deprived (rats placed on the columns of apparatus). In order to induce the sleep deprivation model, the multiple platform device containing 14 columns was used. Rats were placed on the columns of the apparatus for 21 days from 4pm to 10am. Elevated plus maze (EPM) test was used to evaluate the level of anxiety in rats. The results of this test showed that the sleep-deprived group had more anxiety than the control group. Overall, this study showed that long-term sleep deprivation can affect the level of anxiety. The results of this research emphasize the importance of adequate sleep to maintain mental health and show that sleep deprivation can lead to an increase in anxiety. Examining the molecular mechanisms involved in anxiety is proposed as the suggestions of this study.

80. Investigating the effect of Naproxen on TNF- α gene expression and oxidative stress marker Nitric oxide in Wistar rats, a model of polycystic ovary syndrome

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Polycystic ovary syndrome (PCOS), which is known as an important cause of infertility in the world, has now become one of the global health challenges. Since inflammatory pathways are activated in the development and progression of this disease and oxidative stress plays an important role in the occurrence of the disease. In this study, 30 adult virgin Wistar rats weighing 200-250 grams were randomly divided into five control groups, patients induced with estradiol valerate (EV) and patient groups receiving 10, 25 and 50 mg/kg Naproxen. After blood collection, serum was separated and NO was measured. RT-PCR technique was used to check the relative expression of TNF- α gene. In the statistical analysis of one-way variance and for comparison between groups, Tukey's test was used with a significance level of $p < 0.05$. The serum level of NO in the EV group showed a significant increase ($p < 0.01$) compared to the control group. In the groups that received naproxen, only the dose of 50 mg/kg could significantly decrease the serum level of nitric oxide ($p < 0.05$). The relative expression of ovary TNF- α gene increased in the EV group compared to the control group ($p < 0.05$), but all three doses of naproxen could significantly decrease the expression of this gene compared to the patient group ($p < 0.05$). The result of the present study is that naproxen can significantly reduce the inflammation in the ovarian tissue by reducing the expression of the key gene of the inflammatory pathway, TNF- α , and in high doses can inhibit oxidative stress and thereby improve the condition of PCOS rats. To be it seems that naproxen can be used to control and reduce the symptoms of polycystic ovary syndrome.

81. Investigating the effect of celery extract encapsulated with silver nanoparticles on the expression of NRF2 and KEAP1 genes in the ovaries of busulfan-treated mice

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Busulfan is used as a chemotherapy drug before bone marrow transplantation in cancer patients. Celery leaves (*Apium graveolens* L) can also be used to reduce the side effects of busulfan due to its antioxidant properties. In this study, the effect of celery extract encapsulated with silver nanoparticles (AG-SNP) was investigated on the ovaries of Busulfan-treated mice. Therefore, 20 female mice were selected and divided into 4 groups. Busulfan was injected intraperitoneally at a dose of 40 mg/kg. After 4 weeks, the control group did not receive anything, but in the other three groups, 200 mg/kg of celery extract, 200 mg/kg of silver nanoparticles (SNP), and 450 mg/kg of AG-SNP were added to their drinking water. The results showed that busulfan increased cell membrane rupture and, eventually, fibrosis and necrosis of ovarian tissue by increasing reactive oxygen species. The use of AG-SNP, compared to other treatment groups, resulted in more recovery of ovarian tissue after 3 weeks. A significant increase in the expression of the NRF2 gene and a significant decrease in the expression of the KEAP 1 gene were also observed in all three treatment groups compared to the control group ($p \leq 0.05$). Thus, the Nrf2 enzyme is suppressed by the Keap1 protein. In this study, the presence of Nrf2-inducing chemicals, such as AG-SNP, led to a decrease in the activity of the Keap1-Nrf2 complex and stabilization of Nrf2. As a result, the activation of antioxidant genes and inhibition of oxidative stress caused more ovarian regeneration in the AG-SNP group.

82. Investigating the effects of astaxanthin on the antioxidant levels in the blood of male laboratory rats diagnosed with Alzheimer's disease and beta-amyloid accumulation.

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Alzheimer's disease (AD) is a progressive neurological disorder characterized by dementia and memory impairment. Astaxanthin (AST), a carotenoid known for its strong antioxidant properties, was hypothesized to mitigate the pathogenic mechanisms of AD, potentially delaying the onset of cognitive decline. This study aimed to investigate the effects of AST supplementation on cognitive and pathological progression in a rat model of AD. Fifteen Wistar rats, each weighing between 180 and 200 grams, were selected for this experimental study and assigned to three groups: AST, Alz, and Ctrl. Over a period of 21 days, the AST group received astaxanthin while the Alz group was administered distilled water. Cognitive performance was evaluated using the Elevated Plus Maze and Shuttle-box tests. Additionally, both antioxidant and pro-inflammatory markers were analyzed, through Western Blot and ELISA techniques. The findings indicated that the Alz group exhibited significant impairments in learning and memory related to spatial tasks. In contrast, AST administration resulted in an increase in the antioxidants MDA and SOD. Moreover, the Elevated Plus-Maze test results suggested an enhancement in anxiety-related behaviors in Alz group. These results suggest that astaxanthin may represent a promising therapeutic approach for the early stages of Alzheimer's disease.

83. Investigating the protective effects of the hydroalcoholic extract of *Ziziphora clinopodioides* on hepatotoxicity induced by acetaminophen in male Wistar rats.

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Acetaminophen is one of the most popular and safest analgesic drugs worldwide. However, due to its widespread availability, intentional or unintentional overdose can cause severe liver damage and even acute liver failure. *Ziziphora clinopodioides*, a medicinal plant with a warm and dry nature from the Lamiaceae family, is used as a spice from its upper and aerial parts. This study investigated the effect of the hydroalcoholic extract of the aerial parts (leaves and stems) of this plant on liver toxicity in male Wistar rats treated with acetaminophen. In this study, 42 male Wistar rats with a weight range of 220 ± 30 mg were used, divided into 6 groups ($n=7$): healthy control, diseased (receiving 250 mg/kg acetaminophen by gavage), positive control (receiving 200 mg/kg *Ziziphora clinopodioides* extract intraperitoneally), and treatment groups 1, 2, and 3, which simultaneously received 250 mg/kg acetaminophen and 100, 200, and 400 mg/kg *Ziziphora clinopodioides* extract, respectively. The treatment period was 10 days. Twenty-four hours after the last injection, blood was collected from the heart, and serum levels of AST, ALT, albumin, and total protein were measured. Then, for histological study, 0.5-micron sections were prepared and stained with hematoxylin and eosin. The results of the present study showed that the hydroalcoholic extract of *Ziziphora clinopodioides* could alleviate the symptoms of acute acetaminophen toxicity to some extent. The 400 mg/kg dose performed better in reducing serum levels of liver enzymes compared to the 200 and 100 mg/kg doses. Histological examinations in this study also confirmed the results obtained from liver enzyme assessments. It is likely that the hydroalcoholic extract of *Ziziphora clinopodioides*, through its antioxidant capacity and anti-inflammatory effects, is effective in liver protection against acetaminophen.

84. Investigating the effects of silver nanoparticles on the activity of antioxidant enzymes in goldfish (*Carassius auratus*)

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The release of nanoparticles into the aquatic environment is one of the new environmental problems that must be studied. In this regard, the nanobiology of aquatic toxicology is a relatively new field of research that has attracted the attention of researchers; because the final destination of produced nano materials is aquatic ecosystems. Among different metal nanoparticles, silver nanoparticles have many users. In this study, after the synthesis of silver nanoparticles, their physicochemical characteristics were determined by different spectroscopic methods. Then, 36 pieces of goldfish with an average weight of 6 ± 1 grams were selected. The fish were exposed to 1/10 and 1/20 of median lethal concentration (about 0/03 and 0/06 mg/L) of silver nanoparticles along with the control in three replications. The fish were sampled on the 10th day of exposure. The fishes were immediately dissected and their liver organs were separated. The samples were homogenized with phosphate buffer on ice using a homogenizer. The activities of catalase and glutathione peroxidase enzymes were determined using a spectrophotometer kit, respectively, at different wavelengths. The results showed that the activity of catalase and glutathione peroxidase enzymes increased when exposed to a low concentration of silver nanoparticles, but after exposure to a high concentration, it led to inhibiting the capacity of the antioxidant defense system and reducing the activity of these enzymes. According to the results of this research, it can be seen that

silver nanoparticles can lead to a change in the activity of antioxidant enzymes and oxidative stress. Therefore, these nanoparticles should be prevented from entering the aquatic ecosystem.

85. The evaluation of histopathological effect of *Borago officinalis* extract ointment 3% on full thickness experimented Wound on skin Rats

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Wound healing has always been of great concern for the surgeon and therefore using different effective biological substances of either plant or animal origin for a faster and more efficient wound healing (repair) has been considered. The aim of this study was to investigate the accelerating effects of *Hypericum perforatum* extract on open wound healing in rats. Study design: thirty-six adult male Wistar-albino rats (weight 270 ± 10 g) were randomly allocated to three groups (one control and two treatment groups). Seven-mm, circular, full-thickness, skin wounds were created on the back of each rat (2 on the left and 2 on the right side). In the control group, wounds were treated by an ointment with no extract. The treatment groups were treated by standardized ointment containing 0. 3% *Hypericum perforatum* extract. For histopathological studies, the 3 groups were subdivided into 4 subgroups with 4 rats in each. Samples were taken from the groups 1 to 4 on days 3, 7, 14, and 21, respectively. After taking the sample, the rats were euthanized. The sequential wound biopsies were evaluated histopathologically for their fibrin, collagen, myofibroblast, leukocytes and tissue damage status. According to the results of this study, the ointment with 3% extract was much better and slightly better than the control and 0.3% extract ointments, respectively.

86. Investigation of parasites in the digestive system of *Periplaneta americana* in the north of Tehran

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Cockroaches are one of the most successful insects and more than 4000 species have been identified and about 30 species of them are pests. Cockroaches can transfer parasites or their eggs by vomiting and defecating on foods. Recent research on cockroaches, particularly the American cockroach (*Periplaneta americana*), has led to the identification of several parasite species that can be mentioned. Atiokeng Tatang's research in 2017 in Cameroon led to the identification of 6 types of parasites in the intestine of the American cockroach. Also, in the studies conducted in 2024 in Nigeria by Akeju, 11 types of parasites were identified. This study was conducted at Shahid Beheshti University; after collecting cockroaches and killing them with chloroform, their bodies were first washed with 70% alcohol and then with normal saline solution and dissected with a longitudinal cutting. After tying the beginning and end of the digestive system, it was separated and transferred to a plate, and its contents were diluted with normal saline and finally studied under a light microscope. Five species of parasites, including two species of protozoa: *Balantidium coli* and *Nyctotherus ovalis*; one species of nematode *Hammerschmidtella diesengi*; one species of rotifer *Philodina rotifer* and one species of water mite (Acari; *Hydrachnidia*) were identified that three species were reported as pathogenic. The results of this study are in line with the research of Akeju (2024), Atiokeng Tatang (2017) and Nedelchev (2013), but two species of parasites are reported for the first time.

87. Molecular and histological study of the effects of different doses of mercuric chloride on female mice ovary

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Mercuric chloride is a toxic heavy metal with the chemical formula of $HgCl_2$. Before production of antibiotics, mercuric chloride was used as a wound antiseptic in the treatment of syphilis. Today, in many articles, they are mentioned as the cause of water and aquatic pollution in low doses. The purpose of this study is to investigate the effect of different doses of mercury chloride on the fertility rate. For this purpose, female mice were divided into control, treatment 1, treatment 2 and treatment 3 groups. The different concentrations of 500, 2000 and 4000 $\mu g/kg$ body weight of mercury chloride were added to drinking water of treatment groups 1, 2 and 3, respectively. The control group received drinking water without adding mercuric chloride. After 45 days, the results showed that in treatment groups of 2 and 3, the destruction of follicular cells and ovarian tissue damage increased compared to other groups. The results of weighing the mice showed that, the ovarian weight also decreased in treatment groups 2 and 3 compared to the control and treatment group 1 significantly ($p \leq 0.05$). By increasing the dose of mercuric chloride, a decrease in WEE 2 gene expression was observed in the treatment groups. Since WEE 2 is a common gene between humans and mice and is considered an important regulator of meiosis I, the expression of this gene decreases in treatment groups along with increase in the destruction of ovarian follicles. It shows the harmful effects of mercuric chloride on fertility.

88. The study of some biodiversity indicators of polychaeta in the Gowatr Bay (Sistan and Baluchestan)

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Polychaeta include more than 10,000 species, most of which are marine and are one of the dominant benthic species in aquatic environments, and in terms of numbers, they are the most abundant in the macrobenthic fauna, and they are very important in terms of determining the ecological status, especially in coastal waters and coastal areas. Submarine sediments were sampled by Van-Veen grab with an area of 0.025 square meters from three stations with three repetitions in the winter (three months) of 2016. Sediments were identified and counted using a 0.5 mm sieve with water, and the samples were washed after separation. The population density in the entire sampling period was 2940 ± 151.67 individuals per square meter, and the lowest density was recorded in March, the end of the winter monsoon. Shannon's diversity index in the winter monsoon period: January, February and March were 21.87, 3.2 and 2.02 respectively, Simpson dominance index 0.9, 0.87 and 0.92, Pilou index 0.86, 0.88 and 0.83 and Margalef species richness index was 2.93, 4.03 and 1.66. The statistical test showed a significant difference between the months of sampling in all indicators except for pillow ($P < 0.05$). The high diversity index indicates that the substrate conditions are suitable for the growth and reproduction of the species, so that the uniformity of the substrate is effective in the low level of heterogeneity of the species. The suitable conditions for the growth of polychaeta are before and after the winter monsoon.

89. The Impact of the Analgesic Drug Cyclobenzaprine on Muscle Strength and Volume in Adult Rats

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This study investigates the effects of the muscle relaxant cyclobenzaprine on muscle strength and volume in rats. Although cyclobenzaprine is commonly used for muscle spasms and pain relief,

its impact on muscle health is not well-documented. Prior research indicates that analgesics may adversely affect muscle strength and contribute to muscle atrophy with prolonged use. This study aims to fill this gap in the literature. Four groups of adult male rats (20 rats per group) were studied: a control group with no cyclobenzaprine and three treatment groups receiving 1 mg, 5 mg, and 10 mg per kg of body weight daily for 8 weeks. Muscle strength was assessed using a grip strength meter, and muscle volume was evaluated by measuring changes in body weight and comparing these with the control group. Results showed that after 8 weeks, the treatment groups experienced reductions in muscle strength of 12%, 25%, and 35%, and decreases in body weight of 8%, 18%, and 28%, respectively. Cyclobenzaprine appears to disrupt muscle repair and regeneration processes by affecting the central nervous system and reducing motor neuron activity. The control group did not exhibit significant changes. These findings suggest that long-term use of cyclobenzaprine may lead to decreased muscle strength and volume, indicating a need for caution in its prolonged use for managing muscle spasms. These results are consistent with existing literature on similar drugs, though variations may be due to differences in dosages and treatment durations. Further research is needed to clarify the mechanisms behind cyclobenzaprine's effects on muscle tissue.

90. Investigating the Effect of Glutamine Supplementation on Athletic Performance and Muscle Recovery in Taekwondo Athletes: A Case Study

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Glutamine, a non-essential amino acid, plays a crucial role in protein metabolism and immune function. During periods of physical stress and intense exercise, glutamine serves as an energy source for immune cells and a precursor for protein synthesis. Despite its importance, the effects of glutamine supplementation on athletic performance and muscle damage in Taekwondo athletes remain inadequately explored. This study investigates the impact of glutamine supplementation on muscle damage indicators and athletic performance among Taekwondo athletes. The primary aim was to assess whether daily glutamine intake could reduce muscle damage and improve performance in this specific athletic population. In a double-blind, randomized clinical trial, 20 male Taekwondo athletes were randomly assigned to either a glutamine supplementation group (N=10) or a placebo group (N=10). The supplementation group received 5 grams of glutamine daily for 4 weeks, while the placebo group received an inactive substance. Performance evaluations, including tests of strength, speed, and endurance, along with muscle damage measurements (creatinine kinase levels and electromyographic analysis), were conducted before and after the supplementation period. Data analysis indicated that glutamine supplementation did not result in significant improvements in athletic performance or reductions in muscle damage markers. Comparisons of creatine kinase levels and performance metrics between the glutamine and placebo groups revealed no statistically significant differences. The results suggest that glutamine supplementation does not have a substantial effect on enhancing athletic performance or mitigating muscle damage in Taekwondo athletes. These findings highlight the need for further research to better understand the role of dietary supplements in sports performance and muscle recovery.

91. Investigating the effect of colon microbiome on calcium and magnesium serum levels in D-galactose-induced aging model in rats

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Based on the findings in the field of aging and the antioxidant and anti-inflammatory role of the microbiome of young animals, the present study was conducted with the aim of investigating the effects of microbiome transfer of young animals on the serum levels of calcium and magnesium in male rats, which were experimentally aged. 20 male Wistar rats weighing 200 ± 20 g and age 90-120 were obtained from the animal house of Urmia University Science Faculty and adapted for one week. Rats were divided into four groups: recipient of 1 ml/kg saline (Sal) first intraperitoneal then gavage (Control), recipient of 150 mg/kg of D-galactose then saline gavage (Aging), recipient of 150 mg/kg of D-galactose then Microbiome gavage (Age+Mic) and receiving 1 g/L antibiotic, 150 mg/kg D-galactose, microbiome respectively (Age+Mic+Antibio). D-galactose was injected intraperitoneal as a single dose to induce senescence. Other compounds were prescribed daily for 35 days to different groups. The results showed that the serum calcium levels in aging group were significantly lower than the control group ($P < 0.05$) and microbiome treatment with or without antibiotics could improve the levels of this electrolyte in aging rats and bring it to the levels of the healthy control group ($P > 0.05$). However, aging induced by D-galactose or microbiome treatment had no significant effect on magnesium serum levels in any of the treatment groups compared to each other ($P > 0.05$). Conclusion that the young microbiome can improve the impaired levels of some serum electrolytes, including calcium, in aging conditions.

92. Investigating the difference microplastic number in the digestive tract of Pomadasys kaakan in two phases, centrifuged and sieved

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Microplastics are an emerging environmental pollutant and are found in all oceans of the world. The aim of the present study was to investigate the number of microplastic in the digestive tract of Pomadasys kaakan in two phases, centrifuged and sieved. 15 fish were caught from the Oman Sea coasts by using a gillnet. The digestive tract of the fish was removed and digested in ten percent KOH solution for 48 hours in an oven. Then the supernatant was centrifuged at 3000 rpm for 3 minutes. The remaining liquid from tissue digestion was also passed through a sieve. Finally, the centrifuged liquid and the remaining particles on the sieve were filtered separately by a 0.22 micrometer filter with the help of a vacuum pump. A stereomicroscope equipped with a Dinolite digital lens was used to count the number of microplastic. 215 microplastic were counted in the digestive tract of the investigated samples, of which 65 particles were recorded in the centrifuged phase and 150 particles were recorded in the sieved phase. Comparing the number of microplastics in the present study with other studies shows that the number of particles in the studied fish is higher. One of the important reasons for the higher frequency of microplastic in the present study was the examination of all the digested liquid of the fish digestive tract, which was not done in most studies due to the difficulty of doing it. Therefore, to accurately report the number of microplastics that can provide accurate information about the state of microplastic pollution in marine areas, it is necessary to count the microplastic in the total digested liquid.

93. Study of the Length-Weight Relationship of *Alburnus mossulensis* in the Sefidbar River, Kermanshah Province

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Fish constitute the most diverse and abundant group of vertebrates. The study of fish in aquatic ecosystems is of great importance from evolutionary, ecological, and resource utilization perspectives. The length-weight relationship is one of the important biological parameters in fish, used to determine the status and growth of fish stocks and to assess the availability of food resources. The species *A. mossulensis* has a wide distribution in various regions of Iran and is commonly known as Shah-Koli, Shah-Mahi, and Southern Shah-Koli. This study was conducted to examine the length-weight relationship of *A. mossulensis* from the Sefidbar River in Kermanshah Province during the summer of 2020. In this research, a total of 42 fish specimens were caught and fixed in 10% formalin. The largest and smallest specimens captured had total lengths of 134 mm and 35 mm, and total weights of 22.53 g and 0.29 g, respectively. In the allometric growth equation $W=aTL^b$, the values obtained were $a=0.00038$ and $b=3.17$, with a correlation coefficient of $R^2=0.89$, which explains the changes in weight based on the length of the fish and indicates positive allometric growth in this study ($b>3$). Additionally, the Fulton's condition factor for the studied fish was calculated to be 1. The variations in the condition factor relate to the diversity of individuals, and a high condition factor depends on weight growth, favorable body condition, and proper balance in the growth and nutrition of the fish. These results can be beneficial for the management of aquatic resources and the conservation of this species in various regions of Iran.

94. Investigating the morphology of the sagittal otoliths structure of *Plectorhinchus gaterinus* from the Gulf of Oman (Perciformes: Haemulidae)

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Sagittal otoliths are bone-shaped structures that play an important role in the balance and hearing systems of fishes and can provide valuable information related to the history and taxonomy of fishes. Accurate identification of *Haemulidae* fish is crucial due to its high economic importance. The purpose of this research is to investigate and compare the otolith structure of the yellowfin (*Plectorhinchus gaterinus*) from the Gulf of Oman. To conduct this research, seven fish samples of the *P. gaterinus* were collected from Tis station-Chabahar, Gulf of Oman, and their hearing otoliths were separated and examined. The results of the descriptive morphological investigation showed that the overall shape of the otoliths is almost spherical. The diameter of the cauda canal remains the same throughout its length, and it is connected to the ostium on one side. On the other side, the cauda canal is L-shaped and bent towards the ventral side. The Ostium groove has almost the same diameter at all points, creating a curved structure in the front part (Rostrum) of the otoliths. The rear part (Postrostrum) of the otoliths is curved, and in the notch part of the Ostium region, there is a very small depression within.

95. Investigating the viability and motility of sperms collected from small male laboratory mice treated with actinomycete extract

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Actinomycetes are gram-positive filamentous bacteria containing bioactive secondary metabolites. Antibiotics, anticancer compounds, and antioxidant compounds are among the compounds found in actinomycetes extract. Actinomycetes are of interest for extracting new medicinal resources. Therefore, it is necessary to investigate the biological effects of the substances obtained in them in the in vivo environment. In the present study, the effect of the extract obtained from an actinomycete collected from the Garmsar region of Iran was investigated on the parameters of sperm viability and motility of small male laboratory mice. For this purpose, actinomycetes collected in 25 plates containing the basic culture medium were cultivated using the grass method. Extraction was done with ethyl acetate solvent. The mice were divided into 3 groups of 3: control, treatment with a dose of 10 mg/kg, and treatment with a dose of 5 mg/kg. The injection was done intraperitoneally for 28 days and at the end the sperms were collected from the epididymis. Sperm motility and viability were analyzed using spermogram software (Casa). The results showed that there was a significant increase in the motility and viability of sperms in the dose of 10 mg/kg compared to the dose of 5 mg/kg and the control group. This study showed that actinomycete extract has a dose-dependent effect on sperm motility and viability, which should be considered in its applications.

96. Examination of indicators to evaluate kidney function, and interleukin-10 in patients with active systemic lupus erythematosus

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Systemic lupus erythematosus (SLE) is an autoimmune disorder that can lead to renal dysfunction. In present research, the relationship between some markers of renal function, and inflammation with this disease was studied. For this purpose, 25 women and 5 men with active systemic lupus (with an activity score greater than 6), and the same number of healthy people were selected by obtaining consent and having special conditions to enter the study. After blood collection and serum separation, the renal biochemical markers were determined with standard methods, and inflammation factors were measured by ELISA. The data were analyzed with appropriate tests and a significance level of $p < 0.05$. The results indicated a significant increase in serum creatinine, uric acid, blood urea nitrogen, total and direct bilirubin levels in systemic lupus patients compared to healthy individuals. Although no significant difference was observed in the concentration of lipid profiles including total cholesterol, LDL HDL and triglyceride in patients compared to healthy individuals, but the inflammatory factors interleukin-10 and C-reactive protein increased in the serum of patients. Based on the obtained results, despite the fact that the patients did not suffer from lupus nephritis, and the duration of the disease was not long (4 to 10 years), the disease had a negative effect on kidney function at an acceptable level. Considering the significant increase of interleukin-10 and other inflammatory factors, it is suggested to evaluate inflammatory factors in the diagnosis and determination of disease severity.

97. Study of Fishes in the Seymareh River, Kemanshah Prov., Iran

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In this research, distribution, diversity and abundance of fish species in the Seymareh river, Kemanshah Prov. was studied from autumn 2022 to summer 2023. Fishes was caught seasonal by electroshocker instrument. Capture effort were same in every fishing. 1479 fish were caught that they contain 3 family, 5 genera and 10 species. Cyprinidae that were 5 genera and 8 species, had the highest diversity and abundance. Mastacembelidae and Sisoridae were one genus and one species. 10 species of fish caught that Over 67% of the total number of fish caught include Cyprinion macrostomum, Garra rufa and Chalcalburnus mossulensis. Glyptothorax silvia is native to Iran was the lowest number of fish caught, which was approximately 0.5% of all fish caught were included. It is recommended control and protection of the river is more Due to the low diversity and abundance of fish in the river.

98. A comparative study of the morphology of Otoliths of Pomadasys maculatus and Pomadasys stridens in Persian Gulf and Gulf of Oman (Perciformes: Haemulidae)

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The otoliths are dense structures in the heads of fishes that play a role in hearing and balance functions. These structures are also useful in identifying and investigating interspecies diversity among fishes. This research was conducted with the aim of comparing the morphological characteristics of otoliths between two species, Pomadasys maculatus and P. stridens, from the family Haemulidae in the Persian Gulf and the Gulf of Oman. For this purpose, nine samples of otoliths were separated from each species and photographed using a stereomicroscope with a digital camera. TpsDig and MorphoJ software were used for analysis. Then, the margins and grooves of semilandmark otoliths were marked. Principal component analysis (PCA) and discriminant function analysis (DFA) were performed to compare the two species. Examining the appearance of the otoliths of these two species showed that the otoliths of both species are oval. The total length and the Ostium of the otoliths in P. maculatus, compared to P. stridens, are more elongated and the Excisural notch groove in P. maculatus has a greater depression towards the center of the otoliths compared to P. stridens, and no significant difference was observed in the Sulcus groove section. The results of geometric morphometric analysis showed that the shape and structure of otoliths in the two studied species have significant differences.

99. Molecular and histological study of the effect of busulfan on mouse ovary

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Cancer causes the uncontrollable division of cells and the disobedience of vital genes. Busulfan is one of the alkylating chemotherapy agents that is used to treat chronic leukemia and ovarian cancer. It is a cytotoxic drug and when it is hydrolyzed, it releases methane sulfonate groups, which causes DNA alkylation and prevents DNA replication and RNA translation. Alkylation causes cross-linking in DNA and ultimately prevents the proliferation of cancer cells and causes cell apoptosis. The aim of the present study is to investigate the histological and molecular effects of busulfan on ovarian tissue, and serum factors. For this purpose, 20 female mice were randomly divided into 3 equal groups. control group, busulfan solvent group (DMSO) and busulfan group. The third group injected with a dose of 40 mg/kg of busulfan intraperitoneally. The results showed that the expression of TAF4B gene decreased in the treatment group compared to the control. Also,

serum levels of FSH and progesterone increased and the concentration of LH and catalase decreased in the treatment group compared to the control group. Histological studies showed that in the busulfan-treated group, the integrity of ovarian follicular cells was lost and more extensive cortical fibrosis as well as follicular cell degeneration and ovarian tissue necrosis increased compared to the other two groups. As a result, busulfan increases oxidative stress in ovarian follicular cells by reducing catalase and changing the level of serum factors, with production of ROS, which will affect reproductive health.

100. Histochemical study of mucins in the tracheal tissue of Goat

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Mucus normally protects the epithelium of the respiratory tract against dehydration and inhaled infectious agents and toxic substances. The two components of mucus, mucin and water play an important role in eliminating inhaled foreign substances. Mucins are glycoproteins rich in large carbohydrates. The aim of this study was to investigate the histochemical nature of the mucin secreted by the goblet cells in the lining tissue of indigenous goat trachea. Samples (2 x 2 cm) were taken and fixed from the trachea wall of goat. Thin tissue sections were prepared and stained with Schiff's periodic acid (PAS) and Alcian blue and studied by a light microscope. Goat's trachea, like other mammals, is covered by a ciliated columnar pseudo-stratified epithelial tissue, which is mainly composed of ciliated, goblet and basal cells. Goblet cells were irregularly scattered throughout the epithelial tissue. Based on the staining results, it was found that there were two types of goblet cells in the epithelium of the trachea, one type was observed to be purplish red in PAS staining, which contains neutral mucins, and the other type, which is blue in Alcian blue staining was observed to contain acidic mucins. The ratio of these two types of cells can affect the protective function of mucin against harmful factors and toxins of tracheal epithelial tissue. It is suggested to carry out more studies regarding the determination of the proportion of cells and the nature of mucin secreted by them in different physiological conditions.

101. Features of polyvinyl alcohol nano-hybrid system in repairing infected skin

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In the recent years of the 21st century, the use of medicinal plants has witnessed an increasing expansion of research in this field, and it has been proven that replacing the dry extract of the plant instead of its pure material due to the accumulation of substances in the plant strengthens the effect. Its treatment is to prevent its side effects along with medicine and finally this extract is offered in various medicinal forms in the current research, the effect of pterygium extract on the healing of infected skin wounds was investigated. According to accurate statistics, there were 12 experimental groups, and the effect of pterygium extract 5% was investigated. The duration of the experimental period was 21 days. It lasted for a long time and with the results of histopathology tests, it was found that the treatment groups with pterygium extract had complete healing of the skin wound and the treatment group with higher concentration had better recovery. The result of a well-done restoration and a higher concentration brought a better result.

102. The interaction of maternal deprivation and enriched environment on social defeat-induced cognitive and emotional activities: correlation with CA1 hippocampal neurons structure

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Early life stress is an important factor in brain programming to respond to stress in the future. Rapid alterations in brain structure and function during the critical period of brain development increase the effects of stress on the circuits controlling behavioral functions. In this study, newborn

Wistar male rats were divided into control and maternal deprivation groups. In the maternal deprivation group, infants were separated from their mothers for 3 hours/day on postnatal day (PND) 1-21, and experienced social defeat stress on PND 35-38. Rats were housed in either standard or enriched cages from PND23 to PND60. Behavioral tests (forced swimming test and radial maze test) were conducted on PND 61-99. The rats were then perfused on PND100, their brain extracted for sectioning and staining. The structure of CA1 hippocampal neurons was assessed using Golgi-Cox staining. Social stress defeat in young adult rats impaired spatial memory and increased anxiety and depression in behavioral tests, which were associated with a decrease in the dendritic complexity of CA1 neurons. Both behavioral and structural alterations were ameliorated in rats reared in enriched cage. Our findings indicate that maternal deprivation induces aggravating effects on anxiety and depression induced by social defeat in adulthood, but environmental enrichment ameliorates these effects.

103. The interaction of social defeat and endogenous ligand of aryl hydrocarbon receptor on dendritic spines of principal neurons and cell count in the basolateral amygdala of rats

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Exposure to chronic stress increases the likelihood of developing mood or anxiety disorders, which can significantly impact quality of life. Social defeat, a major stressor, plays a crucial role in the onset of various psychiatric disorders, including depression. In this study, male Wistar rat were assigned to a control group or subjected to social defeat stress on postnatal days (PND) 65-68. These rats were further divided into DMSO (solvent), FICZ (an endogenous aryl hydrocarbon receptor ligand), and FICZ+CH22 (endogenous ligand plus aryl hydrocarbon receptor antagonist) groups. On PND 130, transcardial perfusion was performed, and brains were sectioned and stained using the Golgi-Cox method to study the morphology of pyramidal and stellate neurons in the basolateral amygdala (BLA). Social defeat led to a reduction in dendritic spine density in BLA neurons, as well as a decrease in the volume of the amygdala, along with a reduction in the number of neurons and glial cells. Social defeat de Conversely, FICZ treatment increased dendritic spine density, amygdala volume, and neuronal and glial cell counts. Our findings indicate that social defeat, as a model of severe stress, alters the morphology of neurons in the BLA, an effect that is ameliorated by FICZ. These morphological changes may contribute to the anxiety and depression induced by social defeat, as well as the therapeutic effects of FICZ.

104. Testes under pressure of chronic immobilization stress: phytotherapy by yellow alfalfa extract

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Immobilization as a physiological stressor affects animal's growth and biological functions. Many plants have been used in treatment of stress induced-testis dysfunction. In the current study, the ameliorating effect of yellow alfalfa (*Melilotus officinalis*) extract on oxidative stress indices in testes of rats upon chronic immobilization stress was evaluated. To chronically immobilization, male rats were kept a restraint device for 2 hr/d for 21 days. Rats divided into 6 groups: control, pseudo-control (under stress receiving normal saline) and 3 experimental groups (under stress receiving *M. officinalis* extract at doses 25, 50, & 100 mg/kg b.w., IP route, 30 min prior to stress), and positive-control (under stress receiving fluoxetine). Then, the alterations of oxidative stress indices in homogenate's testes were evaluated. Results revealed that chronic immobilization stress could induce alteration in the oxidative stress indices in testes samples as illustrated by increases in ROS levels, lipo-peroxidation (LPO/MDA) content and carbonyl proteins (CP) levels with a decrease in total antioxidant capacity (TAC) value. Following using plant extracts, it has been

found out that pre-treatment of 100 mg/kg of *M. officinalis* extract caused a significant recovery in altered oxidative stress indices in damaged testes. Briefly, this study indicates that phytotherapy with *M. officinalis* extract can prevent chronic immobilization stress-induced oxidative status in testes.

105. An integrative insight into the taxonomic diversity of the cyprinid genus *Pseudobarbus* Smith, 1841 (Teleostei: Cyprinidae)

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The cyprinid genus *Pseudobarbus* Smith, 1841 represents a distinct clade of redfinned tetraploid smiliogastrine minnows endemic to South Africa and Lesotho. In his revision, Skelton (1988) recognized seven species, six of which were confined to the Cape Fold Ecoregion and *P. quathlambae* endemic to the Highlands of Lesotho and the Mkomazana River in Kwa-Zulu-Natal. Over two decades later, three new species, *P. skeltoni*, *P. verlorenei* and *P. swartzi* were described, and *P. senticeps* was reinstated as a valid species. This resulted in a total of 11 species that are currently recognized for this genus. Preliminary phylogeographic evidence, however, showed that there are at least six additional mitochondrial lineages that may merit formal description as new species. In this integrative study, we examined morphological, osteological, and molecular variation of specimens collected from multiple populations of the *P. afer* 'Forest' and *P. quathlambae* 'Mzimkhulu' lineages and provided evidence that they are morphologically differentiated from all known congeners. *Pseudobarbus afer* 'Forest' differs from the aforementioned congeners by colour pattern and scale counts. *Pseudobarbus quathlambae* 'Mzimkhulu' is different from all currently recognised congeners by the number of scales in the lateral line series. Formal description of these two lineages is the next phase of the ongoing work being undertaken by the NRF-SAIAB research team.

106. The distribution of mouse-tailed bats in Kermanshah province

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Bats belong to the order Chiroptera and are highly diverse due to their ability to fly and use echolocation. To date, more than 1,474 species from 236 genera and 21 families have been identified. In Iran, bats are represented by nine families and 52 species. Mouse-tailed bats belong to the family Rhinopomatidae and the genus *Rhinopoma*, which includes six species. Three of these species, the greater mouse-tailed bat (*R. microphyllum*), the lesser mouse-tailed bat (*R. muscatellum*), and the small mouse-tailed bat (*R. hardwickii*), are found in Iran. Kermanshah province, located in the northwestern part of the Zagros mountain range, is characterized by its peaks and elevations, making it an ideal habitat for bats due to the presence of numerous caves and crevices. The aim of this study is to investigate the distribution of mouse-tailed bats in Kermanshah province. In this study, more than 20 caves were identified and examined in various aspects, including the distribution and abundance of bat species. The results of this research revealed the presence of two species: the greater mouse-tailed bat (*R. microphyllum*) and the lesser mouse-tailed bat (*R. muscatellum*). The greater mouse-tailed bat was found in eight caves, including Bisotun, Piran, KakMorad, Nojivaran, Sahneleh, Markori, Mar Golderreh, and Ghadir, with five of these being new reports. The lesser mouse-tailed bat was reported from three caves: Mar Golderreh, Qaleh Turk Sofla, and Davazdah Emam, with two of these being reported for the first time in this province. Considering that mouse-tailed bats are typically found in warm and desert areas, their presence in the caves of Kermanshah province suggests significant ecological

shifts. This unexpected distribution indicates that recent climatic changes, such as rising temperatures and altered precipitation patterns, may have driven these species to migrate to new habitats.

107. The preventive effect of physical exercise training on ameliorating frontal cortex cell damage and fetal forebrain oxidative stress in the rat model of placental insufficiency

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Hypoxia induced uteroplacental insufficiency (UPI) causes oxidative stress and damage to the fetal cerebral cortex. This study investigates the effect of swim training on the antioxidant defense system of the fetal forebrain and the recovery of frontal cortex cell damage following UPI in rats. 21 pregnant Wistar rats were randomly divided into 3 healthy control groups, UPI (uteroplacental insufficiency) and UPI+EX (uteroplacental insufficiency+swimming exercise). UPI was induced by permanent occlusion of the anterior uterine artery and vein on the 18th day of pregnancy. Swimming training was done during pregnancy (3 sessions of 20 minutes per week). On the 21st day of pregnancy, the fetuses were removed by cesarean section and the levels of catalase (CAT), superoxide dismutase (SOD) and total antioxidant capacity (TAC) were measured by ELISA and malondialdehyde (MDA) by thiobarbituric acid method in the brain. The anterior part of the fetus and then the evaluation of neuronal density in the frontal cortex was done. A significant decrease in CAT and SOD enzymes activity in the forebrain and a decrease in neuronal density in the frontal cortex along with a significant increase in MDA were seen in the UPI group compared to the control group. While in the UPI+EX group, there was a significant increase in CAT and SOD and neuronal density of frontal cortex with a significant decrease in MDA compared to the UPI group. Physical activity during pregnancy and before induction of UPI prevented the cortical damage induced UPI in the fetal brain by strengthening the antioxidant system in the fetal forebrain.

108. The effect of different diets on the length-weight relationship and condition factor of *Tenebrio molitor* larva

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The yellow flour beetle larva has received a lot of attention due to its high ability in industrial breeding and use as animal feed. Evaluating the length-weight relationship (LWR) in this insect is essential for accurate calculations of biomass and feed requirements in breeding management. The condition factor (CF) is calculated using the formula $CF = W/L^3 * 100$, where W is the weight of the larvae (grams) and L is their length (centimeters). This study examined the effect of seven types of diets including 400 grams (gr) of wheat bran as a control (W), 200 + 200 gr of barley and wheat bran (A), 100 + 300 gr of barley and wheat bran (B), 200 + 200 gr of chickpea and wheat flour (C), 100 + 300 gr of chickpea and wheat bran (D), 200 + 200 gr of corn and wheat bran (E), 100 + 300 g of corn and wheat bran (F) on the growth and body size of *T. molitor* larvae. In each diet, 50 larvae were placed in plastic containers, with three replicates for each diet. The environmental conditions were 28°C, 60% relative humidity, and a 24-hour dark photoperiod. The substrates were sieved every four days, and the larvae were separated and weighed. First, larvae were photographed with a Sony DSC-H7 camera, and their body length was subsequently measured using DJ Maizer software. A laboratory scale with an accuracy of 0.001 grams was used to weigh the larvae. The data were then analyzed using SPSS 26 software. The results showed that all diets, except diet D, have a significant difference compared to the control group. The lowest

and highest value of condition factor was observed in B and W diets, respectively. These differences are most likely due to nutrient composition, fiber content, or other nutritional components that affect larval growth and metabolism. Variations in the growth potential of the mealworms are related to the different chemical compositions of the cereal bran.

109. Sperm preparation conditions on DNA breakage index in sperm

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In achieving the desired result in in vitro fertilization, sperm preparation conditions play an important role. DNA damage (DFI) is also one of the factors affecting the fertilization outcome. In this research, the relationship between sperm preparation conditions for fertilization and DNA breakage index (DFI) was examined. A study was conducted on 60 infertile male patients participating in fertilization by intracytoplasmic sperm injection (ICSI). After semen collection and sperm preparation, sperm parameters were checked and sperm DFI was measured by chromatin dispersion assay. Patients were divided into three groups with DFI less than 15%, between 15 and 30% and more than 30%. The obtained data were analyzed with statistical tests and correlation of DFI with sperm parameters and sperm preparation conditions was evaluated with Pearson test at $p < 0.05$ level. The results indicated a significant direct correlation of DFI with centrifuge speed and sperm storage temperature from the time of semen collection to use in laboratory insemination. Also, with the increase in DFI, the number of sperm, sperm movement and forward movement, significant reduction and immobility and abnormal sperm morphology increased. Although sperm DFI has a significant correlation with a small number of sperm parameters, it shows a significant correlation with sperm preparation conditions for fertilization. Gave. The optimal conditions for sperm preparation are semen centrifuge at 2000 rpm and its use in less than 4 hours at room temperature or less than that at incubator temperature. Therefore, in in vitro insemination by ICSI method, it is recommended to choose the appropriate preparation method and calculate the sperm DFI.

110. Protective effect of bioactive peptides extracted from Whiteleg shrimp (*Litopenaeus vannamei*) on renal oxidative stress and autophagy genes expression in non-alcoholic fatty liver induced male rats

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Given the negative impact of fatty liver disease on the kidneys, this study aimed to investigate the effects of bioactive peptides extracted from shrimp waste on oxidative stress and autophagy-related genes in the kidneys of rats with non-alcoholic fatty liver disease. Sixteen male rats were obtained from the animal house of Urmia University and fed for 8 weeks with 4 different diets: a control group, a high-fat diet (HFD) group, and two HFD groups supplemented with 20 and 300 mg peptides/kg rats body weight (HFD+GP20 and HFD+GP300, respectively). The rats were sacrificed, and their kidneys were sampled to examine oxidative stress markers and the expression of autophagy genes. At the end of the study, the results showed that the HFD significantly increased TOS and MDA levels and decreased TAC and CAT levels in the kidneys compared to the control and HFD+GP300 groups ($p < 0.05$). The expression levels of autophagy genes in the kidneys were also assessed, revealing the lowest and highest gene expression levels in the HFD group and the peptide-treated groups, respectively, with significant differences between them ($p < 0.05$). These findings suggest that bioactive peptides accelerate recovery in the kidneys of rats fed HFD by reducing oxidative stress and increasing the expression of autophagy genes, indicating their potential as a high-dose antioxidant (300 mg) for further investigation.

111. The effect of astaxanthin on freezability of murine spermatogonial stem cells

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Cryopreservation of spermatogonial stem cells (SSCs) offers several benefits, but it can also cause various forms of damage that may reduce the functionality of these cells. Incorporating antioxidants into the cryopreservation medium can provide protection against the detrimental effects of cryopreservation by reducing levels of reactive oxygen species (ROS). In this study, the protective effect of astaxanthin (AST) was evaluated to establish an optimal cryopreservation method for SSCs obtained from the testes of neonatal male mice. AST was added to the freezing base medium at 1, 10, and 100 μ M concentrations, and then compared with the control and 100 μ M vitamin E. Viability, oxidative stress status, ROS generation level, and the expression of BAX and BCL2 were measured in frozen-thawed SSCs 3 weeks after culture and purification. Results revealed that the presence of antioxidants, especially 10 μ M AST, in the freezing medium significantly increases the viability and total antioxidant capacity (TAC) ($P < 0.05$), and reduces intracellular ROS accumulation in the frozen-thawed SSCs. Vitamin E along with 10 μ M AST reduced apoptosis in mouse SSCs by downregulating BAX and upregulating BCL2. The results of this study reveal that addition of 10 μ M AST to the freezing medium provides protection to SSCs after thawing. Therefore, the combined use of AST and cryoprotectant shows promise as a cryopreservation strategy for preserving fertility in patients e.g. individuals undergoing cancer treatment.

112. The effect of Lactobacillus acidophilus probiotic on neuroinflammation and the number of healthy hippocampal neurons in male rats with Alzheimer's disease and treated with aluminum chloride

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Many metals, including aluminum, are harmful to human health and can affect the brain, leading to disorders in the nervous system. On the other hand, our country is facing middle age and age-related diseases, such as Alzheimer's. Previous research has shown that probiotics have anti-inflammatory properties. The effect of Lactobacillus acidophilus probiotic on neuroinflammation and the number of healthy hippocampal neurons in male rats with Alzheimer's disease and treated with aluminum chloride was investigated in the current study. Adult male Wistar rats were divided into seven groups: control, streptozotocin, aluminum chloride, streptozotocin - aluminum chloride, streptozotocin - probiotic, aluminum chloride - probiotic and streptozotocin - aluminum chloride - probiotic. Animals received intracerebroventricular injection of saline or streptozotocin (3 mg/kg). They were then treated with saline or Lactobacillus acidophilus probiotic (1.5×10^8 CFU/ml) for 14 days via gavage, and aluminum chloride (0.8 g/L) dissolved in drinking water. The number of healthy hippocampal neurons was counted, and inflammatory factors were measured in the blood serum. Treatment with aluminum chloride and streptozotocin increased ($p < 0.05$) blood serum levels of inflammatory factors (TNF- α , IL-6) and decreased healthy neurons in the CA1, CA2 and CA3 areas of the hippocampus compared to the control group ($p < 0.001$). In streptozotocin and aluminum chloride groups, treatment with Lactobacillus acidophilus reduced inflammatory factors ($p < 0.05$) and increased healthy hippocampal neurons ($p < 0.001$). Probably, streptozotocin and aluminum chloride lead to neurotoxicity and destruction of neurons by inflammation. probiotic prevents the adverse effects of streptozotocin and aluminum chloride alone or together on hippocampal cells by preventing the increase of inflammatory factors.

113. The impact of a diet containing *Lactobacillus casei* probiotics and resveratrol on growth performance, nonspecific immunity, and antioxidant enzyme activity in the Amur fish model.

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Aquaculture is one of the most important sources of human food, yet it faces numerous challenges in improving feed formulation and enhancing fish health. The use of probiotics, prebiotics, and synbiotics has emerged as a promising approach to improving various performance indices in fish, including growth and immune response. Among the probiotics used in aquaculture, *Lactobacillus casei* has been recognized for its beneficial effects on fish growth and health. Additionally, resveratrol, a powerful natural antioxidant found in various plant sources, has demonstrated anti-inflammatory properties that could be beneficial for fish health. In this study, 240 Amur fish were divided into four experimental groups and fed for 56 days. Growth indices and immune parameters, including immunoglobulin levels and enzyme activities, were assessed at the end of the feeding period. The expression of immune-related genes was measured using Real-time PCR. The findings revealed that feeding with *Lactobacillus casei* and resveratrol had no significant effect on growth indices. However, lysozyme and protease activities increased in the mixed treatment group compared to the control. Total immunoglobulin levels were higher in the resveratrol group. Gene expression analysis indicated significant increases in the expression of immune-related genes. These results suggest that *Lactobacillus casei* and resveratrol positively influence the non-specific immunity of Amur fish, although their impact on growth and antioxidant enzyme activity was not significant.

114. The effect of *Stachys lavandulifolia* on improving the symptoms of premenstrual syndrome in teachers of Bojnourd city

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Many women of childbearing age experience some menstrual-related mood and physical disorders called premenstrual syndrome (PMS). The prevalence of this syndrome in reproductive age women is reported to be 70- 90 percent. The aim of this study was to evaluate the effect of *Stachys lavandulifolia* on reducing the symptoms of premenstrual syndrome. This double-blind randomized clinical trial was performed on teachers in Bojnourd city (North Khorasan, Iran) in the age range of 20 to 45 years who suffered from moderate to severe PMS symptoms. Participants were divided into two groups: 1) Case group was prescribed with *Stachys lavandulifolia* decoction 2) Control group was given placebo. Participants received drugs for two cycles of medication. In this study, the standard Daily Record of Severity of Problems chart (DRSP) was used to screen for PMS. Before treatment, there was no significant difference between the groups receiving herbal medicine and the placebo group in PMS symptoms. After treatment, depression symptoms were significantly reduced in *Stachys* group ($P < 0.01$). According to the observed effects, The consumption of *Stachys lavandulifolia* can be useful in women with premenstrual syndrome.

115. Reproductive effects of leech therapy in male Wistar rats

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Leech therapy is a traditional medical practice that has been used since ancient times in various countries such as Egypt, Greece, and Iran. Today, the effects of leech therapy in the treatment of various diseases have been investigated and proven. But so far, the effects of leech therapy on

male reproductive physiology have not been investigated. To study the effect of leech therapy on the reproductive physiology of adult male Wistar rats, 24 rats were randomly divided into three groups of 8 rats each. The rats of the control group were injected with 6 ml of physiological serum, the rats of the first experimental group were injected with 6 ml of low-dose leech saliva solution, and the rats of the second experimental group were injected with 6 ml of high-dose leech saliva solution. Injections were administered intraperitoneally to all groups over a two-week period. One week after the final injection, the rats underwent hormonal and testicular histological evaluation. It was observed that the solution of leech saliva has an effect on FSH, LH and testosterone hormones. So that leech saliva with a low dose causes a decrease in FSH and LH hormones and an increase in testosterone, but leech saliva with a high dose causes an increase in FSH and LH hormones and a decrease in testosterone; in other words, low and high doses of leech saliva solution have opposite effects. Examination of rat testicular tissue revealed degeneration of middle seminiferous tubules in the high-dose group.

116. Effect of male age on female choice concept in the mealworm, *Tenebrio molitor* L. (Coleoptera: Tenebrionidae)

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Tenebrio molitor L. (Col.: Tenebrionidae), mealworm or darkling beetle is a cosmopolitan pest of stored products and, also a significant source of protein in the food production industry. To understand the preferences of the female choice in darkling beetle, the effect of male age was investigated. Populations were collected from Tehran (Tehran province) and Karaj (Alborz province) and, were reared at 30 ± 2 °C, $65 \pm 5\%$ RH. They were provided a wheat bran bed as their habitat and, were fed with banana peel and lettuce. Based on the 90-day life span and optimal sexual activity of darkling beetle, males of 10 to 40 days and males of 41 to 70 days were considered young and middle age, respectively. A female was placed in the center, between two males, each positioned five centimeters away and the results were observed and recorded within thirty minutes. To minimize the bias, all three darkling beetles were virgin. In 19 replicates, females chose middle age males 10 times and young males 9 times. The results of this experiment did not show a significant difference ($P = 1$). Based on statistical analysis and observations: the male age difference was not substantial enough to have a distinct effect on the female choice; it seemed, there was a balance of advantages between the two males; while middle age males were generally more experienced, the young males secreted stronger pheromones; when males were skilled enough in mounting and mating, they had more chance of being chosen by the female.

117. The effect of hidroalcoholic extract of stinging nettle on reducing thermal pain in adult *Drosophila*

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Pain is an unpleasant sensory experience that can arise from disease, tissue damage, or as a consequence of surgery and the use of certain medications. Due to their ease of use, availability, low cost, and effectiveness, herbal remedies are considered suitable for treating diseases and their associated complications. The nettle plant (*Urtica dioica*) constitutes a large group of plants widely distributed in tropical and subtropical regions. These plants possess inhibitory compounds with analgesic and antioxidant properties. This study employed wild-type *Drosophila melanogaster* as a model organism. Nettle extract was incorporated into the *Drosophila* culture medium at three concentrations: 125, 250, and 500 mg/liter. The temperature response threshold and the duration of the flies' stay on a hot plate were recorded at temperatures of 41, 44, 47, and 50 degrees Celsius

(n=10). A concentration of 125 mg/liter of the extract significantly reduced the response to thermal pain at temperatures of 35 and 41 degrees ($P<0.05$). At a concentration of 250 mg/liter of the extract, a significant decrease in the response to thermal pain was observed at temperatures of 35 and 41 degrees ($p<0.05$). With a concentration of 500 mg/liter of the extract, a significant decrease in the response to thermal pain was observed at 41 degrees ($P<0.05$). These evaluations indicate that nettle extract reduces pain in *Drosophila* at all three tested concentrations, particularly at 250 mg, suggesting analgesic properties. This finding demonstrates a potential for nettle extract to alleviate thermal pain in *Drosophila*.

118. The effect of hydroalcoholic extract of nettle plant on reducing the thermal pain of *Drosophila* larvae

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Pain is one of the symptoms of the disease; It is a complex sensory and perceptual phenomenon that is often associated with suffering and emotional distress, including anxiety, which affects people's lives. Traditional medical drugs such as herbal extracts have attracted a lot of attention due to their many uses and effective performance in treating diseases and relieving pain. Research on the properties of nettle extract shows that its antimicrobial, anti-inflammatory, anti-diabetic and anti-aging effects are related to its phenolic content and can be used as an antioxidant source in the pharmaceutical industry. In this study, 3rd instar larvae of wild type *Drosophila melanogaster* were used. Nettle extract and morphine (control+) were added to the culture medium of *Drosophila* larvae to obtain three concentrations of extract 125, 250 and 500 mg/liter and morphine 200 mg/liter. The temperature response threshold and the number of twisting movements of larvae on the hot plate were counted and recorded at temperatures of 35 to 44 degrees Celsius for 3 minutes. (n=10) concentrations of 125 mg/l, 250 mg/l and mg/ 1500 extract showed significant values of reduced response and twisting movements compared to the control group. (PANOVA<0.05) There was no significant difference between the 250 mg/l extract group and the 200 mg/l morphine group in any of the tested temperatures. (PANOVA) (>0.05) all concentrations of the extract reduce pain in *Drosophila* larvae and increase the survival of larvae at 44 degrees. Nettle extract (especially the concentration of 250 mg of extract) and has thermal analgesic properties in *Drosophila* larvae.

119. The effect of hydroalcoholic extract of *Urtica dioica* plant on reducing the chemical pain of *Drosophila* larvae

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Pain is one of the symptoms of the disease that is experienced throughout life and acts as a protective mechanism and alerts the body to harmful stimuli. Due to the impact on people's quality of life, it is very necessary to study coping strategies and relieve pain. Herbal medicines have attracted the attention of many scientists due to their many uses and proper performance in the treatment of diseases. The nettle plant (*Urtica dioica*) has various compounds that can have analgesic properties. In this study, 3rd instar larvae of wild type *Drosophila melanogaster* were used. Concentrations of 125 mg/l, 250 mg/l, 500 mg/l extract and 200 mg/l morphine (control+) were prepared and the larvae were placed in the culture medium containing different concentrations of the extract and morphine and after three days of feeding, the larvae Age 31 were evaluated by writhing method and the number of their twisting movements was recorded during 5 minutes in 0 to 40% acetic acid solution. and 250 mg/l had a significant difference compared to the control group. (PANOVA<0.05) Also, there was no significant difference between the 200

mg/l morphine group and the 250 mg/l extract group in any of the tested temperatures. ($P>0.05$) nettle extract caused Chemical pain reduction in *Drosophila* larvae in two concentrations of 125 mg/l and 250 mg/l has analgesic properties.

120. The effect of different concentrations of chitosan nanoparticles on reproductive system and blood serum factors of female mice

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Chitosan is a linear polysaccharide compound that is obtained by reacting chitin with alkaline substances such as sodium hydroxide. In recent years, chitosan has been used in dentistry, ophthalmology, biological imaging, veterinary medicine, packaging industry, agriculture, aquaculture, and cosmetics, beverages, sludge dewatering, biotechnology, and finally photography. Few studies have been done on the effect of chitosan nanoparticles on the reproductive system. In this study, the effect of different concentrations of this nanoparticle on serum factors and ovarian tissue of mice was investigated. For this purpose, 20 female mice were randomly divided into 4 equal groups. A group received nothing as a control. The next three groups, as treatment groups 1, 2, and 3, were exposed to three different doses of chitosan nanoparticles (30, 150, and 300 mg/kg body weight of mice, respectively). The results showed that the serum levels of FSH and catalase increased in the treatment groups compared to the control group. Significant difference was noted in treatment groups 2 and 3 compared to the control group ($P\leq 0.05$). LH concentration decreased in all treatment groups. This reduction in treatment group 3 was significant compared to the control group ($P\leq 0.05$). Histological studies showed that in the treated group with a high dose of chitosan, the integrity of ovarian follicular cells was lost. The ovarian weight decreased and atresia of follicles increased in this group. Chitosan nanoparticles, by increasing the surface to volume, in high doses, can cause damage to ovaries and have a negative effect on fertility.

121. The effect of sleep deprivation on the expression of factors involved in mitochondrial biogenesis in rats

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Sleep is a natural and reversible state that is characterized by changes in the electrical activity of the brain and appears as a change in consciousness, decrease in sensory response, decrease in muscle tone and heart rate. One of the most common stress that has become a concern in modern societies is lack of sleep. The aim of study was to investigate the effect of sleep deprivation on factors involved in mitochondrial biogenesis in the striatum of male Wistar rats. For this purpose, rats were divided into 3 groups: control (rats without sleep deprivation), sham (rats placed on a metal plate located on the columns of apparatus) and sleep deprived (rats placed on the columns of apparatus). In order to induce the sleep deprivation model, the multiple platform device containing 14 columns was used. Rats were placed on the columns of the apparatus for 21 days from 4pm to 10am. Sham and sleep-deprived groups were selected for molecular studies. The level of factors involved in mitochondrial biogenesis (PGC-1 α , NRF-1, and TFAM) were measured in the striatum of sham and sleep-deprived rats by western blot technique. The results showed a significant decrease in the expression of PGC-1 α , NRF-1 and TFAM in the striatum tissue of the sleep-deprived rats compared to the sham group. In general, this study showed that long-term sleep

deprivation causes disruption of mitochondrial biogenesis in the striatum tissue of rats. Examining the level of factors involved in neurogenesis and apoptosis in the mentioned tissue is proposed as the suggestions of this study.

122. Effect of short-term storage of *Tenebrio molitor* larvae at refrigerator temperature on reproductive parameters

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Tenebrio molitor has a complete metamorphosis with four distinct life stages: egg, larva (mealworm), pupa, and adult. Rearing mealworms for the production of animal protein or as food for pets and livestock requires suitable environmental conditions. In unfavorable conditions, the use of low temperatures to slow the growth of the larvae can be a useful solution. This study aimed to investigate the effects of short-term storage of mealworms under unfavorable conditions (in a refrigerator) on the reproductive parameters of *T. molitor*. Larvae of the same age and size were stored in a refrigerator for one month. Two treatments were then prepared: one with the stored larvae (A) with 18 repetitions and another with larvae kept under normal conditions (control group B). The treatments were kept in the laboratory, with natural environmental conditions, until the end of the insect's life cycle. Wheat bran was used as feed, and carrots were used as a source of moisture and vitamins. The reproductive parameters recorded included larval and pupal mortality rates, abnormality rates, metamorphosis rates, pupation rates, and the number of eggs. The data were analyzed using SPSS software and an independent t-test. The results showed that storing mealworms at low temperatures could have significant effects on the survival rate and reproductive parameters of *T. molitor*. It can lead to increased abnormality rates and decreased metamorphosis rates. Except for the number of eggs, all other parameters showed significant differences with the control group. The highest mortality rate in the larval and pupal stages, the highest rate of abnormalities, and the lowest rate of metamorphosis and pupation were observed in treatment A.

123. The effect of Coenzyme Q10 on mitochondrial biogenesis in mouse ovarian follicles during in vitro culture

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The aim of this research was to investigate the effect of Coenzyme Q10 (CoQ10) on the expression of the Transcription Factor A Mitochondrial (Tfam) gene and mtDNA copy number in preantral follicles (PFs) of mice during in vitro culture. To conduct this experimental study, PFs were isolated from 14-day-old National Medical Research Institute mice and cultured in the presence of 50 μ m CoQ10 for 12 days. On the 12th day, human chorionic gonadotropin was added to stimulate ovulation. The fundamental parameters, including preantral follicle developmental rate and oocyte maturation, were evaluated. Additionally, the Tfam gene expression and mtDNA copy number of granulosa cells and oocytes were assessed using the real-time polymerase chain reaction. The results revealed that CoQ10 significantly increased the diameter of PFs, survival rate, antrum formation, and metaphase II (MII) oocytes ($P < 0.05$). Moreover, in the CoQ10-treated groups, the Tfam gene expression in granulosa cells and oocytes increased considerably compared with the control group. The mtDNA copy number of granulosa cells and oocytes cultured in the presence of CoQ10 was substantially higher compared with the control groups ($P < 0.05$). The addition of CoQ10 to the culture medium enhances the developmental competence of PFs during in vitro culture by upregulating Tfam gene expression and increasing mtDNA copy number in oocyte and granulosa cells.

124. Positive effects of oligosaccharides extracted from gum tragacanth (*Astragalus gossypinus*) on liver apoptosis gene expression in induces fatty liver rats

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In this study, the therapeutic effects of oligosaccharides extracted from *Astragalus gossypinus* (katira gum) on the expression of apoptosis-related genes in the liver of rats with induced fatty liver disease were evaluated. Sixteen male rats were divided into four groups: control, high-fat diet (HFD), and two groups (HFD+O200, HFD+O100) that received HFD along with oligosaccharides at concentrations of 100 and 200 mg/kg body weight for 8 weeks under standard conditions. The results showed that the use of oligosaccharides significantly reduced glucose and insulin levels compared to the HFD group ($p < 0.05$), while there was no significant difference with the control group ($p > 0.05$). Additionally, the results indicated that oligosaccharides significantly increased SOD activity compared to the HFD group ($p < 0.05$). The highest significant level of MDA was observed in the HFD group, and oligosaccharides significantly reduced its concentration compared to the HFD group ($p < 0.05$). Furthermore, the oligosaccharides significantly decreased the expression of Bax and Caspase 3 genes compared to the HFD group ($p < 0.05$). The lowest significant expression of the Bcl2 gene was seen in the HFD group, and oligosaccharides increased its expression compared to the HFD group ($p < 0.05$). In summary, this study suggests that oligosaccharides derived from katira gum may positively affect glucose regulation, oxidative stress mitigation, and the expression of apoptosis-related genes in the liver of rats with induced fatty liver disease.

125. Effect of sertraline on gonadotropins (LH, FSH) hormones, testosterone and dihydrotestosterone in male rat

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Sertraline is one of the most widely used antidepressant drug; however, it has some side effect on different parts of body like endocrine axis. The research have studied the effect of sertraline on the concentration of LH, FSH, Testosterone and dihydrotestosterone and testicular tissue changes. The current experimental study was conducted on 40 male adult Wistar rats in 4 groups of 10. The controls did not receive any medication treatments. The sham received 2 ml of distilled water as a medication solvent per day. The experimental groups received 50 and 10 mg / kg Sertraline orally. Blood tests were taken from all groups and LH, FSH, Testosterone and, Dihydrotestosterone serum concentration measurements was done by Radioimmunoassay (RIA) method. The results were analyzed and compared using ANOVA statistical method by SPSS software. $p < 0.05$ was considered as significant. Results: The levels of LH, FSH, Testosterone, and Dihydrotestosterone in the experimental groups receiving 50, 10 mg / kg Sertraline was significantly decrease compared to the control and sham groups. Histological examination of the testicles showed that the concentration of spermatogonia cells, primary spermatocyte, spermatid, sertoli vesicidal in sertraline receiving groups significantly decreased compared to the control group. Sertraline causes male sexual imbalances by changing in LH, FSH, testosterone and dihydrotestosterone hormone concentration.

126. Maharloo Wetland: An important breeding site for the Greater Flamingo in southern Iran

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The Greater Flamingo (*Phoenicopterus roseus*) is the most widespread and largest species of the flamingo family. Wetlands are among the most important breeding habitats of this species. Greater

Flamingo, as a wintering species in many wetlands of Iran, is widespread from Africa and southern Europe through west Asia to south Asia. Historically, it is reported that Uromiyeh Lake in north-western Iran is the only site in Iran where Greater Flamingos breed regularly and a few pairs nest irregularly at Bakhtegan Lake (near Shiraz in south of Iran), Shadegan and Hoorolazim (in southwest of Iran) and Qom (central Iran). Based on extensive fieldwork carried out in wetlands of Fars province in recent years, the Maharloo Wetland (Located near Shiraz) in southern Iran is reported as one of the most important breeding site for the species; an important step towards enhancing the conservation of this migrant species. This wetlands is characterized by its saline waters and unique ecosystem providing an ideal environment for flamingos to feed and breed. During fieldwork, a large number of nests and chicks were observed in the spring of 2022 and a small number of chicks in the summer of 2023. These findings highlight the site's potential as a significant breeding ground in Iran. Considering the recent droughts and anthropogenic factors, more protection of this wetland and study on breeding success rate of flamingos in this habitat seem necessary.

127. Modulation of Oxidative Stress Markers by Glycitin in an Epileptic Male Wistar Rat Model

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Epilepsy is a neurological disorder characterized by abnormal brain activity, and oxidative stress has been implicated in its pathogenesis. Glycitin is a bioactive compound found in soybeans and due to its potent antioxidant properties may have neuroprotective effects. In this study, the effect of glycitin on nitric oxide (NO) levels, catalase (CAT) activity, and total thiol content was investigated in a pentylenetetrazol (PTZ)-induced chronic epileptic rat model. The rats were divided into six groups: (1) the vehicle control group received equal amount of 1% DMSO (in saline) and DMEM, followed by saline after 30 minutes, (2) the PTZ treated group received equal amount of 1% DMSO (in saline) and DMEM, followed by 35 mg/kg PTZ after 30 minutes, (3) the control positive group received 30 mg/kg phenobarbital 30 minutes before PTZ injection, and (4, 5, and 6) groups received varying concentrations of glycitin (5, 10, and 20 mg/kg) respectively, followed by PTZ after 30 minutes. Injections were intraperitoneally given once every 48 hours for 21 days, and then the levels of NO, CAT activity, and thiol content were measured in blood plasma. The results showed that glycitin significantly reduced NO levels ($P = 0.0025$), increased CAT activity ($P < 0.001$), and enhanced thiol content ($P = 0.0248$) in epileptic rats compared to the PTZ treated group. These findings suggest that glycitin may have potential neuroprotective effects by modulating oxidative stress markers in epilepsy. Further research is warranted to elucidate the underlying mechanisms of these effects in the treatment of epilepsy.

128. Determine differences between the populations of stone crayfish *Austropotamobius torrentium* (Schrank, 1803) (Decapoda: Astacoidea: Astacidae) in the drainages of Bulgaria using morphological data.

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The stone crayfish *Austropotamobius torrentium* (Schrank, 1803), the smallest species of freshwater crayfish in the family Astacidae, is endemic to the Black Sea drainage in central and southeastern Europe. It is confined to headwaters and small water systems, adapted to water with

turbulent flow through and rocky environment. This species considered a vulnerable species, protected by international laws. The present study aims to analyze the relative growth, morphometry and morphological sexual maturity of stone crayfish *A. torrentium* in the drainages of Bulgaria. In total 215 specimens belong to 15 rivers were collected from Bulgaria. The data used for this study were collected in two sampling campaigns between May and October in 2010. Morphometric measurements were taken from all sampled *A. torrentium* to compare growth and sexual maturity. Eight morphological traits were measured from carapace, abdomen, and cheliped by digital caliper (0.01mm). For comparison and relative growth the power linearized $\ln y = \ln a + b \ln x$ were used where y is the dependent variable, x is the independent variable and b is the allometric growth index. To evaluate the size at the onset of puberty, we used the piecewise linear regression analysis and to investigate the difference between males and females, principal component analysis (PCA) provided in the R environment v.3.2.5. The onset of puberty was estimated as $CLO = 21.413$ mm in males and $CLO = 20.72$ mm in females. Data analysis shows positive allometric growth in pincers in males in the adult group. PLW had a positive allometric growth in adults and juveniles females, while an isometric pattern was observed in adults and juveniles males. The higher growth rate of males is suggested to be a selective advantage.

129. Sex Determination in Mammals Using Molecular Markers for Sex Chromosomes

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Sex determination in mammals using molecular methods is one of the most important tools in molecular biology and ecology. The applications of these methods are extensive, including ecological studies, wildlife population management, conservation programs and genetic research. In mammals, the genetic sex of the embryo is determined at fertilization by inheriting an X or Y chromosome from the male. The Y chromosome, through the sex-determining gene (SRY), leads to male development. In this study, sex-specific primers for mammalian sex chromosomes were used to determine the sex of samples collected from offenders and illegal hunters. Initially, several samples with known sexes from domestic and wild mammals were selected and DNA was extracted from them. PCR was performed using a pair of specific primers for mammalian sex chromosomes. The mammalian samples were analyzed on a 3% agarose gel following PCR. The results showed the amplification of two DNA fragments of different lengths in male mammals and only one fragment in females. The same method was then applied to samples collected from illegal hunters. The findings of this study indicate that molecular methods, due to their high accuracy, short execution time, non-invasive nature and the ability to work with minimal samples, are suitable tools for biological studies. They are not only effective in identifying crimes of offenders but also highly efficient in the genetic management of species for determining the sex ratio of populations.

130. Characterization and Genetic Modification of Human Bone Marrow-Derived Stem Cells for limb Regenerative Applications

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Human bone marrow-derived stem cells (hBMSCs) are a valuable resource for limb regeneration due to their ability to differentiate into various skeletal lineages, including bone, cartilage, and adipose tissue. Traditional methods for genetic modification of these cells often involve viral

vectors, which can lead to unwanted genomic alterations, increased complexity, and higher costs, along with safety concerns. To enhance the therapeutic potential of hBMSCs, we employed an integrative plasmid transfection method, which offers significant advantages such as minimizing genomic alterations to upregulate the effective regeneration genes including the Sonic Hedgehog (Shh). hBMSCs were isolated and characterized for their differentiation capacity into skeletal lineages, as well for specific surface biomarkers. HEK293 cells were used as a host for the plasmid, utilizing an integrative transfection method in hBMSCs. A plasmid containing Shh gene linked to GFP gene was introduced to hBMSCs, allowing for the expression of Shh and GFP. Post-transduction, several analytical methods were employed to confirm successful gene transfer and expression. Immunocytochemistry and PCR were used to visualize the expression of Shh and GFP in hBMSCs, confirming the presence of the transgene at the protein and mRNA levels. By Flow-cytometry, GFP-positive cells were sorted to enrich the population of successfully transduced hBMSCs for further analysis. The efficiency of the transfection method was highlighted as the high percentage of GFP-positive cells and the robust expression of Shh. Our study demonstrates the effective isolation, characterization, and genetic modification of hBMSCs, highlighting their potential for applications in regenerative medicine, limb regeneration and tissue engineering.

131. Alteration in anxiety like behavior in adult male rats treated with orexin B in term of dental pulp pain induction

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Toothache is one of the intolerable types of orofacial pains with impeding effects on people's quality of life. Especially, patients with orofacial pain have been shown increases in anxiety-like behaviors. Orexin B, a hypothalamic hormone, has been involved in modulation of various physiological functions including pain, cognitive and social behaviors. This study evaluated the effects of orexin B treatment on anxiety behavior in rats with dental pulp pain. Adult male rats were randomly divided into four groups including control, sham, capsaicin and capsaicin treated with orexin B (15 mg) group. The tested groups, except the control group, were cannulated in the trigeminal nucleus caudalis. Orofacial pain was induced by administration capsaicin into the dental pulp. Anxiety-like behavior was measured in the elevated plus maze. Motor activity was evaluated in the open field test. The results showed that the orexin B treatment reduces the time spent and the number of visit into the open arms in the elevated plus maze test, which indicates an increase in anxiety-like behavior. In the open field test, there was no meaningful difference in motor activity between the experimental groups. The obtained results indicate that orexin B efficiency to attenuate anxiety-like behaviors in rats with dental pulp pain. In any case, additional studies are required to determine the precise mechanism of anxiolytic effects of orexin B in rats.

132. Alterations in serum levels of zinc and iron following zinc chloride supplementation in male rats affected by gamma radiation

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Considering the harmful effects of gamma rays on serum levels of iron and zinc and the antioxidant and anti-inflammatory role of zinc, the present study was conducted with the aim of investigating the effects of zinc chloride supplementation on changes in serum zinc and iron levels in male rats under the influence of gamma radiation. 30 male Wistar rats (200 ± 20 g) were obtained from the animal house of the Faculty of Sciences of Urmia University and adapted for one week. Rats were divided into six groups: receiving saline (Sal), receiving 27 mg/kg ZnCl₂ (Zn), receiving gamma

radiation (single dose of 5 Gy) for 20 minutes, and then saline for 14 days (GS), recipient of gamma radiation (single dose of 5 Gy) for 20 minutes and then 27 mg/kg ZnCl₂ for 14 days (GZ), recipient of 14 days of saline and then gamma radiation (single dose of 5 Gy) for 20 minutes (SG) and received 14 days of ZnCl₂ (27 mg/kg) and then gamma radiation (single dose of 5 Gy) for 20 minutes (ZG). The results showed that the serum level of Zn was decreased in all treatment groups compared to the control group. The highest amount of reduction was observed in the GZ group. But these changes were not significant ($P>0.05$). Also, iron serum levels increased in the groups receiving zinc compared to the control group, but these changes were not significant ($P>0.05$). As a result, despite the changes in serum levels of zinc and iron in the serum of rats exposed to gamma rays and receiving zinc chloride, these changes were not significant.

133. Sex-dependent differences in apical dendritic complexity of rat CA1 pyramidal neurons during adolescence

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Extensive research in humans and animals has highlighted sex differences in brain structure and behavior. However, the hippocampus, a critical brain region involved in learning and memory, has received less attention regarding sex-dependent differences, especially during adolescence. This study examined the apical dendritic complexity of CA1 neurons in male and female rats during early adolescence (postnatal day 40, PND40) and late adolescence (PND60). The brains were processed using Golgi-Cox staining for histological analysis, and Sholl analysis was employed to quantify dendritic morphology. At PND40, male rats exhibited longer total dendritic length and a greater number of Sholl intersections in the apical dendrites of CA1 neurons compared to females. By PND60, female rats showed an increase in Sholl intersections in the apical dendrites compared to PND40 females, reaching a complexity nearly similar to that of the males. These sex- and age-related differences in the apical dendrites of CA1 neurons suggest that neuronal development during adolescence may be differentially influenced by sex hormones. These differences may contribute to behavioral differences between sexes, both under normal conditions and in response to interfering factors during adolescence

134. Taxonomic diversity and distribution of *Chiloglanis swierstrai* van der Horst, 1931 (Siluriformes: Mochokidae): preliminary evidence for two new species

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Suckermouth catfishes of the genus *Chiloglanis* Peters, 1868 occur throughout tropical Africa. This group of diminutive fishes presently comprises 66 recognized species which occur in a variety of habitats, but are usually associated with fast-flowing water and rocky substrates. Recent studies using molecular species delimitation methods have revealed high levels of hidden diversity within this group, with potentially 50 new species distributed across the African continent. Southern Africa which has eight valid species represents one of the regions with the most underestimated diversity. Six of these species are found in South Africa; where they were originally described: *C. anoterus*, *C. bifurcus*, *C. emarginatus*, *C. paratus*, *C. pretoriae*, and *C. swierstrai*. *Chiloglanis swierstrai*, originally described from the Crocodile River in the Gauteng Province of South Africa, is one of the most widely distributed among these species having been reported from within this country and neighboring Eswatini and Zimbabwe. Mitochondrial cytochrome c oxidase I data shows the presence of three geographically isolated lineages within *C. swierstrai*: one in the Limpopo River system including the species type locality, a second lineage in the Incomati River system, and a third lineage distributed in the Maputo River system. The three lineages are separated

by 2–2.5 % Kimura two-parameter model genetic distance, and their separation is supported by different molecular species delimitation methods. An integrative morphological and molecular study has been initiated at NRF-SAIAB to critically test species status, geographic distributions and biogeographic history of the three *C. swierstrai* lineages.

135. Sperm variation in two species of *Bufo* (*Bufo eichwaldi* and *Bufo variabilis*) in north of Iran

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Fertilization is of central importance in the determination of reproductive success for both males and females. Sperm competition is recognized as a widespread phenomenon in animals. It occurs when more than one male competes over the fertilization of the same female and influences on whole ejaculate traits (i.e., proportion viable, number, and length of sperm). However, statistically significant variation amongst males in a variety of sperm size characters, particularly total length and a number of head characters, has been reported in at least 13 species of Anura. In this study, we examined inter and intraspecific sperm size in the two species of *Bufo* in the north of Iran. In total 3 samples of *Bufo eichwaldi* and 5 samples of *Bufo variabilis* were captured by net and hand. They anesthetized and sperm was obtained from their epididymis. Smear were prepared and stained by diff quick and measured by image J software. The total length of sperm was assessed and compared within and between males. Results showed that intraspecific sperm sizes were significantly different within males in both species ($P < 0.05$). Moreover, a significant interspecific difference was observed between the two species ($P < 0.05$). Interspecific variation in quantitative characters of sperm morphology is considerable, even between closely related species, and this variation may have been associated with species differences in sperm competition risk. Different studies indicated a strong association between the risk of sperm competition and intraspecific variation in sperm size.

136. Biodiversity and abundance of short horned grasshoppers (Orthoptera: Acrididae) in the northern and southern slopes of Joghtai mountain range, Razavi Khorasan province

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Orthoptera is considered as one of the most known orders of insects that cause damages to agricultural products. For economic reasons, the diversity of the Orthoptera is important. To determine the diversity and abundance of short horned grasshoppers in the northern and southern slopes of the Joghtai mountain range located in Razavi Khorasan province during two consecutive years of 1400-1401, regular sampling was done in summer and autumn. Collected specimens were placed in separate tube containing 75% alcohol and then mounted. After identifying the samples, the biodiversity and abundance of species were analyzed by SPSS software. Evaluating the Shannon index of grasshoppers according to the t-test in the northern and southern slopes showed that these two slopes have no significant difference in grasshoppers' diversity (p -value = 0.15, df = 228.57, t = 1.08). Also, after comparing the abundance of grasshoppers among the 19 species, it was found that *Calliptamus barbarus* had the highest frequency with 31.91%, which is probably the reason for the high compatibility of this species with the environmental conditions and ecology of the area.

137. Habitat diversity of *Dendrobaena* species in Alborz and Zagros

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Earthworms can be found in most places on the planet in suitable habitats. They are considered one of the most important soil invertebrates in terms of biomass and impact on soil processes. Soil physicochemical factors (temperature, moisture, pH, mineral salts, aeration, and texture), food availability (vegetation cover, decomposing organic matter, and manure), and reproductive and dispersal ability of species determine the composition of earthworms in each habitat. This study investigated the biodiversity of the genus *Dendrobaena* in different habitats and the habitat preferences of different species. *Dendrobaena* species live in habitats rich in organic matter. They live in the organic layer of the soil surface and decomposing tree logs. The reported species of this genus in Iran include *D. byblica*, *D. hortensis*, *D. octaedra*, *D. veneta*, *D. semitica*, *D. pentheri*, and *D. orientalis*. The species *D. orientalis*, *D. semitica* and *D. pentheri* have not been reported from the Alborz region. The most common species of this genus in Iran is *D. byblica*. A high morphological variation has been observed in different populations of the species. The relative size of the body varies between different populations, with some being larger and others being smaller. This species occurs in Alborz and Zagros regions in high forested areas. The preferred habitat of *D. pentheri* and *D. veneta* is pastures. *D. octaedra* and *D. orientalis* are widely distributed in forest habitats. *D. hortensis* is found in disturbed and semi-natural habitats. The *D. semitica* is mostly observed in alluvial areas.

138. Preparation of Thermoplastic polyurethane/Chitosan/Sodium alginate scaffold and evaluation of its biocompatibility for vascular tissue engineering

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Tissue engineering has opened up possibilities, for improving and modernizing treatment approaches for common illnesses. Within tissue engineering, three primary parts are scaffold, cell, and biological factor. Scaffolds provide a biocompatible substrate and architectural support for cell attachment and growth [3]. In this research, we prepared a scaffold using a combination of thermoplastic polyurethane (TPU), chitosan (Cs), and sodium alginate, which is a unique blend has not been utilized previously in vascular tissue engineering. The study aimed to create a scaffold for tissue engineering through a technique involving solvent casting. A solution of TPU in tetrahydrofuran (THF), Cs, and sodium alginate in 90% acetic acid was stirred for 12 hours. After mixing the solutions, samples were homogenized for 30 minutes using an ultrasonic bath. Scaffolds were sterilized by 70% ethanol and UV irradiation on each side of the surface for 20 min and incubated with the culture medium for 12 h. The biocompatibility of the scaffold was confirmed through MTT testing with 104 Human Umbilical Vein Endothelial Cell (HUVEC) cells per well in 96 well culture plate. Through the investigations for five days, It was found that the scaffold was biocompatible. The contact angle was 57°, which indicated the scaffold was highly hydrophilic, promoting cell attachment and growth. Scaffold prepared in this research exhibits biocompatibility and features a hydrophilic surface that encourages cell adhesion and growth. To make the scaffold specific for use in vascular tissue engineering, it is advised to use compounds with anticoagulant properties, such as heparin.

139. The Southwest Indian Ocean, a previously unrecognized hotspot of endemism for the gobiid genus *Glossogobius* Gill, 1859 (Teleostei: Gobiidae)

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The genus *Glossogobius* Gill, 1859, with 39 currently recognized species, is among the most speciose genera of the family Gobiidae. They are found across the Indo-Pacific in a diversity of stream, river, estuary, wetland, and lake environments. Hitherto, studies have shown that the highest diversity of *Glossogobius* occurs in the West Pacific (34 species), with the Australia-New Guinea region as a hotspot for endemism in the genus. A lower species diversity has been reported for the Indian Ocean, i.e., 10 species. Based on recently generated and archived COI-barcoding sequences of specimens from numerous widespread localities in South Africa, Mozambique and Madagascar, a phylogenetic and phylogeographical framework was applied to provide a pilot-assessment of potential species level divergence of *Glossogobius* populations. Our results suggest a considerable underestimation of *Glossogobius* diversity in the area, i.e., nine mitochondrial lineages, only four corresponding with nominal species (i.e., *G. callidus*, *G. ankaransensis*, *G. tenuiformis*, and *G. giuris* “clade B”), and five lineages possibly representing yet undescribed species in two species complexes. Seven of the nine lineages are native/endemic to the Southwestern Indian Ocean, making this region a hotspot of endemism for the genus. Species level status of the five newly discovered lineages is supported by different molecular species delimitation methods, and an integrative morphological and molecular approach has been initiated to critically test their species status and to possibly describe them as new species, and to assess the patterns and processes of *Glossogobius* diversification in the Southwest Indian Ocean.

140. Conservation of amphibians using assisted reproductive techniques in captivity: a case study of the Marsh frog (*Pelophylax ridibundus*)

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The use of hormone therapy in the field of fertility assistance can impact the breeding of animals in captivity. This study examined the effects of two hormones, Gonadotropin-Releasing Hormone (GnRH) and Human Chorionic Gonadotropin (hCG), on the effectiveness and assistance for endangered species, specifically on the male Marsh Frog (*Pelophylax ridibundus*), which is of least concern regarding extinction. The study was conducted outside the breeding season and under captivity conditions. For this purpose, 12 frogs were injected with 7.5 units of hCG per body weight and 0.1 micrograms of GnRH per body weight, intraperitoneally, using an insulin syringe during the fall season. The animals were maintained under natural light conditions with 12 hours of light and 12 hours of darkness, and at a temperature of 15-16°C. They were evaluated for the hormone effects every half hour. The results showed that the latency time for hCG was 1±0.5 hours and for GnRH was 3±0.5 hours, while the duration of action for GnRH was 14±1 hours, which was longer than hCG, which was 5±1 hours. Additionally, the volume of sperm obtained through hCG was 360 microliters, and through GnRH was 320 microliters. The stored sperm was kept for six days at 4°C in the refrigerator. The findings of this study indicate that hormone therapy can be effective in aiding other endangered species. Furthermore, sperm storage can assist in breeding programs and synchronization of reproduction in captivity.

141. Renal protection against cisplatin-induced acute kidney injury by sodium hydrosulfide and remote ischemic preconditioning

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The pathophysiology of cisplatin-induced acute kidney injury includes proximal tubule damage, oxidative stress and inflammation. Remote ischemic preconditioning (RIPreC) and hydrogen sulfide (H₂S) therapy are two methods used to reduce kidney tissue damage with potential therapeutic potential. This study aimed to investigate the renal protective effects of RIPreC and a H₂S donor against functional disorders and inflammation induced by cisplatin. In this research, 35 adult male Sprague Dawley rats weighing between 220 and 240 g were divided into five groups: sham, Cis (cisplatin, 8 mg/kg, intraperitoneal injection), RIPreC+CIS (cisplatin and RIPreC), NaHS+CIS (cisplatin and sodium hydrosulfide at a rate of 100 μ mol/kg intraperitoneally 30 minutes before cisplatin injection), and RIPreC+CIS+ NaHS (cisplatin and RIPreC and sodium hydrosulfide). In the groups under RIPreC 6 h before cisplatin injection, four cycles of 5 min of ischemia and 5 min of reperfusion were applied to the animal's left femoral artery. 72 hours after the cisplatin injection, kidney tissue, urine and plasma samples were collected. Cisplatin treatment results in increased interleukin-1 gene expression and renal dysfunction (reduced creatinine clearance and increased sodium excretion). RIPreC and NaHS reduced these changes, and this study showed that the effects were synergistic, and the enhancement of ischemic preconditioning and NaHS in the reduction of functional disorders caused by cisplatin-induced acute kidney injury is mediated by the reduction of IL-1 gene expression.

142. Characterization of Electrospun PVA/Origanum vulgare Nanofibers Loaded with Rosmarinic Acid

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Electrospinning is a well-known and distinctive method for fabricating nanofiber mats, which are often developed as suitable drug-loading platforms. The scaffolds resemble the extracellular matrix and support cell adhesion and proliferation as well as maintaining phenotypic structure and guided growth in line with the direction of the electrospun fibers. Choosing different precursor materials can alter the structure and properties of the resulting product to offer a wide range of applications. PVA is a hydrophilic, non-toxic, biocompatible, and biodegradable polymer, and due to its suitable physicochemical properties, it is used in tissue engineering when combined with other natural compounds. In this study, fibers comprising synthetic polymer PVA and hydroalcoholic extract of marjoram were examined. The plant *Origanum vulgare* is an important genus in the Lamiaceae family due to the presence of aromatic medicinal compounds. PVA with a hydrolysis degree of 99.5% was used, and marjoram was extracted by percolation method with 70% alcohol and concentrated with a rotary evaporator. The amount of Rosmarinic acid was identified using HPLC. The electrospun scaffold was made from 10% w/w PVA and *Origanum vulgare* extract. The morphology of the fibers was analyzed by SEM and IR, and cell viability was assessed using the MTT method. The results indicate that the mats containing the extract have uniform, hydrophilic fibers that are compatible with cell adhesion and proliferation. Due to the use of a completely natural and compatible compound, they can be applied in tissue engineering and regenerative medicine.

143. Sexual dimorphism in *Niphargus zagrosensis*

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The genus *Niphargus*, with 27 species recorded from Iran, is one of the most diverse genera of freshwater amphipods. Sexual dimorphism, a common phenomenon in the animal kingdom, refers to the morphological differences between males and females of the same species. Sexual selection, which occurs in response to mate choice by either the male or female, is a type of selection related to sexual dimorphism. This study aimed to investigate sexual dimorphism in the species *Niphargus zagrosensis*. Samples of this species were first collected from its type locality in the Kahak region of Markazi Province, and then transported to the laboratory. Morphological examinations began with sex determination of the specimens. After measuring head and body lengths, slides were prepared from the specimens. Slides were examined under an Olympus SZX9 microscope, and morphometric traits were measured using ToupView software. The results of the morphometric studies revealed sexual dimorphism in body size and traits such as the ratio of segment II to I in the external ramus of uropod III, the ratio of antenna II to I, the ratio of antenna II to peduncle four and five, the ratio of basis to carpus in gnathopods I and II, and the length-to-width ratio of the telson between male and female specimens. Sexual dimorphism in the genus *Niphargus* is observed in species inhabiting near-surface groundwater and is effective in enhancing the mating success of males. Investigating sexual dimorphism can aid in the identification of populations belonging to a single species based on sex.

144. Two new sister species of *Rhinebothrium* (Cestoda: Rhinebothriidea) from Stingrays of the Persian Gulf and Gulf of Oman

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The genus *Rhinebothrium* (Cestoda: Rhinebothriidea) comprises species of tapeworms that infect cartilaginous fishes, particularly stingrays. There are numerous recent findings on the biodiversity of elasmobranch parasites worldwide, particularly in regions such as the Gulf of Mexico, Australia, and Southeast Asia. However, the biodiversity of tapeworms inhabiting elasmobranch hosts of the Persian Gulf and Gulf of Oman remains largely unknown. In the present study, two new sister species of the genus *Rhinebothrium* are introduced from stingrays in the Persian Gulf and Gulf of Oman from *Maculabatis arabica* and *Maculabatis randalli*. Each of these new tapeworm species is found in both host species, but with notably different prevalence rates. The validity of these new species has been previously confirmed through molecular analyses by the current research group, and the revealed genetic distinctions required detailed morphological examinations at the species level. A combination of morphometric characteristics, including body size, scolex features, proglottid morphology, and reproductive structures, distinguishes the new species from other congeneric species. These two new species are morphologically differentiated from each other by the number of testes (6–8 and 8–14) and bothridial loculi (50 and 42) in *Rhinebothrium* sp. 1 and *Rhinebothrium* sp. 2, respectively. Given the importance of this region in terms of biodiversity and the need for further studies, the results of the current investigation could be of significant importance. These findings contribute to our understanding of marine tapeworm diversity and underscore the importance of further research in this ecologically significant region.

145. Growth efficiency, immunological and hematological changes in Common carp (*Cyprinus carpio*) fed *Lactobacillus salivarius* and *Saccharomyces uvarum* against *Aeromonas hydrophila* Infection

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Growth performance, immunological and hematological responses of Common carp fed diets containing *Saccharomyces uvarum* (Su) and *Lactobacillus salivarius* (LS) were tested against *Aeromonas hydrophila*. A total of 240 fish (~ 5-7g) were randomly distributed in 12 tanks with 20 fish per tank (4 treatments with 3 replications). Four diets were prepared including control diet and three diets supplemented with 107 CFU/g LS, 10 g/kg Su, and LS+Su (107 CFU/g + 10 g/kg). Fish fed diets containing LS+Su had significantly higher final weight and growth than the control group. Food conversion ratio in fish fed both probiotics statistically better than in other treatments. The number of lymphocytes increased when both LS and Su were used together. Also, the WBCs of fish treated with LS+Su were noticeably higher than control ($P < 0.05$). The challenge test with *A. hydrophila* revealed that fish fed LS+Su supplemented diet had highest survival rate. In addition, evaluation of the serum antioxidant enzymes (catalase (CAT), glutathione peroxidase (GPX), and superoxide dismutase (SOD)) activity showed significant ($P < 0.05$) increase in fish fed both LS and Su as compared to the control. No marked difference was seen in serum total Ig ($P > 0.05$). Furthermore, whole body lipid content was higher in fish fed LS+Su than the other groups. Overall, this experiment demonstrated the potentially combination effects of LS and Su on growth performance, mucosal immunity, and disease resistance against *A. hydrophila* infection in Common carp.

146. Rosmarinic acid protects against gentamicin-induced liver oxidative stress through the intensification of antioxidant enzymes

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Gentamicin-induced oxidative stress is a key factor in the development of acute liver damage. The goal of the current investigation was to evaluate the possible ameliorative effects of rosmarinic acid (Ros) on gentamicin-induced liver oxidative stress and tissue damage in rats. Twenty-eight male Sprague-Dawley rats were divided into four groups: Gentami (gentamicin, 100 mg/kg/day for 10 days, i.p.); sham, sham+Ros (rosmarinic acid, 1 mg/kg/day for 10 days, i.p.), and Gentami + Ros. At the end of 10-day experimental period, liver tissue, plasma, and urine samples were collected. Compared to the sham and sham+Ros groups, the injection of gentamicin resulted in a decrease in the plasma concentration of glucose; an increase in the plasma concentrations of bilirubin, total bilirubin, cholesterol, and triglycerides; an increase in the urinary glucose concentration; a decrease in the activity levels of the enzymes SOD and CAT in the liver tissue; and an increase in the infiltration of inflammatory cells in the portal space. The injection of rosmarinic acid minimized all alterations. The current investigation showed that in an in vivo model, rosmarinic acid injection can shield the liver from oxidative stress and histological alterations induced by a 10-day gentamicin injection. This protection is most likely due to the enhancement of the antioxidant system

147. New records for scorpion fauna from Fars province (Arachnida: Scorpiones), Iran

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Scorpions are fascinating animals that unfortunately, the interest shown by most people stems from the scorpion's reputation as a deadly scourge, a killer of man and his animals. Indeed, there are

about 25 species in world whose venom is capable of causing human death. However, the rest of species are no more than efficient predators of insects and other small animals. According to literatures, 24 scorpion species reported from Fars province until now. In this study, 217 specimens were collected from different habitats of Fars province. Scorpions collected during the day when they are resting, or night with the help of ultraviolet light. Geographical information of the localities (latitude, longitude, and altitude) were recorded using GPS during samplings. Finally the specimens were identified using a stereomicroscope and valid identification keys. Results showed six new records for scorpion fauna of Fars province from three genera *Hemiscorpius*, *Hottentotta* and *Orthochirus*, which including *Hemiscorpius acanthocercus*, *Hemiscorpius enischnochela*, *Hottentotta navidpouri*, *Orthochirus kermanensis*, *Orthochirus stockwelli* and *Orthochirus varius*. Among *Hemiscorpius* spp., *H. acanthocercus* and *H. enischnochela* are respectively closely related to *H. lepturus* and *H. gaillardi*. It seems that the specimens previously reported as *H. lepturus* and *H. gaillardi*, were the result of a misidentification. Identifying scorpion species in each region and their range of distribution is useful and practical for preventing scorpionism and treating patients.

- 148. The pink whiplay, *Pateobatis fai*, from Persian Gulf, A new host for numerous tapeworms**
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Tapeworms exist at different levels of the life network of an ecosystem, especially in the digestive system of vertebrates and more specifically in the spiral intestine of cartilaginous fish. It has been shown that the more infected the host, the richer the biodiversity and the healthier the ecosystem, and conversely, the lower the parasite load, the more likely the disruption of the food web. Nine of the 19 orders of tapeworms infect only cartilaginous fish. Of the 5 species of the genus *Pateobatis*, the pink whiplay and *Pateobatis jenkinsii* are present in the Persian Gulf and the Sea of Oman. Despite the wide distribution, four species of tapeworms have been reported so far from *Pateobatis fai*. As a result of bycatch a piece of dead pink stingray with a disk wide of 150 cm from the Strait of Hormuz, its tapeworm fauna was investigated. 1247 tapeworms were isolated from its spiral intestine. 87 individuals were stained with Delafield's hematoxylin and the permanent slides were prepared from them. The results showed that the parasites that were obtained belong to five orders, nine genera, and 12 species. The genera *Acanthobothrium*, *Scyphophyllidium*, *Stillabothrium*, *Polypocephalus*, *Divaricobothrium*, and *Tetragonocephalum* are new records from the host and region. Investigations indicate the existence of new species of parasitic genera, so additional studies will be conducted to identify them at the species level.

149. Sympathectomy: A Strategy to Reduce Cardiac Complications After Stroke

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Cardiovascular complications are the second leading cause of death after stroke. Following stroke, the sympathetic nervous system is activated, which is evident by increased blood pressure and circulating metanephrines. Stroke not only causes neurological problems, but also affects cardiac function in more than 70% of patients, resulting in electrocardiogram changes, reduced left ventricular ejection fraction, and elevated cardiac enzyme levels. In this context, cardiac troponin I (cTnI) has been identified as a sensitive and specific biomarker for detecting cardiac damage and left ventricular dysfunction. In this study, 14 animals were divided into two groups of seven. Cerebral ischemia was induced by middle cerebral artery occlusion for one hour. In the treatment group, after 1 hour of ischemia and during reperfusion, the superior cervical ganglion was transected. Blood samples were collected from the animals' veins 48 hours after ischemia and

serum troponin levels were measured using a mini Vidas device. Moreover, neurological deficits were assessed using the Neurological Deficit Score (NDS) two hours after stroke. The results showed a significant increase in troponin levels after stroke. While this increase was significantly reduced in the sympathectomy group. The NDS, as an index of ischemia induction, was significantly increased two hours after ischemia, sympathectomy reduced this index after 48 hours. According to the results, sympathectomy is suggested as a reducing factors of cardiac complications caused by stroke.

150. Toxicity of cigarette butt leachate in earthworms

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Cigarette butts (CBs) are a widespread source of pollution in urban rural areas, river and sea beaches. They contain toxins which can filter into soil and water. Each year, ~ 4.5 trillion used cigarette butts deposit in the environment. Owing to their large quantity, high dispersion and small size, CBs are difficult to collect from soil and water environments. Unfortunately, the harmful effects of CBs are largely ignored and underestimated by the public. CBs contain numerous toxic substances such as heavy metals, nicotine, PAHs, which easily leak into the environment and pose potential risks to organisms. CBs are usually discarded on the ground, yielding CB leachate with water exposure and consequentially exerting unavoidable influences on terrestrial organisms. Earthworms are often used as indicator organisms to evaluate the ecotoxicological effects of hazardous substances. In this study, earthworms (*Eisenia fetida*) were exposed to 0.5, 1, and 2 CB/L for 14 days, then homogenates were made and coelomic fluid extracted. The alterations in reactive oxygen species (ROS) level, lipoperoxidation (LPO/MDA) content in homogenates, with total antioxidant capacity (TAC) value in coelomic fluid were evaluated. Histopathological observations were also made. Results showed elevated ROS level and LPO content, and a lowered TAC value in CB leachate-treated earthworms. Meanwhile, ruptures were observed in earthworm's cell wall. In brief, CB leachate could induce oxidative stress and related tissue damages in earthworms resulting in a lowered survival rate.

151. Genetic identification of sind sardine (Clupeidae: *Sardinella sindensis*) using cytochrome b and ITS1 genes in the Persian Gulf

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Identification of animal species in marine environments is of great importance in various aspects such as management of marine environments, Fishery science, environmental protection programs, taxonomic studies and species protection. The aim of this study is to determine partial sequences of mtDNA molecule and the nucleus genes and to check their efficiency in identifying this species from its close species. In this study, 5 samples of *Sardinella sindensis* fish collected from Qeshm region. Fragments of 350 bp of Cytb gene as mitochondrial gene and 600 bp of ITS1 as nuclear gene were sequenced by Sanger didioxy method and analyzed with MEGA7 and Finch TV software. *Sardinella lemuru* was used as out group for both genes and Phylogenetic trees and genetic distances were obtained. The results from the Phylogenetic trees illustrate that all individuals of the sind sardine species are at the closest genetic distance and are located in one branch and have a high genetic distance with *Sardinella lemuru* for both gens. Comparison of the genetic distances between the samples indicates a low amount between the individuals of this species (D=0.022-0.098) and high amount between *Sardinella sindensis* and *Sardinella lemuru* (D=0.734-0.781) for Cytb and low genetic distance (D=0.025-0.169) between sind sardins and high genetic distance (D=0.868-1.048) between them and *Sardinella lemuru* for ITS1. The results

indicate that the Cyt b gene and ITS1 are suitable to identify sardine from the species that are morphologically similar to it..

152. Identifying *Daphnia* species and their community structure in Tar mountain lake, Tehran, Iran

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Daphnia are crustacean organisms, are frequently found in continental aquatic ecosystems, likewise play a crucial role in freshwater ecosystems. *Daphnia* are known for their sensitivity to environmental changes, making them important bioindicators for assessing water quality and ecosystem health. This study aims to fill the knowledge gap regarding the diversity and community ecology of *Daphnia* species in a mountain lake of Iran, Tar Lake. The following parameters were also monitored: water temperature, pH, electrical conductivity, dissolved oxygen and chlorophyll a. Samples were collected monthly between May to September at three station, in three replicate. For the quantitative analysis, 100 L of water was filtered (approximately 10 L/min) with a plankton net with 50 μ m mesh size. Here, we present the first morphological identification for *Daphnia laevis*, *D. ambigua* and *D. rosea* from Iranian freshwaters. *D. laevis* were most abundant zooplankton, its frequency reached to 14 individual per liter, yet *D. ambigua* and *D. rosea* were present in a low abundance, 0.36 and 0.22 ind.l⁻¹, respectively. A seasonal pattern was detected in the variations of *D. laevis*, with higher densities recorded during periods of circulation (May and September) and a low density during stratification between Jun to August. However a negative correlation between the *D. laevis* density and temperature was observed in Lake Tar indicating that the natural fluctuation of this species can also be widely influenced by changes in water temperature. Alternatively, Tar *D. laevis* may be a true highland species, tended to occur in lower temperatures as well as more transparent mountain lakes.

153. Hydroalcohol extract of *Zingiber officinale* protects against cisplatin-induced acute kidney injury through improving antioxidant enzyme activity in male rats

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Cisplatin can destroy tubular cells, reduce glomerular filtration, and increase serum creatinine and urea levels. Cisplatin is a major cause of acute kidney injury. This study looks into the potential benefits of *Zingiber officinale* hydroalcohol extract on renal dysfunction in male rats. For this investigation, 28 adult male Sprague Dawley rats weighing between 210 and 230 g were divided into four groups: sham, sham+ ZE (*Zingiber Officinale*, 400 mg/Kg/day for 14 days, intragastric gavage), Cis (cisplatin, 8 mg/Kg on 7th day, i.p.), and Cis+ZE (cisplatin+ *Zingiber officinale* extract). Fourteen days after drug delivery, kidney tissue, blood, and urine samples were collected. Compared to the sham and Sham+ZO.E groups, cisplatin ended in increased levels of malondialdehyde, reduced enzymatic activities of superoxide dismutase and catalase, and kidney dysfunction (reduced glomerular filtration rate and increased fractional excretion of Na). The administration of *Zingiber Officinale* hydroalcohol extract reduced every modification. This study showed that injecting *Zingiber officinale* hydroalcohol extract can inhibit gentamicin-induced damage in an in vivo model by lowering lipid peroxidation and potentially strengthening the antioxidant system. It is quite probable that the improvement in the antioxidant system provided this protection.

154. Scorpions in Zoological Museum of Shahid Bahonar University of Kerman, collected in 2023

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Scorpions with an ancestral structure are strange but very beneficial creatures for the ecosystem and humans. While they control the population of other Arachnids and arthropods, especially insects, their venom is used to prepare various medicines and insecticides, and their oil is used in traditional medicine. A few species have deadly venom for humans, especially children and the elderly. Therefore, identifying these organisms is important and beneficial for the above reasons. During the year 2023, scorpions were collected at night using ultraviolet light or during the day by searching directly under stones and tree trunks from Sistan and Baluchistan, Kerman, Kohgiluyeh and Boyer Ahmad and Fars provinces and were transferred to the Zoological Museum of Shahid Bahonar University of Kerman. Examination of the specimens resulted in the identification of 16 species belonging to nine genera and two families, including: *Androctonus cf. crassicauda*, *A. crassicauda*, *Compsobuthus sp.*, *Hottentotta zagrosensis*, *Mesobuthus macmahoni*, *M. navidpourii*, *M. phillipsii*, *M. rakhshanii*, *Odontobuthus kermanus*, *Od. tavighiae*, *Olivierus sp.*, *Orthochirus kermanensis*, *Or. kuceraei*, *Sassanidotus sp.* (Buthidae), *Hemiscorpius acanthocercus* and *He. enischnochela* (Hemiscorpiidae). The populations belonging to the three genera consisting *Compsobuthus*, *Olivierus* and *Sassanidotus* have morphological differences with the previously known species. In order to accurately investigate and describe possible new species, it is necessary to collect more samples and simultaneously examine the morphological and molecular characteristics of the samples.

155. Species richness of earthworms in different habitats of Iran

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Despite the biological, economic, and ecological importance of earthworms, there is still a lack of comprehensive information on their biodiversity and geographical distribution in Iran. So far, 35 species belonging to 12 genera and three families have been reported from Iran. Two genera of the family Lumbricidae, Aporectodea and Dendrobaena, have the highest species richness; 5 and 8 species of these genera, respectively, have been recorded from Iran until now. The distribution of species in different habitats throughout Iran is due to habitat conditions and species preferences. Species of the genus Aporectodea are found in semi-natural habitats with low humidity, while members of the genus Bimastos are found in habitats with relatively high humidity. The *Dendrobaena* species are observed in soils with a relatively high content of organic matter, the *Eiseniella* and *Helodrilus* species in alluvial soils, the *Lumbricus* species in meadows, and the Octolasion species in gardens and arboreal habitats. The species of the genus *Octodrilus*, one of the newly reported genera from Iran, together with the members of the genus *Perelia*, are found in wet soils and have a strong preference for forest and grassland habitats. Members of the two genera *Amyntas* and *Metaphire* from the family Megascolecidae are mostly found in cultivated fields and disturbed areas. The *Criodrilus* species of the Acanthodrilidae family are common in riparian habitats. Species belonging to Lumbricidae family have the highest abundance, distribution and species richness in Iran.

156. Ultrastructure and Biochemical Composition of the Cocoon of Medicinal Leech *Hirudo orientalis*

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Medicinal leeches have garnered significant attention due to their widespread use in both traditional and modern medicine. One of the crucial aspects of leech biology is their cocoon structure, which plays a fundamental role in protecting the eggs and ensuring the species survival. In this study, the cocoon structure of the *Hirudo orientalis* species was examined. The cocoon formation and its microscopic structure were analyzed using light and Scanning Electron Microscopes. The proteins present in the spongy structure of the cocoon were extracted and identified using biochemical methods, including SDS-PAGE. The results revealed that the cocoon contains enzymes such as Hirustasin, Hirudin, LCI, Bdekins, and Eglin, each with specific biological function. Additionally, electron microscopy studies demonstrated that the cocoon possesses a unique structure, contributing to its stability and strength. Given the protective role of cocoons for eggs and embryos in the environment outside of water until emergence of juveniles, these features are essential. This study reveals that leech cocoons are characterized by their unique protein composition and microscopic structure, which hold potential for medical and biotechnological applications. The findings lay a foundation for future research into the therapeutic and industrial application of medicinal leech cocoons.

157. New data on the spider fauna from Kerman, Iran (Arachnida)

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New faunistic data are provided for 7 families of arachnids from the south of Kerman province. The provided specimens were collected from diverse and similar ecologies; gardens, agricultural lands, plains, riverside lands, mountain slopes located in Jiroft city and its surroundings. 10 species were identified among the collected fauna, which belong to 7 families with different genus; *Philodromidae*, *Lycosidae*, *Scytodidae*, *Prodidomidae*, *Gnaphosidae*, *Corinnidae* and *Theridiidae*. Identified specimens range from the first reports from an area and city to the first reports from the country. Additionally, remarkable and interesting specimens were collected, especially a species of black widow spiders with possible effects and nature of its venom similar to spiders of this category. Five species from Kerman province, and also two for Iran are recorded for the first time. *Theridion melanostictum* (O. Pickard, 1876) and *Steatoda erigoniformis* (O. Pickard, 1872) are new for Iranian spider fauna. *Steatoda erigoniformis* is the first report from Iran, and the closest area report to Iran was from India.

158. A new species of *Dysdera ninnii* species group (Araneae: Arachnida) from Iran

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Family Dysderidae C.L. Koch, 1837 are distributed in West Palearctic. Several species of the genus *Dysdera* Latreille, 1804 were recorded from Iran. A new species belonging to *D. ninnii* species group was found during our investigation on Darab spider fauna. The bulb has simple crest in this species group. In our new species, *Dysdera* sp. bulb is small. Tegulum is almost large, its length is greater than width, and bell shaped. Psempolus is shorter than tegulum. Median crest and apex are triangular. Posterior apophysis is claw-shaped with triangular growth on anterior side. Stylus bent, short and weak.

159. Maternal deprivation exacerbates kidney dysfunction: evidence from biochemical and molecular markers

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Maternal deprivation (MD) refers to the early separation of an infant from its mother, disrupting the critical bond and caregiving necessary for healthy development. This deprivation can have profound and long-lasting effects on offspring. It has recently been revealed that MD can lead to various physiological and immunological changes that can impact kidney function. This study aimed to evaluate the detrimental effects of MD on kidney functions by assessing biochemical and molecular factors. Eight female offspring of Wistar rats aged 8-10 weeks were subjected to 3 hours of daily MD during postnatal days 1-14. A group of offspring that experienced no MD was regarded as the control. After being sacrificed, blood serum and kidney tissue were collected from both groups. The levels of urea and creatinine were assessed in the blood serum, while the expression of TNF- α , NF- κ B, and IL-6 genes in the kidney tissue was evaluated using real-time PCR. Our findings demonstrated a significant increase in urea and creatinine levels in the MD animals compared to the control group, indicating kidney dysfunction. This was further corroborated by the upregulation of TNF- α , NF- κ B, and IL-6 gene expression in the kidney tissue of the MD group, ranging from 45-56% compared to the control group. These results suggest that maternal deprivation significantly contributes to kidney dysfunction in young rats through the upregulation of inflammatory markers. Future research can investigate the specific mechanisms by which MD impacts kidney function and examine the long-term consequences of MD on kidney health.

160. A Review of the Phytochemical and Pharmacological Activity of Melilotus officinalis L.

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In recent years, the tendency of people to use herbal medicines and treatments as well as natural products derived from plants is increasing and one of the reasons is the harmful and side effects of chemical drugs. Some medicinal plants have been reviewed in scientific literature. This review study examines the medicinal effects of Melilotus officinalis L. belonging to the Fabaceae family. It is also known as yellow sweet clover and widely spread all over the world. Phytochemical analysis has shown that this plant contains coumarins, polyphenols, especially flavonoids and condensed tannins. This plant has anti-inflammatory and antioxidant properties and can be used to treat diseases in which inflammation and free radicals play a role in causing the disease. Based on the findings of this study, the use of this plant or compounds extracted from it may be useful for treating people suffering from the diseases caused by oxidative stress and inflammation, as well as the healing of diabetic foot ulcers.

161. Blockade of hippocampal NMDA receptors improved amnesic and anxiogenic effects of neuroinflammation in an LPS-induced Alzheimer's mouse model

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Lipopolysaccharide (LPS), a key component of the outer membrane of Gram-negative bacteria, is a pyrogen and potent immune system activator. It can trigger an inflammatory cascade leading to neurodegenerative disorders, including Alzheimer's disease (AD). Using an LPS-induced Alzheimer's mouse model, the role of hippocampal NMDA receptor signaling in the effect of LPS on learning and memory processes, emotional behaviors, and locomotor activity was investigated in the present study. Adult male NMRI mice (20-30 gr) were simultaneously cannulated

unilaterally in the lateral ventricle (LV) and the hippocampal CA1 region using a stereotaxic apparatus. After a seven-day recovery period, each animal received intra-LV and intra-CA1 microinjections of different doses of LPS and D-AP5 (selective NMDA receptor antagonist) over 24 hours according to a specific procedure. The effects of LPS with or without D-AP5 were evaluated on memory formation and emotional behaviors using the step-down passive avoidance task, open field test, and elevated plus maze test. Intra-LV microinjection of LPS impaired memory formation, induced an anxiogenic-like response, and reduced locomotor activity. Blocking NMDA receptors of the hippocampal CA1 region ameliorated the amnesic and anxiogenic effects of LPS, suggesting the involvement of NMDA receptor signaling in the LPS-induced Alzheimer's mice model. These findings suggest that LPS-induced neuroinflammation significantly affects the central nervous system, leading to memory impairment and emotional/locomotor disorders. The ameliorative effect of NMDA receptor antagonist highlights the potential of targeting NMDA receptors for therapeutic interventions in Alzheimer's disease models induced by LPS.

162. Study of anticonvulsant effects of LFS during unilateral kindling process of CA1 region of dorsal hippocampus in adult male rats

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Today, the use of LFS as an alternative treatment is also considered in patients epilepsy. Therefore, in this research, the effect of LFS during epileptogenesis on seizure parameters in adult male rats is investigated. Thirty-five adult Wistar male rats were randomly divided into 5 groups: control, surgical control, Kindler, LFS, and Kindler-LFS. Kindler rats received daily kindling stimuli rapidly in the dorsal hippocampus. In animals in the Kindler + LFS group, LFS stimulation is performed immediately after the end of the kindling stimulation. The LFS instruction was applied in the form of 4 electrical excitation packages with a frequency of 1 Hz. Seizure intensity indices, duration of subsequent discharge waves, and duration of seizures were recorded during execution. Seizure behavior data were analyzed using analysis of variance and Kruskal-Wallis tests. The results show that there is a significant difference between the mean seizure severity in KND group and KLFS group ($p = 0.004$) and the mean seizure severity in KLFS group is less than KND group. However, there was no significant difference between the mean duration of afterdischarge waves in the KND group and the KLFS group despite the decrease ($p = 0.175$). Also, there was no significant difference between the mean duration of seizures in the KND group and the KLFS group at the 5% error level ($p = 0.718$). In general, the results showed that LFS application reduced seizure severity, immediately after hippocampal kindling ($p = 0.004$). However, it did not affect the mean duration of subsequent afterdischarge waves ($p = 0.175$) and seizure duration ($p = 0.718$).

163. Histological study of the reproductive system of female Persian gecko *Hemidactylus persicus* in spring and summer

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Persian gecko *Hemidactylus persicus* is a reptile belonging to the Gekkonidae family. One of the characteristics of this animal is that it is nocturnal and lives in desert and semi-desert areas. Since few studies have been done on the histology of the reproductive system and the reproductive cycle of the Persian gecko in Iran and the world, therefore, this study has investigated the reproductive biology of this species in Kermanshah province. In spring and summer, four material samples were collected from an abandoned brick kiln in Qasr-e Shirin city. The samples were taken to the

laboratory and anesthetized with chloroform. Then, morphometric traits and length of snout to denominator (SVL) were measured in each season. After dissecting and removing their reproductive system, the weight of the ovaries was measured and the gonadosomatic index was calculated. The female reproductive system was fixed in 10% formalin buffer and the usual histological procedures were performed on them. The slides were stained with Hematoxylin-Eosin. The results of this research showed that the average weight of ovaries and the maximum diameter of follicles in spring season is smaller than summer season. In the spring season, most follicles are in the pre-vitellogenic phase and in the summer season, most of the follicles are in the vitellogenesis and post-vitellogenesis phase. Also, a large egg was seen in the animal's oviduct in the summer season. These observations show that the animal was in the pre-sexual activity phase in the spring and in the sexual activity phase in the summer.

164. Taxonomic studies of parasites in frogs of Kurdistan Province

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Globally, parasites of amphibians are among the least studied of vertebrate parasites. However, due to their reliance on aquatic environments, they are more susceptible to parasitic worm infections. Scientific resources on amphibian parasites are often old and scattered. In recent years, attention to amphibian parasites has increased due to declining amphibian populations and some observations of malformed organs caused mostly by digenetic parasite infections. In the present study, 40 water frogs, *Pelophylax bedriagae*, and two tree frogs, *Hyla savignyi*, were collected from stations around the city of Marivan in 2023 using hand nets. Various frog organs were searched for parasitic worms. For morphological studies, permanent slides of the found parasites were prepared using hematoxylin method. Four species of digenetic trematodes named *Pleurogenoides medians*, *Diplodiscus subclavatus*, *Haplometra cylindracea*, and *Gorgoderia sp.*, and two species of nematodes of the genera *Rhabdias* and *Parapharyngodon* were identified. The highest prevalence of infection was related to *Parapharyngodon* in the frog's rectum. Many species are reported from the region for the first time. Many previous studies have only reported parasites without detailed morphological descriptions and photographs, and the taxonomy of these taxa requires further studies on a larger scale.

165. Meta-analysis of N-Acetylcysteine-related Gene Expression and Signaling Pathways on Human Mesenchymal Stem Cells aging, using Bioinformatics and Network Pharmacology

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Aging is almost the inevitable fate of all organisms; however, it is possible to delay it. Several genetic and environmental factors can affect the aging process. N-Acetylcysteine (NAC), as an antioxidant and glutathione inducer, can possibly have the opposite effect on aging. The purpose of this study is to investigate the anti-aging effect of NAC on aged mesenchymal stem cells. In this study, the GSE35959 dataset of the GEO database was used. Differentially expressed genes (DEGs), were obtained by GEO2R with screening criteria adj P value < 0.05 and $|\log FC| > 2$ and NAC target genes were also obtained from Swiss Target Prediction and Pharm Mapper databases. Finally, the number of 38 shared genes was obtained from the sharing of target genes of NAC and DEGs. The biological functions and signaling pathways of these 38 genes were investigated and their protein-protein interaction (PPI) network was drawn by Cytoscape. In addition, 10 genes KIF11, DHFR, GART, CA2, APC5, SRC, CTSK, MMP8, ARG1 and CHEK1 were also identified as hub genes. The results showed that NAC target genes can play a role in aging signaling

pathways. Based on these findings, NAC can be a suitable solution to prevent aging by affecting the expression of genes effective in aging by affecting the biological pathways involved in it.

166. Study of scorpions (Arachnida: Scorpiones) in central Iran

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Scorpions are strange creatures that are noticed by everyone because of their poisonous sting. Some species have deadly venom for humans and unfortunately they cause the death of some of our compatriots in the southern regions of Iran every year. So far, 11 and 7 scorpion species have been reported for the fauna of Isfahan and Yazd provinces, respectively. Examining the samples collected from Isfahan and Yazd provinces in 2018 and 2019 led to the identification of seven species belong Buthidae family, including nine specimens of *Androctonus crassicauda* from Isfahan (Naeen, Khur and Biabank) and Yazd (Ardakan and Bafq), one specimen of *Compsobuthus kaftani* from Yazd (Meybod), one specimen of *Iranobuthus krali* from Isfahan (Khansar), one specimen of *Kraepelinia sp.* from Yazd (Ardakan), 17 specimens of *Mesobuthus vignolii* from Isfahan (Khur and Biabank) and Yazd (Ardakan and Meybod), one specimen of *Odontobuthus doriae* from Isfahan (Khur and Biabank) and one specimen of *Orthochirus vignolii* from Isfahan (Naeen). The specimen belonging to the *Kraepelinia* seems to be a new species for zoology science. To describe this species, it is necessary to collect enough samples and examine them morphologically and molecularly. The small number of reported species compared to the climate diversity of Isfahan and Yazd provinces is the reason for the lack of sufficient study in this region and also strengthens the possibility of finding more new species. Identifying the species of each area, in addition to determining the fauna of the region, is also necessary to help the prevention and treatment.

167. Study of scorpions (Arachnida: Scorpiones) in the central areas of Kerman province

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Scorpions are a group of arachnids that play an important role in biological control of pests because they feed on arachnids and arthropods (especially insects and important agricultural pests). On the other hand, a number of species have deadly venom for humans and are of special importance from a medical point of view. In addition, the compounds in the venom of scorpions are used to prepare some medicines and insecticides. Therefore, despite the dangerous venom of some species, scorpions are very useful and valuable creatures for nature. According to the research done so far, three families including 10 genera and 17 species of scorpions are distributed in Kerman province. Collecting and examining 181 specimens from the central regions of Kerman province (Baft, Rabor, Rayen and Lalehzar) in 2023 led to the identification of eight species from six genera and two families, including *Androctonus crassicauda*, *Compsobuthus sp.*, *Mesobuthus mirshamsii*, *M. navidpourii*, *Odontobuthus kermanus*, *Orthochirus gruberi* and *Or. kermanensis* (Buthidae) and *Hemiscorpius acanthocercus* (Hemiscorpiidae). *Mesobuthus mirshamsii* had the most abundance while *H. acanthocercus* had the least. *Hemiscorpius acanthocercus* is venomous to humans and there is a report of death due to the bite of this species in the south areas of Kerman province. It seems that the specimen belonging to *Compsobuthus* is a new species for Zoology. The species diversity of the studied area shows the presence of unknown species and a complete investigation

of fauna of area seems necessary. This information is important for Zoology, medicine and pharmacy and has practical value.

168. Ultrastructural study of the luminal surface of goat trachea

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The trachea is a tubular structure that starts from the cricoid cartilage of the larynx and ends at the point of bifurcation to form the main bronchi. There are several types of cells in the covering tissue of the trachea, the most abundant of which are ciliated, goblet and basal cells. In the present study, the ultrastructure of the luminal surface of the trachea in indigenous goats was investigated by scanning electron microscopy in order to provide detailed information about it. Samples with dimensions of 2 x 2 cm were taken from the trachea wall of goats and fixed. Then, the samples were dehydrated with the help of increasing concentrations of alcohol and sent to the laboratory for preparing electron microscope sections. There, after preparation and coating with gold, the sections were examined with an electron microscope and the necessary images were taken from the luminal surface of the trachea. Based on the prepared electrographs, only cilia were observed in most of the surface of tracheal tissue, which hid the cells. Cilia are relatively large cylindrical structures that are placed between the electron beam and cell surfaces. Microvilli cells were covered by many microvilli. The pores of the goblet cells were clear in the images and most of their apical surface was surrounded by cilia. Mucus secreted by goblet cells was visible on the surface of some cells. In line with the present study, it is suggested to investigate the structure of tracheal lining tissue with the help of transmission electron microscope.

169. The fauna of anthocorid bugs in pistachio orchards of Damghan

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Pistachio is one of the major horticultural crops in Iran country and considers as an important non-oil export product which counts a main source of foreign exchange. Therefore, protecting this national wealth and making better use of it as a priority to improve the national economy is important. Semnan province is one of the main and traditional pistachio growing areas in the country with an estimated 26000 hectares of pistachio orchards. Common pistachio psyllid, *Agonoscena pistaciae* Burckhardt & Lauterer (Hemiptera: Aphalaridae) is the key pest in Semnan pistachio orchards especially Damghan town, which causes severe crop damage and results in the highest pesticide application. This pest induces significant loss of the crop in orchards, annually. Due to high reproductive capacity and numerous generations of the pest, maximum rates of population often occurs one or several times a year that leads to considerable damage to orchards and crops. Psyllid outbreaks result in not only crop loss, but also effect on the following year's crop by losing shoots and severe premature defoliation that consequence tree weakened. Various biological agents, such as insects, mites and spiders attack different life stages of common pistachio psyllid (egg, nymph and adult). Anthocorids bugs have been recognized as one of the most important predators of the pests in the world that they have high potential to limit the population density of insect pests including: aphids, scales, psyllids, hoppers, thrips, mites, etc. This family has 400 species that high searching efficiency, ability of rapid increasing population in such situation where host is abundant, aggregating in areas with high host density and consuming of pollen in the absence of host are advantages of these agents. This survey was carried

out in pistachio orchards of Amirabad, Forat and Mehmandost areas of Damghan. The result indicated that four species *Anthocoris nemoralis* Fabricius, *Anthocoris pilosus* Jakovlev, *Anthocoris nemorum* Linnaeus, *Anthocoris minki* Dohrn belong to subfamily Anthocorinae are present on pistachio trees. This bugs feeds on pistachio psyllid nymphs. This predators haven't high population density in pistachio orchards of Damghan region. One of the reasons for the low population of these predators is the excessive and unreasonable chemical spraying that is done to control the pistachio psyllid in the orchards of the region.

170. Morphometric and micrometric study of ovarian tissue of rats with polycystic ovary syndrome treated with curcumin and its nanomicelles

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Curcumin is the main ingredient of turmeric, which is widely used as a nutrient, spice and medicine. Considering the inflammatory nature of polycystic ovary syndrome (PCOS), the effect of nanomicelle curcumin on rat ovarian function was investigated. So, 40 female Wistar rats were divided into 5 groups and all except the control group were induced PCOS with letrozole solution by gavage within 35 days. Curcumin solution 200 mg/kg bw in olive oil (treatment1) and nanomicelle curcumin 100 and 200(mg/kg bw) as treatment groups 2,3 were given to rats by gavage during 21days. Finally, the rats were anesthetized, blood collected, and their ovaries were separated. After taking the ovarian weight and volume by immersion method, tissue passage was performed according to the stereological protocol. The investigated parameters were measured and the resulting data were statistically analyzed ($p < 0.05$). The results showed a significant increase in lutein hormone and testosterone in the PCOS groups, and moderated in treatment groups with curcumin and its nanoparticle, compared to the PCOS groups without treatment. Also, a decrease in antreal and graafian follicles, and an increase in atretic and cystic follicles, a decrease in the number and size of corpus luteum and egg diameter in PCOS groups without treatment and their compensation to the control level in the treatment groups, especially in the nanocurcumin group with a higher dose, were observed. Therefore, the healing effect of curcumin and nanomicelle curcumin is suggested in reducing the complications of this syndrome, which was observed in PCOS rats.

171. Histological study of pharynx and different parts of hamster esophagus

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Hamster is a group of rodents that belongs to the mouse family. Due to the similarity of the test results in humans and hamsters, this animal is widely used in experiments. Hamster life span is 2-3 years and they have different types. Among them are golden, Russian, white dwarf, Roborovsky Chinese dwarf, Tibetan dwarf, European and so on. The largest European hamster is 34 cm long and Angora is 18 cm long, which belongs to the golden hamster branch In 1977, Winans et al studied the olfactory tissue of male and female hamsters. They described the parietal region, which is related to the sense of smell, and studied the effect of zinc sulfate on it. In this research, the histological study of the pharynx, the beginning of the esophagus, the end of the esophagus, and the lower part of the esophagus of hamsters has been studied. Three adult male and female hamsters with an age group of more than 10 months were prepared and anesthetized using 10% chloroform, which led to their death. In order to prepare microscopic sections of the samples, the usual method of preparing tissue sections was used. Staining was done with hematoxylin eosin (H&E) method. According to the studies done by light microscope, the epithelial tissue of the

pharynx is squamous and non keratinized, which lacks mucosal muscle. The covering tissue of the esophagus is squamous, and the muscular layer of the esophagus consists of two layers of smooth skeletal muscle. No differences were observed between male and female hamsters.

172. Taxonomic study on the Slender Whip Snake (*Platyceps najadum*) based on morphological and molecular data

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Platyceps represents one of the genera within the Colubridae family, exhibiting a wide distribution across North and Northeast Africa, South and Southeast Europe, Southwest Asia, Turkey, Iraq, the Caucasus, as well as Iran along Zagros and Alborz. A total of 29 species have been identified within this genus, with approximately five or six of these species found in Iran. The present study delves into the morphological and molecular examination of 20 specimens designated as *P.najadum*. The investigation of phylogenetic relationships was conducted utilizing the mitochondrial cytochrome b gene (Cytb). Following DNA extraction, PCR amplification of around 700 base pairs of the Cyt b gene was carried out employing L14919 and Ei700r primers. The amplified fragments underwent sequencing using the L14919 primer. Sequences of *Hemorrhois ravergieri* were acquired from the gene bank (NCBI) for utilization in phylogenetic assessments as outgroups to root trees. According to the findings of the phylogenetic analysis, the samples obtained from Ilam province exhibit significant divergence from the remaining samples, showcasing a genetic difference of approximately 12%. Notably, specimens from the Caucasus region and Russia, previously classified as a subspecies of *P.najadum*, are distinct from other samples by approximately 7% genetically, thus being identified as a separate species named *P.atayevi*. Moreover, samples from Chaharmahal and Bakhtiari provinces along with Isfahan province demonstrate a noticeable genetic distance of 4.2% in comparison to other *P.najadum* samples, tentatively labeled as *Platyceps Cf. schmidtleri* until further morphological and molecular analyses are completed. The outcomes of this study underscore that the samples attributed to *P.najadum* in Iran do not constitute a singular species from a molecular perspective, necessitating broader investigations at the national level.

173. Chromosomal Study of *Bufotes viridis* (laurenti, 1768) Populations in Chaharmahal and Bakhtiari Province

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The genus *Bufotes* belongs to the cosmopolitan family Bufonidae. All species of this genus are members of the *Bufotes viridis* complex. These toads are the only species group in the amphibian that comprises diploid (2n), triploid (3n), and tetraploid (4n) bisexually reproducing taxa. The group is widely distributed in Palearctic. In order to understand the phylogenetic relationships, we need further chromosomal and molecular studies on the complex in Iran. *B. viridis* is distributed in central and western Iran. Many populations of the green toad species have not been chromosomally studied yet. In this study, 16 samples toads were collected from spring to summer of 2022 in Chaharmahal and Bakhtiari province from three areas Shahrekord, Lordegan, and Ardal. The results showed populations of all three regions are the same in terms of the chromosomes number (2n=22). Chromosomes of all three areas were classified into two large (6 pairs of chromosomes) and small groups (5pairs of chromosomes) which consisted of 9 pairs of

metacentric chromosomes and 2 pairs of submetacentric chromosomes. The karyotypes of the Ardal and Shahrekord had the same pattern and were slightly different from the Lordegan so that among the large chromosomes in all three areas, the 4th pairs of chromosomes were submetacentric. Among small chromosomes of Shahrekord and Ardal toads, the 7th pairs of chromosomes were submetacentric while in the Lordegan toads, 8th pairs were submetacentric. Therefore, the intraspecies differences of the studied populations are small. Neither sexual heteromorphism, nor secondary constriction was observed in any pairs of chromosomes.

174. Two new species of Araneae (Arachnida) from Iran

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Fadami is a city with tropical climate in southeast of Fars Province. In the first survey on spider fauna of Darab County, two new species belonging to families Gnaphosidae Banks, 1892 and Salticidae Blackwall, 1841 were found. Berinda sp. from the family Gnaphosidae shows similarity to B. bifurcate but it differs from its congener in several characters. The tibial apophysis is longer and thinner; median apophysis is different when viewed retrolaterally. Retrolateral tibial apophysis shallow bifurcated, clung to palp, very longer and transparent; in lateral view median apophysis is pitchfork and the palp tip is longer, thinner and bent in Berinda sp. In Eravcha sp. from the family Salticidae, retrolateral tibial apophysis is short and thinner in comparison to other species of the genera. Moreover, apophysis is short triangle in lateroventral view.

175. Comparison of the therapeutic effect of gentamicin and lytic bacteriophage in Escherichia coli infection and its impact on memory function in burn model rats

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Burn wounds are a good place for germs to grow and cause infection. Escherichia coli is one of the most common gram-negative bacteria causing burn infections. Gentamicin antibiotic is usually used to treat this infection. Despite the beneficial effects, long-term antibiotic treatment can lead to side effects, such as disruption of the gut-brain axis. According to studies, phage therapy can be a suitable alternative to antibiotics in the treatment of bacterial infections. In this study, the therapeutic effect of the antibiotic gentamicin and lytic bacteriophage against Escherichia coli and its impact on the memory of animals was investigated. 24 adults' male rats were divided into control, gentamicin, and phage treatment groups. All groups, after anesthesia, a third-degree burn was created in the lower back area and infected with 100µl of half McFarland suspension of Escherichia coli bacteria. After one hour, treatment with antibiotic gentamicin (40mg/kg) or lytic phage (100µl/rat) was performed for four days. Then, memory was evaluated with the help of passive avoidance test, a new object recognition test and motor activity. In both new object detection and passive avoidance tests, in the group treated with gentamicin antibiotic, memory significantly decreased compared to the control group ($P < 0.001$). While the phage treatment group did not show any significant difference with the control group ($P > 0.05$). Measurement of motor activity did not show any significant difference between experimental groups ($P > 0.05$). It seems that unlike antibiotics, phage therapy does not have a damaging effect on memory along with the treatment of infection.

176. Comparison the effect of nanoparticles of ZnO and MgO on GABAA receptor expression in the hippocampus of male rat in the presence and absence of acute stress

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Acute stress can affect GABAergic system activity and GABAA receptor expression. Also, zinc and magnesium ions level can change expression of the gabrg1 gene associated with GABAA receptor in the hippocampus of animals. In this study, the effects of nanoparticles of ZnO and MgO, as zinc and magnesium supplements, were evaluated on gabrg1 gene expression in the hippocampus of rats following acute stress induction. Adult male Wistar rats (220±20 g) were divided into the groups of control (saline), acute stress of 90 min, nano- ZnO (5 mg/kg) and nano-MgO (5 mg/kg) with and without acute stress of 90 min. Stress was induced by the plexiglass restrainer and components injected intraperitoneally and immediately after stress induction. Expression of the gabrg1 gene was evaluated in the hippocampus of all groups by the Real-Time PCR method and 2 hours after stress induction or component injection. Stress decreased gabrg1 expression while nano-ZnO the in present of stress significantly increased gabrg1 expression ($p < 0.001$). Even though, nano-ZnO increased gabrg1 expression in the absence of stress but it was not significant. Nano-MgO with or without acute stress did not change gabrg1 expression ($p > 0.05$). It seems that nano-ZnO, in comparison to nano-MgO, have a high ability in correcting complications caused by the stress, such as reducing GABAA receptor (gabrg1) expression and this ability increases in the presence of stress.

177. Comparison of lipid profile and semen parameters between 3-day and 4-hour sexual abstinence periods in varicocele patients

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Varicocele is one of the common causes of male infertility, in which the alteration of the temperature regulation system in the pampiniform plexus and the increase in reactive oxygen species (ROS) levels damage sperm cells through lipid peroxidation. It is believed that altering the duration of sperm presence in the epididymis can prevent damage from ROS in the epididymis and improve sperm quality. Semen samples were obtained from 25 patients with grade I varicocele. After liquefaction, the volume, concentration, morphology, and sperm motility were assessed according to the World Health Organization (WHO) guidelines. Viability and sperm morphology were examined using eosin staining and Diff-Quik staining, respectively. Sperm DNA fragmentation index (DFI) was evaluated using the Halosperm test. Finally, the sperm lipid profile was analyzed by gas chromatography to determine the levels of omega-3 and omega-6 fatty acids. Findings: The results indicated that semen volume, sperm count, and concentration significantly decreased with a reduction in sexual abstinence to 4 hours. Comparing sperm motility between the two groups showed significantly higher non-progressive motility in samples with 4-hour abstinence compared to those with 3-day abstinence. However, no significant differences were observed between the groups in terms of progressive motility and sperm morphology. Additionally, viability and DNA fragmentation index (DFI) improved with 4-hour sexual abstinence compared to 3-day abstinence. Analysis of the sperm lipid profile revealed no significant differences in the levels of omega-3 and omega-6 fatty acids between the two abstinence periods. Conclusion: Reducing sexual abstinence to 4 hours can improve sperm parameters in men with grade I varicocele-related infertility. These findings assist embryologists in optimizing the timing of assisted reproductive treatments for varicocele patients by determining an appropriate abstinence period to achieve high-quality sperm.

178. Comparison and Analysis of Growth Parameters of *Barbus lacerta* Heckle, 1843 in the Gamasiab and Sefidbar Rivers of Kermanshah Province

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In the study of aquatic ecosystems, the examination of fish populations is paramount. Biological and ecological studies of various fish species within an aquatic ecosystem are essential for the preservation and restoration of their stocks. These studies lead to an understanding and ecological analysis of the ecosystem's food chain, which is crucial for effective fisheries management. Fish growth characteristics exhibit significant regional variability, which can be explained by the diversity in habitat features. This study aimed to compare the growth of the species *B. lacerta* in two rivers, Gamasiab and Sefidbar, during the summer of 2020. In this study, 14 and 33 specimens were caught from each station, respectively, and the samples were immediately fixed in 10% formalin. The maximum total length for the Gamasiab population was 126 mm, while for Sefidbar it was 129 mm. The mean total weight for the Gamasiab samples was 34.6 g, and for the Sefidbar samples, it was 21.4 g. The growth equation for each population was $W=0.211TL^{3.12}$ and $W=0.283TL^{3.0}$, with a correlation coefficient of $R^2=0.87$ and $R^2=0.90$, respectively. The Fulton's condition factor for the Gamasiab samples was 1.31, and for the Sefidbar samples, it was 1.03. The Gamasiab population, due to positive allometric growth and a higher Fulton's condition factor, exhibited better growth and health status compared to the Sefidbar population, which showed isometric growth. This likely indicates more favorable living and environmental conditions for the Gamasiab population, possibly due to better access to food resources or more suitable environmental conditions.

179. Comparison of the effect of hydro-alcoholic extract of (*Nigella sativa* L.) and Silver nanoparticle on inhibiting the formation of Nephrolithiasis in male mice

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Silver nanoparticles can disrupt the function of the organs of the body, including the kidneys. *Nigella sativa* is a well-known plant that is used in traditional medicine for the treatment of nephrolithiasis. This study aimed to compare the effect of hydroalcoholic extract of *Nigella sativa* and silver nanoparticles on inhibiting the formation of kidney stone, following changes in blood biochemical parameters in this disease. In this experimental study, 40 male Albino mice were randomly divided into 5 groups: (positive and Negative control groups that added to their drinking water and other groups Ethylene glycol 1%, receiver hydroalcoholic extract of *Nigella sativa* 125 and 250 mg/kg body weight per day and nano silver 125 ppm). At the end of the treatment, Blood samples were taken from their heart to investigate uric acid, creatinine, and urea After 24 hours, the urine samples of each group of mice were collected individually to test for oxalate and calcium, and to ensure the formation of nephrolithiasis. Data were analyzed by ANOVA and significance level ($P < 0.05$). Results showed that none of the groups had no significant effect on creatinine. In groups, *Nigella sativa* 250 mg/kg showed a significant decrease in uric acid and urea ($p < 0.01$). However, none of the factors in the silver nano group did not show significant differences compared to the negative control. Hydroalcoholic extract of *Nigella sativa* improves blood and urine biochemical parameters and thus inhibits nephrolithiasis disease but in silver nanoparticles, it increases urine calcium oxalate and creates nephrolithiasis.

180. Comparison of BDNF level changes in the hippocampus of Alzheimer's disease model adult male rats after intracerebral injection of astrocyte cells and Astrocyte derived exosomes

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The progression of Alzheimer's disease (AD) is associated with the disruption of BDNF production, followed by a reduction in the process of memory consolidation. Recently, the use of cell therapy and exosomes in improving AD symptoms has been of interest. This study compares the effect of intracerebral injection of Astrocyte cells and Astrocyte derived exosomes in improving the level of BDNF in AD model adult male rats. Male rats were used in four groups: Control (without surgery), Alzheimer's control (surgery with lesion), and treatment groups (surgery with lesion+ injection of Astrocyte cells and exosome). The model of AD was established through bilateral electrical lesion in the nucleus basalis of Meynert (NBM). Astrocyte cells were extracted from the brain of newborn rats and exosomes were extracted from the conditioned medium of these cells using the instructions of Anacel kit. Astrocyte cells and exosomes were injected into NBM one week after modeling. After 28 days, the animals were killed and the level of BDNF in the hippocampus was evaluated by ELISA method. The lesion of NBM significantly decreased the level of BDNF in Alzheimer's models compared to the control group ($p<0.001$). Intracerebral injection of Astrocyte cells and exosomes caused a considerable increase in BDNF compared to the Alzheimer's control group ($p<0.05$). Conclusion: It seems that the transplantation of Astrocyte cells and Astrocyte derived exosomes can play a significant role in improving BDNF levels in AD.

181. Terrestrial Vertebrates of West Azerbaijan Province

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In recent decades, advancements in zoological and taxonomic methods have revolutionized our understanding of Iranian vertebrate biodiversity, previously dominated by studies from foreign researchers. These developments have prompted extensive re-assessment of earlier findings, resulting in substantial revisions to species numbers and classifications. The application of new taxonomic techniques has frequently led to the splitting or merging of nominal species and adjustments in classification levels. Despite these advances, the true biodiversity of the Iranian plateau remains incompletely understood, owing to its vast geographic extent and diverse topography. This study systematically reviewed scientific literature on terrestrial vertebrates in Iran, focusing on West Azerbaijan province. A comprehensive species checklist was compiled for mammals, birds, amphibians, and reptiles, incorporating 436 identified species. Birds exhibited the highest diversity with 313 species, followed by mammals (67 species), reptiles (48 species), and amphibians (8 species). The province's exceptional vertebrate diversity was anticipated, given its strategic location within the Iran-Anatolian and Caucasus biodiversity hotspots. This preliminary assessment aims to stimulate further field and genetic research across vertebrate groups in the region.

182. Role of Sphingosine in Male Fertility: Implications for Oligozoospermia as a Therapeutic Target

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Sphingolipids play crucial roles in regulating cellular processes such as cell differentiation and apoptosis. Among the key sphingolipid metabolites is sphingosine. As a precursor to sphingosine-1-phosphate, sphingosine modulates various cellular processes, including proliferation, growth,

and differentiation. This study examines sphingosine as a biomarker using standard chromatographic techniques, with a particular focus on its presence in samples from individuals with normozoospermia and oligozoospermia. Fresh sperm samples (n=20) were obtained from couples undergoing infertility treatments at the Alzahra Educational and Remedial Center in Rasht between April and June 2024. These samples were meticulously collected and analyzed according to World Health Organization criteria, and subsequently categorized into normozoospermia (control group) and oligozoospermia groups. Notably, patients had not received any hormonal, chemotherapeutic, or radiotherapeutic interventions prior to sample collection. The level of sphingosine was quantified using high-performance liquid chromatography. The results of our analysis reveal a significant increase in sphingosine levels in the oligozoospermia compared to normozoospermia ($p<0.05$). This finding highlights the importance of sphingolipid metabolism in male fertility and suggests that sphingosine could serve as a potential biomarker or mediator in the pathophysiology of oligozoospermia. This result clarifies the intricate interplay between sphingosine and sperm quality, providing valuable insights into the molecular mechanisms underlying male infertility. Further studies are necessary to elucidate the precise role of sphingosine in sperm function and to explore its potential as a therapeutic target for the management of oligozoospermia.

183. The Role of Type3 Serotonin Receptors in Hippocampus CA1 Region on Memory and Pain Due to Sleep Deprivation

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Sleep has an important role in human health and every kind of impairment in sleep and wake process can be basis of numerous diseases such as memory disorders, reduction of concentration, irritability, decreased loco-motor skills. In this regard, one can refer to the close relationship between sleep and memory formation; moreover, 3-serotinine receptor is expressed in prefrontal regions of human brain such as hippocampus, amygdala, and caudate nuclei as well as putamen. Investigations have indicated that 5HT3 is important in regulation of sleep and wake cycle and also in process of memory consolidation. According to previous evidence, the present study aims to investigate the effects of activating and inactivating 5HT3 receptors of M-Chlorophenylbiguanide and Y25130 on disruption of memory consolidation under N-REM SD in rats. This is while water box apparatus is used to induce NREM SD. Passive avoidance memory test was used to evaluate memory consolidation. According to the results, 24 hours deprivation of NREM decreases memory significantly, while it increases time required to react to pain. Application of Mchl (3-serotinine agonist) with a dose of 0.0001 $\mu\text{g}/\text{rat}$ into CA1 region with 24 hours NREM deprivation as pre-train didn't lead to memory improvement, while Y25130 (5HT3 antagonist) with a dose of 0.001 mg/rat improved memory consolidation. and interference of 5HT3 receptors with NREM SD can lead to an increase in time required for reaction to pain; however, the results of this research don't show a significant increase. Nevertheless, this increase is more evident in NREM sleep,

184. Role of Nitric oxide in induction of morphine antinociception in the rat's dorsal hippocampus and periaqueductal gray (PAG)

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Nitric oxide (NO) levels in brain nuclei, such as the hippocampus and brainstem, are involved in morphine analgesia, but the relationship between the dorsal hippocampus (dH) and the dorsolateral periaqueductal gray matter (dlPAG) needs to be clarified, which is our goal. Wistar rats were simultaneously equipped with a stereotaxic device with unilateral guide cannula at dH and dlPAG. After recovery, they were divided into control and experimental groups. Formalin (50 μ L of 2.5%) was inoculated into the left hind paw of rat. Morphine (6 mg/kg) was administered intraperitoneally (i.p.) 10 min before formalin injection. L-Arginine (0.25, 0.5, 1 and 2 μ g/rat), and L-NAME (0.25, 0.5, 1 and 2 μ g/rat), unrelatedly or with the respect in the order of injection were used in the nuclei before morphine injection (i.p.). Activation of the neuronal NO synthase (nNOS) in the brains of all animals was measured using NADPH-diaphorase, a selective biochemical marker of nNOS. Morphine reduced inflammatory pain in the early and late stages of the rat formalin test. The morphine response was attenuated by before injection of single L-arginine but not L-NAME in the two target areas. However, the acute phase result was stopped due to L-NAME pretreatment. When L-arginine was injected first into the dH and then L-NAME into dlPAG, morphine was not effective in both phases, but when L-arginine was first injected into dlPAG and then L-NAME was injected into dH only in the morphine phase. When L-NAME was injected into dlPAG before injecting L-arginine at dH and conversely, the morphine response did not decrease at all, indicating a modulatory role of NO in dlPAG, which was confirmed by NADPH-d staining. Conclusions: : High levels of NO in dlPAG may regulate pain process in downward synaptic interactions.

185. Fluctuations in the levels of 17-alpha hydroxyprogesterone (17 α -OHP) and its relationship with sexual maturation in the spawning season of females broodstock Caspian Kutum (*Rutilus frisii kutum*) in the southwest of the Caspian Sea

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It is of great importance to conduct a study on the changes of sex steroid hormones such as 17-alpha hydroxyprogesterone in females broodstock Caspian Kutum, which are intricately involved in their sexual development. In this field, research has been done on different species of fish. Among them, the study on the changes in the levels of 17 α -OHP hormone in male and female silver carp broodstock, during 6 months, indicates the increase in the levels of this hormone at the same time as sexual maturation progresses. (Mehran Yasmi et al., 2015). In this research, 41 pieces of females broodstock Caspian Kutum (31 pieces in the sea, in Sibley Mojgol, Astara and 10 pieces from Chelvand River, Astara) were caught and blood collected from March to May. 17 α -OHP levels were measured using the Iodine 125 detector by RIA method. Conventional methods of histology (eggs) and photography with a Nikon E600 microscope were also used. The data were analyzed with the help of EXCEL, SPSS and T-test. The results show a significant increase ($P < 0.05$) in the levels of 17 α -OHP in females broodstock caught from the river ($39.19 \text{ ng/ml} \pm 34.63$) compared to females broodstock caught from the sea ($4.75 \text{ ng/ml} \pm 3.65$). Also, the results show an increase in the diameter of the eggs of females broodstock (river) ($2.14 \text{ mm} \pm 0.35$) compared to females broodstock (sea) ($1.55 \text{ mm} \pm 0.11$). The high levels of 17 α -OHP in the females broodstock caught from the river is due to the proof of its role in vitellogenic growth and

final maturation of oocytes. So that the above result is consistent with the significant relationship ($P < 0.05$) of 17α -OHP levels with egg diameter and egg histological studies. The results indicate that 17α -OHP hormone is one of the important indicators of sexual maturation in females Caspian Kutum. It is recommended to conduct this research during different seasons and at the same time on both males and females of this fish.

186. Ketoprofen reduced the intensity of seizures behavior in a pentylenetetrazol induced seizures in the male Wistar rats

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Seizure is a behavior or involuntary movements caused by abnormal electric functions in the brain. Ketoprofen (KP) is a nonsteroidal, anti-inflammatory drug (NSAIDs), that can be used to treat pain, inflammation and fever. This study investigated KP's anticonvulsant potential on male Wistar rats caused by pentylenetetrazol (PTZ). Rats were randomly assigned to 4 groups, each group contains 5 rats (200-250 g), a healthy control group, the PTZ-treated group received equal amount saline and followed by PTZ after 30 min, and two treatment groups receiving KP at doses of 1 and 10 mg/kg, respectively. Following 30 min post-treatment, the rats received a PTZ dose of 60 mg/kg via intraperitoneal injection except healthy control group. Seizure behavior was observed and recorded according to the Racine scale over a 30-min period. The results demonstrated that KP significantly reduced the duration and severity of seizures compared to the PTZ group ($P < 0.05$). Furthermore, different doses of KP markedly decreased the duration of generalized seizures, which cause tonic and clonic convulsions, in comparison to the PTZ group ($P < 0.05$). These findings suggest that KP has the potential to mitigate seizure occurrences effectively. Given that KP is highlighted as an anti-inflammatory agent in this study, it is suggested that further research should also focus on exploring the inflammatory and molecular pathways to enhance the understanding and implications of these results. The comprehensive analysis of these pathways could provide deeper insights into the mechanisms through which KP exerts its anticonvulsant effects and possibly inform the development of more effective treatments for seizure disorders.

187. Diet composition of two sympatric amphibian species in rice paddies in Ilam province

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Amphibian are widely distributed on all of the world except Antractica, and, due to their generalist nature, they consume a wide variety of prey including arthropods, Annelidae, Mollusca, and occasionally small vertebrates such as fish and frogs. Due to their life cycle and connection between terrestrial and aquatic ecosystems, amphibians are one of the main components of food webs. Many species of amphibians exist in human-dominated areas, for example, frogs are widespread in rice paddies. Many studies have demonstrated dietary habits, trophic resource availability, and resource competition between sympatric amphibians in a variety of settings. In this study, food composition and overlap between two species of Anura (*Pelophylax ridibundus* and *Hyla savignyi*) were determined in many populations in the rice paddies of Darrehshahr township, Ilam province. For this purpose, a total of 81 stomach contents (42 belonging to the *P. ridibundus* and 39 belonging to the *H. savignyi*) were flushed (through stomach flushing) and examined. During the study, 139 prey items in the diet of *P. ridibundus* and 97 prey items were identified in the diet of *H. savignyi*. Coleoptera is the most important prey items in two study species. Furthermore, insects belonging to the Hymenoptera, Dermaptera and Hemiptera were observed in greater numbers. Arachnida and gastropods were the most prevalent non-insect invertebrates. *H. savignyi* only caught terrestrial prey, whereas *P. ridibundus* also capture aquatic prey, including aquatic gastropods. The presence of different sizes of prey indicates an opportunistic feeding for these species, which ensures their survival. Due to the high similarity of the food items of these two species, there is probably a competition for food resources between them in the places with sympatric distribution.

188. Hormesis Effect of Cold Atmospheric Plasma on the Khapra Beetle in Laboratory

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Through hormoligosis or induced hormesis, traces of chemicals or physical irradiation leads to oviposition stimulation in some arthropod species. This phenomenon is well documented in two-spotted spider mite. Plasma is a mixture of ions, high energy electrons and various reactive species that are reproduced after ionizing gas inserted in an electromagnetism field between two electrodes with a certain voltage. These chemical species are produced in a closed cavity and with a random movement interact physically or chemically with the substrate. The khapra beetle, *Trogoderma granarium* Everts (Col.: Dermestidae), is a cosmopolite insect and one of the most important damage factors in cereals and other stored products in particular in tropical and subtropical regions. In this research, 120s cold atmospheric plasma against the beetle' one-day old larvae was studied. Results showed increased total fecundity of plasma treated cohort (13.5 ± 10.55) in comparison to the control one (7.4 ± 5.58) ($F_{10,10} = 2.6227$, $p < 0.0721$) that can be dedicated to the triggering effect of cold atmospheric plasma on oviposition. In complementary experiments the physiological or genetical mode of action of this chemical species will be studied that needs depicting simultaneous spectrometry and testing the most probable tissues to receive stimulant and elicit adults triggered oviposition.

189. Species composition and abundance of landbirds in Parishan Lake, Southern Iran

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Parishan Lake, one of the largest freshwater lakes in Iran and west Asia and one of the Important Bird Areas (IBA) in Iran, dried up in recent years. This lake is located near Kazeroon county, Fars Province, and southern Iran. Although few studies have addressed the waterbird diversity of the lake, its landbird diversity has not been investigated so far. Therefore, in this study, diversity and abundance of landbirds of the Parishan plain were investigated monthly over a period of one year using the Line-transect sampling method. To identify the birds, a Vanguard 10x50 binocular and a Canon EOS 760D camera equipped with a Sigma 150-600 mm lens were used. The results showed that 77 landbird species belonging to 47 genera, 28 families, and 9 orders inhabit in the Parishan plain. Maximum bird species were recorded from the Order Passeriformes with 60 species followed by Coraciiformes and Columbiformes, each with four species. Resident, wintering and summering birds were listed. The most abundant species were crested lark, house sparrow, barn swallow, and white-eared bulbul in the area. Regarding drying up of the lake and numerous human activities in the area, it seems necessary to protect endanger and vulnerable species and species with a small population in the area.

190. Intraspecific variation or signs of hybridization: challenges related to the head color pattern of Buntings in the hybrid zone between Red-headed (*Emberiza bruniceps*) and Black-headed (*Emberiza melanocephala*) Buntings in northern Iran

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Hybridization is relatively common in birds. Where morphologically dissimilar bird species come into contact, morphological cues are usually the first signs of hybridization. In the hybrid zone between Red-headed and Black-headed Buntings in northern Iran, parental males are easily distinguished morphologically and male hybrids can be recognized using phenotypic traits. Regarding extensive fieldwork in northern Iran and based on collected and photographed birds,

hybrids possessed many transitional traits between the two parental species as they show a variety of intermediate or mosaic characters. Many kinds of mixed color traits were seen, especially in the head, ranging from black to red to yellow. Two collected and six photographed Black-headed specimens from the area of hybridization had black feathers in the throat. This black is restricted as a spot, patch, extending towards the chin and throat from head or very extensive where the head is completely black. In two Black-headed specimens from the hybrid zone that had completely black heads, there were other signs of hybridization. Thus, probably this phenomenon (entirely black head) is attributable to hybridization. However, few Black-headed specimens with black spot were observed outside the hybrid zone. Molecular studies are suggested to investigate these patterns more closely.

191. Examination of indicators to evaluate renal function, and interleukin-10 in patients with active systemic lupus erythematosus

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Systemic lupus erythematosus (SLE) is an autoimmune disorder that can lead to renal dysfunction. In present research, the relationship between some markers of renal function, and inflammation with this disease was studied. For this purpose, 25 women and 5 men with active systemic lupus (with an activity score greater than 6), and the same number of healthy people were selected by obtaining consent and having special conditions to enter the study. After blood collection and serum separation, the renal biochemical markers were determined with standard methods, and inflammation factors were measured by ELISA. The data were analyzed with appropriate tests and a significance level of $p < 0.05$. The results indicated a significant increase in serum creatinine, uric acid, blood urea nitrogen, total and direct bilirubin levels in systemic lupus patients compared to healthy individuals. Although no significant difference was observed in the concentration of lipid profiles including total cholesterol, LDL HDL and triglyceride in patients compared to healthy individuals, but the inflammatory factors interleukin-10 and C-reactive protein increased in the serum of patients. Based on the obtained results, despite the fact that the patients did not suffer from lupus nephritis, and the duration of the disease was not long (4 to 10 years), the disease had a negative effect on kidney function at an acceptable level. Considering the significant increase of interleukin-10 and other inflammatory factors, it is suggested to evaluate inflammatory factors in the diagnosis and determination of disease severity.

192. Effect of Spirulina platensis on Liver necrosis of Male Musculus Mice Exposed of Accetaminophen

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The most commonly used analgesic worldwide is acetaminophen. Like all other chemical medicine, this medication is accompanied by side effects. In the body, acetaminophen is converted by a system into a toxic substance. This substance binds to glutathione, becomes water-soluble, and is excreted through the kidneys. Excessive consumption of this medicine and the subsequent overproduction of this toxic metabolite lead to liver necrosis. Spirulina, an alga, possesses numerous beneficial properties. It is rich in proteins and vitamins and proteins making up the majority of its composition. Numerous studies have been conducted on the effects of this alga on various parts of the body. In this project, we examine the impact of this alga on liver necrosis in Syrian mice. This experimental study was conducted on 40 adult male Musculus mice, divided

into five groups of eight. The toxic dose of acetaminophen was 600 mg/kg. Blood test from the mice showed that the levels of liver enzymes (ALT, AST) in the group that received only acetaminophen were higher than in the groups that received Spirulina. This indicates that the livers of the groups receiving Spirulina were healthier compared to the group receiving acetaminophen without Spirulina. This alga can be used in the prevention or treatment of liver cirrhosis. Researchers can explore the effects of this alga in the treatment of other liver diseases or other bodily ailments.

193. Evaluation of DNA barcoding as a molecular marker for genetic identification of paracalanid copepods in the Gulf of Oman

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Small planktonic marine copepods represent a highly diverse and abundant group of metazoans. Among the ten copepod orders, Calanoids are the most successful group of aquatic invertebrates. Also, the family Paracalanidae is particularly widespread within the order Calanoida. In present study, specimens were collected over four consecutive seasons from five stations in Chabahar Bay during 2021-2022. The material was immediately preserved in 96% ethanol, transferred to the laboratory of Animal Systematics at the School of Biology, University of Tehran, and were used for molecular study. This study evaluated morphology-based groupings and the species identifications of seven genera from the Paracalanidae using the mitochondrial cytochrome c oxidase I gene. Phylogenetic analyses of the *COI* gene were conducted using Maximum Likelihood (ML) and Bayesian Inference (BI). Genetic distances within and between species were calculated for *COI* in this family using Kimura's two-parameter (K2P) model. The results confirm the validity of *COI* for paracalanid species identification. Intraspecific variation of the sequences is indicated ranges from 0-8%, while interspecific variation from 9-23% for every species.

**The Fourth International
Conference on Cell and
Molecular Biology**

Oral Presentation

1. Nano and Micro Structures in Molecular and Cell Biology Studies: From the Point of View of Diagnosis and Treatment

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In the third millennium, the idea of convergence of four newly emerging fields (Nanotechnology, Biotechnology, Information technology and Cognitive science, NBIC), not only new windows, but rather new highways, have been revealed to biological researchers. Interdisciplinary sciences, specifically nanobiotechnology, which has brought other researchers of basic, technical and engineering sciences to this field quickly. In this presentation, some of these questions and answer methods that have been examined in our group in the last few years are discussed and examined with an emphasis on the methods of basic studies and diagnosis and treatment according to the available time. Nano biotechnology in the diagnosis of diseases includes; Nanobiosensors, chips and microarrays and in the treatment of diseases including; Targeted drug delivery with a variety of nanocarriers and drug delivery routes that are designed and implemented in diagnosis and treatment by combining nanostructures and bioactive compounds of biological systems. Microstructures including laboratory on a chip are used to combine all kinds of screening tests needed by society and drug discovery research and micro needles to invent new methods of drug delivery. Also, the development of the microfluidic system with the aim of studying single cells in two-dimensional and three-dimensional platforms is important for better understanding and treatment of diseases. In some cases, these microstructures are injectable and biodegradable, while creating a suitable substrate for the growth and proliferation of stem cells. This branch of science and new technologies is known as the solution to many human problems in the third millennium.

2. Application of NGS Technology in Personalized Medicine and Pharmacogenomics

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Recent advances in next generation sequencing (NGS) have provided unprecedented chance to figure out the whole genome variations in human genome and their impact on human health. Additionally, RNA and ChIP sequencing allow for studying the functional genome and epigenome, respectively. Identification of individual and/or population-specific variations provides valuable information to predict the disease risks and accordingly, retard the malignancy progression. Based on the genetic background, the best effective treatment strategies could also be personalized. Here, we overview the current and future impacts of NGS technology on emerging precision medicine and how it fosters population-based screening, targeted treatments and human healthcare.

3. Science and Technology in Development and Wealth Generation

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With the current rate of growth, it is expected that world population to reach about 9.7 billion in 2050. This is while the natural resources are declining very quickly. This is the source of uncertainty and anxiety among scientists and decision makers. However, investments on the potential of converging sciences and technologies are growing in many developed countries to meet the demands of future generation in a sustainable manner, without putting more pressure on the natural resources. Making a reasonable balance between programs in development of basic sciences and technologies is important for generation of wealth out of knowledge. Based on recent advancements, biological sciences are considered among very important disciplines for this purpose, which will be discussed here.

4. Evolution of Breast Carcinogenesis

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Within a stable ecosystem, species appear harmoniously synchronized, akin to components of a larger super-organism. Yet, when one species breaks free from its ecological limits and multiplies rapidly, this disrupts the equilibrium, leading to the extinction of other species and potential ecosystem collapse. In the realm of medicine, we term this ecological phenomenon as cancer. The ecological changes of tumor microenvironment will apply novel selection pressure on cancer cells and dictates which changes in cancer cells offer adaptive advantages. While the significance of these evolutionary and ecological processes in cancer is acknowledged, we are still lacking the knowledge on cancer initiation, progression, and metastasis. To address that, we study how various tumors are evolving in their microenvironment from normal to precancer and cancer in clinically meaningful ways. We study how changes in microenvironment of normal, precancer, and cancer cells can change their phenotype adapting to varied microenvironment and how adaptation to it can shape the new ecosystem and evolutionary trajectory of cancer cells. This interplay between tumor cells and the microenvironment plays a fundamental role in the development of an ever-changing tumor ecosystem leading to more genotypic heterogeneity and phenotypic plasticity. We use the integration of spatial single-cell transcriptomics, proteomics, metabolomic and lipidomics, and pathomics machine learning analysis to capture the heterogeneity and plasticity of cancer cells in their natural ecological microenvironment and habitats. We discovered novel metabolic phenotypic switch in cells adapted to early acidosis in mammary ducts leading to pre-cancer and carcinogenesis. We then used these markers in our breast cancer ductal carcinoma cohort to find biomarkers for progression from precancer to cancer and upstaging of DCIS.

5. Investigating the Dynamics and Structure of Therapeutic Proteins in Nanoparticle Drug Delivery Formulations

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Nanoparticles have shown great potential in the field of drug delivery, particularly in encapsulating therapeutic proteins. This technique holds promise for improving the targeted delivery and effectiveness of various therapeutic proteins in medical treatment. However, the conformational dynamics of the proteins within these nanoparticle formulations remain poorly understood. To address this knowledge gap, we applied molecular dynamics (MD) simulations to study the conformational dynamics of therapeutic proteins in chitosan-based drug nanoparticle systems. The results recognized key residues involved in the adsorption of proteins onto the nanoparticle surface. Specifically, we found that the interacting residues of human growth hormone (hGH) were predominantly found in the connecting loops in the presence of modified chitosan nanoparticles. The data confirmed the crucial role of hydrophobic residues in Insulin during the adsorption process and provided insights into the primary driving forces behind these interactions. Binding energy calculations indicated favorable physical interactions between the modified chitosan nanoparticles and Lysozyme, whereas Pyrazinamidase displayed unfavorable binding. Notably, the conformation of Follicle-Stimulating Hormone (FSH) remained unchanged in the presence of chitosan nanoparticles. Our data demonstrate that the encapsulation of FSH into modified chitosan nanoparticles happens gradually, driven by hydrophobic interactions between the hydrophobic regions of FSH and the hydrophobic regions of the nanoparticles. Furthermore, we observed that, except in the hydrophobic patch region, the flexibility of FSH was reduced in the presence of the nanoparticles. These findings provide valuable insights into the structural stability and flexibility of therapeutic proteins within these formulations, which could have substantial implications for their safety and efficacy in clinical applications.

6. Tubulins, from development and diagnosis to treatment of cancer

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Tubulins, dimer of alpha and beta tubulin, make up microtubules in the cell, which play a vital role in cell survival and division. Therefore, the high conservation is one of the main characteristics of tubulins in micro and macro-organisms. The formation and destruction dynamics of microtubules directly affect the rate of cell division. The dynamic instability of microtubules leads to cancer. The high conservation of tubulins and the high rate of cell division in tumors raises the possibility of the existence of subtypes and isotypes. For example, nine isoforms of tubulins have been identified in humans, which are tissue or cell specific. A subtype expression of human alpha tubulin is influenced on the division of immune cells and contributes to cancer growth. The expression level of this subtype can be used for early cancer diagnosis. In contrast to the deep knowledge for human tubulins, not much is known about the plant tubulins'. Vinca alkaloids produced by *Catharanthus roseus* plant are cell toxins that have been used as the first natural anti-cancer drug in pharmacies without any changes and have been used to treat cancer. Here, alpha

and beta tubulin coding sequences were studied to find any isoform(s) from *C. roseus* serving for the plant's self-protection against their own toxin, vinca alkaloides. This information can be used in cancer treatment by introducing more effective vinca alkaloids (stronger binding to tubulins).

7. Antimicrobial Peptides from Animal Venom: Multifunctional Therapeutic Molecules

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Antimicrobial peptides (AMP) are one of the oldest defense factors of the innate immune system that exist in different organisms. AMPs have attracted a lot of attention as alternate molecules in dealing with antibiotics-resistant bacteria. These peptides also show activity against different types of microbes such as viruses, fungi, parasites and protozoa. They also show other functions included anti-cancer activity, the activating effects of immune system cells, mediation of immune responses, anti-inflammatory and wound healing activities. The venom of animals such as bees, scorpions, spiders and snakes are rich sources of AMPs. Several types of AMPs present in the venom of an organism, there are also many variations of AMPs among similar species. This high diversity has created different functions for venom AMPs. So far, various types of these peptides have been isolated. For example, melittin and meucins, the main peptide of bee and scorpion venom, respectively; have various antibacterial, antifungal, anticancer and anti-inflammatory functions. Identification of antimicrobial peptides from the native species of each region provides a rich source of these powerful, multifunctional molecules that can be exploited in various therapeutic fields. The challenge of large-scale production of these peptides can be solved using biotechnology methods by their recombinant production. In this review article, several antimicrobial peptides that isolated from Iranian species by our group have been introduced and their therapeutic functions have been investigated and compared. Diverse functions of these peptides along with the ability of their recombinant production can lead to their wide therapeutic applications.

8. Recreating Everything: is Biology the Future-Making Power of the World?

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The title "created co-creator" reflects the role of humans in the post-anthropocentric era, highlighting our advancements in biology and genetics as evidence of our scientific mastery. This concept introduces co-creation, innovation, and the emergence of new human-made phenomena. Harnessing this unique capacity requires a proactive approach to biology, grounded in human acceptance of free will and agency in understanding, decision-making, and controlling genes. This perspective, considered as "technological advances," enables us to reshape our understanding of genetics and its complexities to enhance its benefits. However, it also imposes ethical responsibilities to ensure that these advancements respect social and environmental considerations. This means that humans have the ability to rearrange both material and immaterial elements of the world—genes, atoms, bits, and neurons—through thoughtful decision-making, thus creating new futures. Concurrently, a heightened ecological awareness fosters a new ethical framework that promotes harmony among humans, non-humans, and in-humans, ultimately leading to a world

where both humanity and nature are valued and protected. This endeavor is undoubtedly a noble pursuit for humanity.

9. Anti-CRISPR: A Strategy for Control of the Gene Editing Risks

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Since 2012, with the development of gene editing technology based on CRISPR-Cas9, a revolution in the medical field has been developed using creating a new method of treating incurable diseases, but the use of this technology in the case of human embryonic cells carries risks that have caused the world health organization has recommended not to use this technology (for embryonic cells) at this time. On the other hand, in parallel with new treatment methods, the dangers of using this molecular knife in the design and production of emerging organisms have caused some people to mention gene editing and CRISPR as a biological threat and highlight the consequences of this technology's biosecurity. In this regard, the use of Anti-CRISPR as a smart strategy to control the risks of gene editing has attracted the attention of researchers. Anti-CRISPR is an evolved tool to help bacteriophages survive against the bacterial immune system (CRISPR-Cas). Anti-CRISPR was first identified in 2013 in the phage infecting *Pseudomonas aeruginosa* bacteria. Anti-CRISPR is part of a developing toolkit that allows us to turn CRISPR on and off exactly when needed, much like turning a light switch on and off. As a result, the characteristics of protein and non-protein anti-CRISPR and their function in inhibiting and exploiting gene editing from the point of view of biosecurity are of interest and very important.

10. The Effect of Mitotherapy on Human Fibroblast Cells in Wound Healing

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Mitochondria are intracellular organelles that play an important role in cellular processes. In the past, the mitochondrial transplant method was used to investigate the metabolic function of stem cells, to restore ischemic heart tissue and to reduce heart attack and other clinical activities. Wound healing is a multifactorial process including homeostasis, inflammation, tissue proliferation and regeneration, which regularly leads to the creation of new tissue, and if the energy supply of any of the steps is disrupted, the wound will return to a chronic state. The energy of each step of wound healing is provided by mitochondria in the form of ATP. In the conducted study, mitochondria were extracted from Wistar rat liver cells and examined for their activity and morphological properties. In order to reach the target population, fibroblast cells were cultured in DMEM medium containing 10-20% fetal bovine serum and FBS and in a 37°C incubator containing 5% CO₂ gas, which were incubated in the presence of different concentrations of mitochondria for 1, 7, 14, 21 days. Microscopic observations and survival test related to the growth of fibroblast cells during treatment and non-treatment of cells with different concentrations of mitochondria were investigated. Based on the information obtained from microscopic observations, the proliferation rate of fibroblasts increased compared to the control sample (without treatment with mitochondria). Also, the treatment with mitochondria had no toxic effect on the cells.

11. Association of Single Nucleotide Polymorphisms in the Long Noncoding RNA HOTAIR Gene With Susceptibility To Type 2 Diabetes In Iraqi Patients

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Diabetes mellitus (DM) is a prevalent global health issue, imposing a significant burden on healthcare systems worldwide and associated with high mortality rates. According to the World Health Organization's 2020 data, approximately 13.9% of adults in Iraq suffer from diabetes. Recent studies have highlighted the involvement of long noncoding RNAs (lncRNAs) in various biological processes, including glucose homeostasis. HOTAIR, an lncRNA composed of 2158 nucleotides, has been shown to harbor four single nucleotide polymorphisms (SNPs): rs1899663, rs12826786, rs4759314, and rs920778, which are associated with the development of diabetes. In Iraq, there have been no previous investigations into the relationship between genetic variations in the HOTAIR gene and type 2 diabetes. To determine the association between the rs1899663 and rs12826786 SNPs in the HOTAIR gene and serum glucose levels, as well as its potential as a diagnostic marker for Iraqi diabetic patients, blood samples were collected from 28 type 2 diabetes patients and 20 healthy controls. Physiological data, including height, weight, blood pressure, fasting blood glucose, HbA1c, HDL, LDL, cholesterol, and diabetes-related complications, were collected. The type of HOTAIR SNPs was determined using ARMS-PCR, followed by statistical analysis to identify correlations between different parameters. Based on the data analysis, a significant correlation was found between the two lncRNA HOTAIR gene SNPs and the examined variables. Therefore, these SNPs can be considered as potential prognostic markers in T2DM patients.

12. Evaluation of the protective effects of nanoparticles synthesized from Teucrium Polium plant on oxidative stress induced by Fe2+/ascorbate system in liver homogenates

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Extensive studies indicate the involvement of oxidative stress and free radicals, including ROS, in initiating and developing various diseases. ROS can destroy cellular structures, nucleic acids, lipids, and proteins in high concentrations. Liver homogenates are one of the most common experimental models used to study oxidative stress due to their high metabolic activity and their sensitivity to oxidative damage. It is a liver homogenate. The use of nanoparticles prepared from plants has attracted the attention of various researchers in recent years. Kalpura, with the scientific name Teucrium Polium from the mint family (Lamiaceae), is a fragrant, aromatic herbaceous and stable plant, and its height reaches about 40 cm. This research investigated the protective effects of nanoparticles synthesized from Teucrium polium on the Fe2+/ascorbate system in liver homogenates. First, the oxidative stress system was created in liver homogenates using specific iron and ascorbic acid concentrations. Synthesized nanoparticles were incubated in different concentrations with the desired system. Then, several markers, such as lipid peroxidation, protein carbonyl oxidation (PCO), changes in glutathione (GSH), and ROS formation, were measured. Catechin was used as a standard antioxidant. Our results showed that simultaneous incubation of liver homogenates with the Fe2+/ascorbate system and compounds reduced lipid peroxidation, PCO content, ROS formation, and GSH oxidation in a concentration-dependent manner. Finally, the results of this study showed that nanoparticles synthesized from this plant can be used as an important agent to improve diseases related to oxidative stress.

13. Increasing the Effect of Liposomal Formulation on *Gardner lavaginalis*

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Gardnerlavaginalis is one of the vaginobacterial agents, whose resistant strains have been created by frequent use of antibiotics such as clindamycin. Today, drug carriers are used to treat resistant infections. The aim of this study was to prepare and evaluate the effect of clindamycin liposomal formulation on the resistant isolate of *Gardnerella vaginalis*. First, 0.520 g of phospholipid and 0.154 g of cholesterol were dissolved in chloroform, and with the help of a rotary solvent, it was removed and was formed a dry phospholipid film. Then clindamycin solution was added to the film and vortex was performed until the liposomal solution was prepared. Encapsulation percentage, particle size, shape and formulation stability were measured. The MIC of the liposomal formulation was evaluated on an isolate of *Gardner lavaginalis* that was obtained using biochemical tests and its resistance was proven to clindamycin and metronidazole antibiotic discs. Light and electron microscope showed the formation of spherical particles and Zetasizer device reported the size and charge of liposome as 576 nm and 2 mV respectively. The physical stability was 5 months and the encapsulation percentage was 20%. MIC of free clindamycin was 8000 µg/ml and liposome formulation was 4000. The liposomal formulation of clindamycin was able to reduce the MIC of *Gardnerlavaginalis* by half compared to the free clindamycin drug, thus increasing the effect of the clindamycin drug. Using cationic or anionic clindamycin liposomes may have a stronger effect than neutral liposomes.

14. Investigation of Biological Health in Adults with Different Telomere Lengths

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Biological health score is an index used to evaluate individuals' health. On the other hand, telomere length can also express people's biological age. The study was performed on 119 healthy volunteers (28-74 years) from Rabat city (West Azerbaijan, Iran). To estimate BHS, 18 blood-derived biomarkers. These biomarkers included dehydroepiandrosterone sulfate, prolactin, luteinizing hormone, testosterone, hemoglobin, high-density lipoprotein cholesterol, low-density lipoprotein cholesterol, total cholesterol, triglycerides, systolic diastolic blood pressure, pulses, C-reactive protein, transforming growth factor beta, alanine transaminase, aspartate transaminase, gamma-glutamyltransferase, and creatinine. The leukocyte telomere length of each individual was relatively measured by Monochrome Multiplex Quantitative PCR (MMqPCR). Participants were divided into three groups based on the telomere length, *i.e.*, short ($TL \leq 0.8$, $N=27$), intermediate ($0.8 < TL < 1.8$, $N=35$), and long ($TL \geq 1.8$, $N=57$). Then the biological health score was compared among them (a higher biological score indicates a lower level of health). The biological health score of individuals with short telomere length (7.11 ± 2.75) was significantly higher than individuals with intermediate (5.63 ± 2.61) and long (5.56 ± 2.34) telomere length ($P < 0.05$). The biological health score of the two groups with medium and long telomere length did not differ from each other ($P > 0.05$). Data from this study show that individuals with short telomere length have a lower level of biological health. In other words, there is a close relationship between biological health and telomere length (as an indicator of cellular aging).

15. The Potential of Xcpq Protein to Stimulate Immunity Against *Pseudomonas Aeruginosa* Infections, A Bioinformatics Study

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Many Gram-negative bacteria, including *Pseudomonas aeruginosa*, use secretion systems II for virulence. Secretion system II includes two types of XCP and HXC in *P. aeruginosa*. Most of the toxic proteins, such as exotoxin A and phospholipase C, are secreted by the XCP system. XcpQ is the part of the XCP system located at the outer surface of *P. aeruginosa*. In this study, the bioinformatics and immune-informatics properties of the XcpQ protein was investigated as a vaccine agent. The location of the protein in the cell, protein domains, protein virulence, molecular weight, non-interference with the functions of human cells, protein antigenicity, conservation among *P. aeruginosa* strains, MHC I, MHC II and B lymphocytes epitopes, allergenicity, and protein toxicity were studied here. Our results showed that the XcpQ is located at the outer membrane of *P. aeruginosa* and comprises four domains in the periplasmic region and one in the outer part. The protein's virulence assessment confirmed it as a virulent protein with no similarity to human proteins. XcpQ showed antigenic properties and is conserved within *P. aeruginosa* strains. Studying of MHC I and MHC II epitopes revealed seven MHC I epitopes and two MHC II epitope sequences based on the reference alleles set from the IEDB server (respectively). Two B lymphocyte epitopes were identified in the range of 10 to 15 amino acids. The protein was non-allergenic and non-toxic to human cells, an important factor for its potential as a vaccine candidate against *P. aeruginosa*.

16. M2e-HSP70 Chimeric Protein as an Influenza Vaccine Candidate

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Influenza virus is the cause of annual epidemics and causes the death of thousands of people in the world. This virus is transmitted from one person to another by respiratory droplets in the air or contact with contaminated surfaces and causes destruction and disruption of the respiratory tract. This disease is dangerous for the elderly, young children and people who suffer from underlying diseases such as lung, kidney, heart, etc. It is very necessary to prevent it through effective and universal vaccines. There is always a serious need to improve the vaccines produced against the influenza virus in order to create a broader immunity with long-term stability. By comparing the types of vaccines designed against the influenza virus, one of the necessities that is now felt is to separate the stages of vaccine production from the embryonated egg system and to be on the path of producing new vaccines based on biotechnology. One of the best production routes for seasonal vaccines, as well as for modern and universal vaccines, is the route of recombinant protein vaccines. So far, a lot of work has been done on recombinant influenza protein vaccines and its various genes have been investigated. One of these proteins is the M2e protein, which is highly conserved in different influenza virus strains. M2e is a type 3 non-glycosylated protein that is abundantly expressed in the plasma membrane of virus-infected cells. In the present study, the recombinant production of this protein in *Escherichia coli* bacteria and the purification of the produced product were carried out with the aim of using it as a component of the influenza vaccine set. In this study, the recombinant influenza virus M2e protein was expressed and purified in a chimeric form with HSP70, in order to be used in the production of a subunit vaccine set in the prokaryotic host *E.coli*. For this purpose, the 4xM2e.HSP70 gene fragment was expressed in the expression host *E.coli* strain M-15, using the isopropyl beta-di1-thiogalactopyranoside (IPTG)

inducer. And it was confirmed by performing SDS-PAGE and western blot with Anti-His-tag antibody. The expression was carried out in optimized conditions with 0.5 mM amount of IPTG inducer at 25°C temperature and after protein extraction with urea and its purification in optimized conditions with urea by Ni-NTA affinity chromatography column, protein 4xM2e.HSP70 was recovered and deureated by dialysis method in 2 phosphate buffer and saline buffer. Finally, i

17. Transcriptomic Analysis and Investigation of Biological Networks of NSCLC Lung Cancer

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Each year, approximately 2.2 million cases of lung cancer are diagnosed worldwide, accounting for about 18.4% of cancer-related deaths. Approximately 85% of lung cancer cases are classified as non-small cell lung cancer (NSCLC), which includes lung squamous cell carcinoma (LUSC) and lung adenocarcinoma (LUAD). RNA-seq data for normal and cancerous lung squamous cell carcinoma were downloaded from The Cancer Genome Atlas (TCGA) using the TCGAbiolinks package in R software. The DESeq2 package was utilized for analyzing differentially expressed genes (DEGs). Protein-protein interaction (PPI) network analysis and the CytoHubba plugin in Cytoscape software identified eight hub genes. Gene enrichment analyses and the KEGG database, as well as the relationships between genes and functional pathways in the biological network, were conducted using ClueGO. The results revealed 2051 upregulated and 1270 downregulated genes ($P < 0.05$; $\log_{2}FC > 2$). The biological network analysis identified eight key genes (BUB1B, CCNB1, CCNB2, CCNA2, KIF23, KIF2C, CDK1, BIRC5). Gene enrichment analysis indicated that most upregulated genes were involved in activities such as retinol metabolism, transmitter-gated ion channel activity, aldo-keto reductase (NADP) activity, and cysteine-type endopeptidase inhibitor activity. Downregulated genes were associated with activities including: metal ion transport, regulation of ion transport activity, serine-type peptidase activity, hypertrophic cardiomyopathy, malaria, and cytokine-receptor interaction. This study provides a promising approach for prognosis and accelerated effective treatment of lung cancer patients by identifying key genes and important biological pathways in LUSC.

18. Long-term Nitrate Administration Modulates Sialin Gene Expression in the Main Tissues of Male Wistar Rats With Type 2 Diabetes

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Increased sialin gene expression in the main tissues of diabetic rats is associated with decreased levels of nitrate and nitrite, suggesting a counterregulatory response for reduced bioavailability of nitric oxide (NO). In this study, we hypothesized that long-term nitrate administration (6 months), would decrease sialin gene expression in rats with type 2 diabetes (T2D). Material and methods: Rats were assigned to two groups (n=10): T2D and T2D+nitrate, receiving nitrate in their drinking water at a concentration of 100 mg/L over a period of 6 months. Tissue samples were collected from the main tissues to measure the gene expression of sialin, as well as nitrate and nitrite levels. Nitrate-treated T2D rats had higher nitrate levels in the soleus muscle (SM) (163%), stomach (83%), lung (271%), pancreas (90%), aorta (61%), adrenal gland (88%), brain (145%), liver (95%), and heart (87%). Nitrite levels were also higher in SM (136%), lung (108%), pancreas (86%), kidney (88%), aorta (33%), brain (221%), epididymal adipose tissue (eAT) (52%), and

heart (93%), of nitrate treated T2D rats (all $P < 0.05$). Nitrate decreased sialin gene expression in the SM (0.21-fold, $P < 0.001$), stomach (0.37-fold, $P = 0.002$), liver (0.21-fold, $P < 0.001$), and eAT (0.47-fold, $P = 0.005$) but it increased it in the intestine (1.99-fold, $P < 0.001$), pancreas (2.01-fold, $P = 0.006$), and the kidney (2.45-fold, $P < 0.001$) of diabetic rats, with no effects in the lung, aorta, adrenal gland, brain, and heart. Nitrate administration restores the compensatory increase in sialin gene expression in tissues of T2D rats. However, this compensatory mechanism does not appear to be generalizable to all tissues.

19. Transdifferentiation of Human Dermal Fibroblasts to Functional Neurons: A Promising Approach for Alzheimer's Disease Modeling

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Direct conversion of human adult fibroblasts into mature neurons presents a promising avenue for generating patient-specific neuronal cells in neurodegenerative diseases such as Alzheimer's. This approach enables disease modeling, mechanistic studies, and drug screening. However, transdifferentiation of human adult cells remains challenging, especially with increasing passage numbers. In this study, we optimized existing protocols to efficiently generate mature neurons from fibroblasts of elderly Alzheimer's patients, regardless of passage number. These neurons retained age-related characteristics and exhibited functional capabilities similar to native neurons. For this purpose, human dermal fibroblasts were obtained from skin biopsies of six Alzheimer's patients. Lenti-X 293 cells were transfected with a lentiviral vector containing *Ascl1* and *Brn2* transcription factors, along with shRNA against *REST* and packaging vectors pMD2.G and psPAX2. Three days post-transduction, human dermal fibroblasts were cultured in an induction medium containing dual SMAD inhibition factors, growth factors, and VPA. On day 12, cells were passaged using ROCKi and accutase onto plates coated with PO/FN/Lam. Seven days later, a secondary induction medium containing LM-22A4, GDNF, NT3, AA, and db-cAMP was applied. At day 25, Western blot, real-time PCR, and immunocytochemistry analyses confirmed the expression of neuronal markers such as MAP2 and TAU. This protocol offers an efficient method for generating induced neurons (iNs) from human adult dermal fibroblasts, regardless of passage number. Our results demonstrate the feasibility of producing neurons from individuals aged 50-79 with high efficiency, providing a valuable tool for Alzheimer's disease research.

20. In vivo Detection of Anti-angiogenic Peptide in an Animal Model of Breast Tumor

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The present study is the synthesis, characterization, binding and biodistribution of gold nanoparticles decorated by a peptide (named VGB3) with the ability to bind to receptors 1 and 2 vascular endothelial growth factor (VEGFR 1/2). Characterization of free gold nanoparticles and synthesized with 3VGB was performed using UV-Vis, DLS, FT-IR and TEM. Cellular analysis by immunocytochemistry and flow cytometry showed that the gold nanoparticle conjugated with 3VGB and free peptide are able to bind to human umbilical vein endothelial cells (HUVECs) and mouse breast cancer cells (4T1), which express vascular endothelial growth factor receptors (VEGFR 1/2). While they are unable to bind to 60 HL-erythroid leukemia cells that lack both receptors. SPECT (Whole Body Fluorescence Imaging) imaging of the whole body of the animal (female BALB/c mouse) showed that the peptide bound to gold nanoparticles decorated and labeled with fluorescein isothiocyanate (FITC-GNP-VGB3) were specifically accumulated in

mouse mammary tumors. The findings confirm that cell-specific peptides are very suitable for targeted delivery and biomedical applications of nanoparticles due to their low intrinsic toxicity and high tumor penetration. Prism software was used to draw graphs and statistically analyze the obtained data. All data are based on mean \pm SEM. was prepared. To evaluate significant differences in multiple comparisons of more than two groups with an independent variable, one-way ANOVA analysis using Tukey's test method was used. The level of statistical significance in all analyzes with the level Confidence was more than 95% ($P < 0.05$).

21. Application of Bacterial Derivatives in Stem Cell Engineering for Regenerative Medicine

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Tissue engineering (TE), as a fast-moving and cutting-edge multidisciplinary field, which involves the combination of cells, scaffolds, and appropriate induction factors, promises approach for regenerating and repairing damaged tissues and leads to a growing global market. Stem cell fate decisions, such as survival, proliferation, or differentiation, critically depend on external various factors. Bacterial derivatives including biopolymers, secondary metabolites and extracellular vesicles, serving as triggers or mediators of cellular signaling, has gained considerable attention in the field of tissue engineering. Due to biocompatibility, non-toxicity, high flexibility and diversity, the application of some bacterial derivatives such as cellulose, alginic acid, agar, chitin, dextran, gellan gum, and hyaluronic acid as well as antibiotics, bacterial growth hormones, and antitumor agents in tissue engineering is under focus. In addition to bacterial compounds, probiotics, living organisms that benefit host health, have also been found to hold promise for TE. In addition to bacterial compounds, probiotics, living organisms that are beneficial to host health, also hold promise for use in tissue engineering. In addition to bacterial compounds, probiotics, living organisms that are beneficial to host health, also hold promise for use in tissue engineering. In this study, we review the effects of bacterial derivatives on different aspects of stem cell fate with the approach of use in tissue engineering. Furthermore, the simultaneous use of bacterial derivatives with other stimuli to elicit synergistic responses that likely improve functional outcomes could contribute to more efficient products in the fast-growing tissue engineering industry and successful clinical therapies in the future.

22. Design and Synthesis of Amphiphilically Modified Chitosan Nanoparticles for Delivery of Therapeutic Proteins

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Self-assembly is a spontaneous process that enables the creation of organized structures with specific functions and properties, eliminating the need for complex processing or modification steps. Recently, self-aggregated nanoparticles derived from biocompatible and biodegradable polymers have attracted significant scientific interest. Chitosan, a natural polysaccharide, is pivotal in self-assembly due to its cationic and hydrophobic sites. Herein, a novel soluble, amphiphilic copolymer was designed and synthesized by grafting deoxycholic acid (DCA) and polyacrylic acid (PAA) onto chitosan chains. Characterization through Fourier Transformed Infra-Red (FTIR) spectroscopy revealed the presence of the amide I bond (1652 cm^{-1}) between chitosan and DCA, along with absorption peaks at 1725 cm^{-1} and 1464 cm^{-1} corresponding to C–O stretching vibrations in carboxylic acid groups and bending modes of $-\text{CH}_2-$ in polyacrylic acid.

Furthermore, thermogravimetric analysis indicated that while DCA slightly reduced chitosan's thermal stability, PAA enhanced the stability of the chitosan-DCA complex. Dynamic light scattering (DLS) confirmed that the copolymer nanoparticles had an average size of 196.7 nm and a surface charge of approximately -26.6 mV due to the PAA groups. Finally, molecular dynamics (MD) simulations revealed stronger interactions among DCA components, with hydrophobic regions accumulating at the structure's center, while PAA hydrophilic segments interacted with the solvent, highlighting the polymer's self-recovery property. This copolymer is anticipated to offer promising solutions for challenges in developing drug delivery platforms, particularly for therapeutic proteins.

23. Design, Fabrication and Comparison of the bleeding bandage performance based on kaolin mineral component and poly- γ -glutamic acid biopolymer

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Bleeding is stopped during a process called hemostasis by several mechanisms. The organic and inorganic various hemostatic agents have been developed to control bleeding and prevent human mortality. In this research, first, two types of bleeding bandages were made. The first bandage was prepared by fixing the kaolin mineral compound on the polyester/rayon fabric and the second bandage was developed by impregnating the polyester/rayon fabric with poly- γ -glutamic acid (γ -PGA) biopolymer. The first bandage was contained 12% the treated kaolin plus softening agent. The second bandage was made using different concentrations of the solution γ -PGA biopolymer (4g/l, 5g/l, 7.5g/l). γ -PGA is produced by batch-fermentation process of *Bacillus licheniiformis* strain in a specific culture medium and then separated by precipitation process with alcohol and subsequent purification steps. The performance of two bleeding dressings were compared using the blood coagulation index (BCI) and the amount of blood coagulation. By increasing the γ -PGA content of bandage, the percentage of BCI also increased, so that the one-hour BCI of polymer dressings with a concentration of 4, 5 and 7.5 g/l were 47.69%, 53.95%, and 60.32%, respectively. In the bleeding dressing containing kaolin, blood coagulation index was 45.09%. Pay attention to the results of BCI evaluation of bleeding bandage, the use of bleeding bandages containing biopolymer can be a promising dressing to control bleeding.

24. Comparing the Modulating Effects of the Resveratrol and Exosome-Encapsulated MicroRNA-149-3p on Endometriotic Menstrual Blood-Derived Stem Cells

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Endometriosis is a gynecological disease in which chronic inflammation has a significant role in its development and progression. Unfortunately, the clinical therapeutic methods are unsatisfactory. Recently, exosomes, membrane-bound extracellular vesicles, have emerged as an ideal vector to deliver therapeutic molecules. In addition, numerous studies have shown miRNAs as key gene regulators to control inflammation. Furthermore, resveratrol is a phytochemical with potential ameliorative effects in endometriosis, probably due to anti-proliferative and anti-inflammatory actions. We compared the effects of exosome-encapsulated MicroRNA-149-3p and resveratrol on inflammation and cell proliferation of menstrual blood-derived stem cells of endometriosis women (MenSCs). Using ficoll solution, MenSCs were isolated from menstrual blood of endometriosis and healthy women (E- and NE-MenSCs) and cultured in the laboratory.

E-MenSCs were treated with 100 μ M resveratrol (resveratrol group) or 200 μ g/ml exosome-encapsulated miRNA-149-3p (miR-Exo group) for 72 h, while in NE-MenSCs and E-MenSCs groups, no treatment was done during this period. The evaluation of the mRNA level of inflammatory markers and protein level of Ki67 was done using real-time PCR and western blotting, respectively. Although E-MenSCs in both miR-Exo and resveratrol groups showed decreased expression of IL-10 and IL-1 β , the mRNA level of IL-6 and IL-8 were only significantly decreased in miR-Exo group comparing E-MenSCs group. Additionally, in compare to E-MenSCs, ki67 was significantly lower in both miR-Exo and resveratrol groups, however, the resveratrol group had higher ki67 protein level than NE-MenSCs. Therefore, exosome-encapsulated mir-149-3p showed better anti-inflammatory and anti-proliferative effects on E-MenSCs making it a good candidate in developing novel endometriosis therapies.

25. Comparison of Phytochemical Profile and Anticancer Properties of Satureja sahendica and Hymenocrater longiflorus Essential Oils

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Cancer, as one of the biggest medical challenges, remains the focus of many researchers. In an effort to find more effective treatments, medicinal plants have been investigated for their bioactive properties and diverse chemical compositions. This research aims to compare the anticancer effects of the essential oils of Satureja sahendica Bornm and Hymenocrater longiflorus Benth. The essential oils were extracted using the Clevenger apparatus based on the water distillation method, and their chemical compounds were identified by GC-MS. The cytotoxic effects of the essential oils on the MDA-MB-231 breast cancer cell line were investigated using the MTT test and flow cytometry analysis. The results showed that the essential oils induce apoptotic cell death in the MDA-MB-231 cell line in a concentration- and time-dependent manner. The IC₅₀ values for the essential oils of Satureja sahendica and Hymenocrater longiflorus were 0.28 \pm 0.008 mg/mL and 0.13 \pm 0.005 mg/mL at 72 hours, respectively. 62.64% of the compounds in the essential oil of Hymenocrater longiflorus were monoterpenes and sesquiterpenes. 57.11% of the compounds in the essential oil of Satureja sahendica were phenols. This comparison showed that the essential oil of Hymenocrater longiflorus had a more toxic effect on the MDA-MB-231 cell line than the essential oil of Satureja sahendica. Both essential oils contain effective compounds for inducing apoptosis in breast cancer cells. The common compounds between the essential oils of Satureja sahendica and Hymenocrater longiflorus included alpha-pinene, caryophyllene, and alpha-thujene.

26. Topological Invariants in Human Metabolic Organs

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The metabolism is a complex system of chemical reactions that produces the body energy. Various organs in the body work together in a harmonious manner to reach this goal. Pancreas and Thyroid are two organs that have a major role in this process. In this work, we present a data driven approach to identify cyclic invariant objects in insulin-glucose dynamics in diabetic patients and to detect cyclic invariant objects in thyroid real hormone data, Triiodothyronine (T3)-Tetraiodothyronine (T4). We have used various data sets to show the invariant objects in real data for healthy and unhealthy circumstances. We employ suitable algorithms to automatically learn the inner dynamics of the given data. The provided method is very fast and memory efficient. Our

modeling technique has done well to demonstrate invariant cyclic behavior in both insulin-glucose and T3- T4 dynamics. Our algorithm successfully finds limit cycles with different sizes, locations and orientations that separate healthy and unhealthy cases for both organs. This geometric classification tool could be used for monitoring drug administration and better understanding of pancreas and thyroid.

27. The Role of Paternally expressed gene 6 (PEG6) in Recurrent Pregnancy Loss: A Study on Gene Expression, DNA Integrity in Spermatozoa and single cell RNA sequencing analysis

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Recently, there has been increased focus on understanding the role of spermatozoa in embryogenesis. The 6q24 region, which includes paternally expressed 6 (PEG6) imprinted genes, is of particular interest because only the paternal copy of these genes is typically active. PEG6, a key gene at the paternal-fetal interface, plays a crucial role in ensuring successful pregnancy by enhancing glucose transport in the placenta. This case-control study aimed to investigate PEG6 gene expression in the spermatozoa of male partners from couples with unexplained recurrent pregnancy loss (RPL). The study also sought to examine correlations between PEG6 expression, reactive oxygen species (ROS) levels, and the DNA Fragmentation Index (DFI). Semen samples were collected from 25 RPL cases and 25 fertile controls. PEG6 gene expression was analyzed using real-time PCR, with relative quantification determined by the $2^{-\Delta\Delta C_t}$ method. ROS levels and DFI were assessed using chemiluminescence and the sperm chromatin structure assay, respectively. To gain further insights, single-cell RNA sequencing (scRNA-seq) and Python's Scanpy package were utilized to analyze publicly available data (GEO accession number: GSE106487). This analysis provided a detailed understanding of tissue microenvironments at a molecular and single-cell resolution, focusing on protein expression, protein-protein interactions (PPIs), and DNA methylation dynamics during spermatogenesis. The results showed that the relative expression of PEG6 was significantly different between the RPL group and the control group ($p=0.05$). RPL patients exhibited higher ROS levels ($p=0.001$) and a higher DFI ($p=0.001$) compared to controls. Additionally, PEG6 was found to have significant protein interactions with PRM1, TP53, and PEG3, suggesting its involvement in the differentiation of spermatocytes into mature sperm. The dysregulation of sperm transcripts and oxidative DNA damage observed in this study could persist beyond implantation, potentially affecting embryogenesis and the health of future offspring.

28. Machine Learning Classification of Lung Adenocarcinoma Recurrence and Progression: Unveiling 12 Novel lncRNA Markers

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Lung cancer remains the leading cause of cancer-related deaths, with non-small cell lung cancers (NSCLCs) comprising about 85% of cases. Lung adenocarcinomas (LUAD), the most common subtype, account for 40-50%. Despite recent advancements, LUAD survival rates have only slightly improved, with frequent recurrence and metastasis even in early-stage diagnoses. This highlights the need for novel biomarkers and therapeutic targets. Long non-coding RNAs (lncRNAs), defined as over 200 nucleotides long RNAs which do not code for proteins, are recognized as significant contributors in cancer biology, enhancing treatment and serving as

reliable indicators for disease prediction and diagnosis. This study analyzed RNA-seq STAR counts and clinical metadata from The Cancer Genome Atlas for 513 LUAD samples. Patients were grouped based on recurrence, progression, or death versus progression-free survival. After filtering low counts, 2990 lncRNAs per sample were normalized using the variance stabilizing transformation method. Two Recursive Feature Elimination (RFE) methods, based on ridge logistic regression and support vector machine (SVM), achieved model accuracies of 1.00 and 0.908, AUCs of 1.00 and 0.975, and F1 scores of 1.00 and 0.906 with 321 and 95 features, respectively. External validation with a combination of array datasets with 672 cases identified 12 significantly prognostic lncRNAs from the 20 intersecting lncRNAs selected by both models and in the external set. External univariate Cox regression of 6 favorable and 6 unfavorable lncRNAs showed P-values of 1.1×10^{-8} (hazard ratio = 0.49) and 5.7×10^{-6} (hazard ratio = 1.74), respectively, indicating our approach identified 12 novel prognostic lncRNA markers for LUAD.

29. SHED-MSC Exosomes Play a Pivotal Role in Immunomodulation by Boosting M2 Macrophage Phenotype

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Exosomes derived from mesenchymal stem cells of human exfoliated deciduous teeth (SHED-MSC-Exos) are naturally occurring nano-sized particles that have gained attention as potential cell-free therapeutic agents for autoimmune and inflammatory diseases due to their low immunogenicity and beneficial physical attributes such as their nano-scale size and lipid membrane. An imbalance in the polarization of macrophages, specifically between M1 and M2 types, is often linked to the onset of autoimmune diseases, as macrophages are crucial in the inflammatory response. Therefore, targeting macrophage polarization with MSC-Exos could be a promising therapeutic approach. Our objective is to explore the potential application of SHED-MSC-Exos in regulating macrophage balance. To accomplish this, we differentiated the THP-1 monocyte cell line into M0 and M1 macrophage cells. We utilized flow cytometry to verify the presence of CD14, CD68, CD80, and CD86 markers in the differentiated macrophages. After conducting morphological and survival assessments, we isolated exosomes from the culture supernatants of SHED-MSCs. Once the exosomes were confirmed and stained, they were introduced to the treated macrophage cells. We then investigated the immunomodulatory effects of SHED-MSC-Exos on these macrophages by evaluating the expression of markers associated with the M2 phenotype using flow cytometry. The results showed that SHED-MSC-derived exosomes can increase CD206 expression levels and modify the polarization of M0 and M1 macrophages to the M2 macrophage phenotype. SHED-MSC Exos can be used in the treatment of diseases associated with M2 macrophage depletion due to their unique physical properties and ability to easily penetrate target cells.

Posters

30. Transcriptional Insights into the Role of THY-1 in Vascular Aging and Pathological Damage

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This study examines the role of Thymus Cell Surface Antigen 1 (THY-1), also known as CD90, in vascular aging and cardiovascular diseases. THY-1, a glycoprotein within the immunoglobulin

superfamily, is expressed in various cell types and is crucial for several biological processes, including those in the immune and nervous systems. Recent findings suggest THY-1's involvement in the aging of vascular systems and its potential tumor-suppressing effects. To explore THY-1's role in age-related vascular changes and its relationship with cardiovascular diseases, we employed quantitative real-time PCR (qRT-PCR) to evaluate THY-1 expression levels in both damaged and undamaged vascular tissues from individuals with cardiovascular disease. The analysis revealed significantly lower THY-1 expression in damaged vascular regions, suggesting that reduced THY-1 levels may impair cell adhesion and migration, thereby hindering repair and regeneration processes. These results highlight the potential of THY-1 as a therapeutic target for mitigating age-related vascular diseases and improving cardiovascular health. Moreover, the findings suggest that THY-1 could be instrumental in diagnosing and assessing the severity and progression of cardiovascular conditions. The study underscores the importance of further research into THY-1's mechanisms to develop new strategies for preventing and treating vascular aging and related diseases.

31. Screening of isolated bacterial from *Haliclona* sp with probiotic properties

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Probiotics are living microorganisms with roles for balancing the microbial flora in the host's digestive tract and suppressing pathogenic bacteria growth. In this study, the isolates from sea sponge *Haliclona* sp (collected in the microbial bank of Semnan University) were screened for probiotic properties. The microscopic characteristics of 15 isolates were determined. The biochemical features, including catalase and oxidase activity, indole, the presence of haemolysin and gelatinase enzymes, and the movement were evaluated. The supernatants antagonistic activity of the isolates culture media were tested by diffusion agar method against *Bacillus subtilis*, *Escherichia coli*, *Staphylococcus aureus*, *Salmonella typhimurium*, and *Pseudomonas aeruginosa*. The concentrated supernatant of four isolates, PGCM22, PGCM35, PGCM44, and PGCM198, showed antagonistic properties against *B. subtilis*. PGCM35 exhibited the largest halo diameter (18 mm), while the PGCM44 showed the smallest at 9 mm. Seven isolates γ -hemolyzed the bold agar. PGCM22 and PGCM44 showed phenotypic gelatinase activity. Both of these isolates were resistant to bile salts while not to acidity. Advance probiotic tests for the isolates are in progress.

32. Molecular Docking Studies of Poly (ADP-Ribose) Polymerase-1 (PARP-1) Inhibitors by Molecular Docking Study

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Cancer accounts for the majority of deaths worldwide and the increasing incidence of cancer is a matter of great concern. Poly (ADP-ribose) polymerase-1 (PARP-1) has emerged as an attractive target for the treatment of cancer because it plays an important role in DNA repair. In this study we focused on comparing of molecular mechanisms of PARP-1 inhibitors interaction with the target protein using Molecular Docking method. Vina method in Autodock Tools software was implemented to explore the molecular interaction mechanism and binding energy of different drugs. In this study, we exploited the interaction of five drug compounds (olaparib, rucaparib, talazoparib, INO1001 and PJ-34) with PARP1 protein. Target PARP1 protein with the accession PDB ID 5HA9 was used from PDB data bank. The docking results indicate that talazoparib is the strongest inhibitor of the 5HA9 protein with three hydrogen bonds and has the best binding affinity

of -10.776 kcal/mol. The binding energy of the protein with olaparib, rucaparib, INO1001 and PJ-34 are -10.497, -10.001, -10.039 and -9.456, respectively. Examining the binding site of these drugs on the protein indicated that E401, M299 and Y23 are the most important and common interacting amino acids in the binding site of the protein and can be used in the development of new PARP inhibitor drugs. The results of this study suggest that talazoparib and olaparib have strongest binding with target protein and accordingly they will have best efficiency in the PARP inhibitor-based cancer treatment.

33. Expression Pattern of lncRNAs in Pituitary Adenomas

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Non-functioning pituitary adenomas (NFPAs) are a subtype of pituitary tumors that lack symptoms typically associated with excess hormone production, such as acromegaly or Cushing's syndrome. Recent research has begun to uncover the role of long non-coding RNAs (lncRNAs) in tumor development, highlighting their potential as key molecular players. In this study, we investigated the expression levels of five specific lncRNAs-FGD5-AS1, ATP6V0E2-AS1, ARHGAP5-AS1, WWC2-AS2, and EPB41L4A-AS1-in NFPA samples compared to adjacent non-tumoral tissues. Methodologically, we assessed these lncRNAs in 40 NFPA and 40 control samples using quantitative PCR. The analysis revealed significant upregulation of ATP6V0E2-AS1, EPB41L4A-AS1, FGD5-AS1, and WWC2-AS2 in NFPA tissues with P-values of 0.037, 0.007, 0.008, and 0.03, respectively, while ARHGAP5-AS1 showed no significant change (P-value = 0.62). Notably, EPB41L4A-AS1 and FGD5-AS1 were effective in differentiating NFPA from non-tumoral samples, although the AUC values indicated limited diagnostic utility. Correlation analysis highlighted a significant positive association between patient age and NFPA invasiveness ($\chi^2 = 4.24$, P-value = 0.039), disease duration and CSF leaks ($\chi^2 = 11.4$, P-value = 0.023), and tumor size with both Knosp classification ($\chi^2 = 11.5$, P-value = 0.02) and NFPA invasiveness ($\chi^2 = 6.12$, P-value = 0.04). This study contributes to understanding the dysregulation of lncRNAs in NFPAs and suggests further exploration into their potential roles and applications in the management of these tumors.

34. Identification of New Regulators of Symbiotic Nodule Formation in Medicago Truncatula

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Nitrogen is the key building block of biological macromolecules such as nucleic acids and amino acids. Although it is the most abundant element in the atmosphere, but most organism could not absorb this form of nitrogen. Among plant, legumes are able to fix nitrogen through interaction with a specific group of bacteria called rhizobia. This process is named biological nitrogen fixation and leads to the formation of nodule organ on the plants root, where the conversion of atmospheric

nitrogen to ammonia could take place. This form of nitrogen (ammonia) is absorbable by plants. Biological nitrogen fixation reduces the use of chemical fertilizers and thus reduces environmental pollution. Nodules form as a result of interaction between transcription factors (TFs) and phytohormones. The aim of this work was to identify new possible regulator of symbiotic nodule development in *Medicago truncatula*. So we have selected the most significant TFs during nodule organogenesis including IPD3, NSP1, NSP2, NIN, ERN1, ERN2, ERN3. Firstly, we have studied the most co-expressed genes with this TFS using phytozome database. Secondly their interaction with other proteins was investigated with STRING database. Interestingly among NIN interacting proteins we found two auxin response factor which suggest the contribution of this TF in activation of auxin response. Besides, we found the co-expression of NIN with cytokinin transporter gene MtABCG38. NIN is a cytokinin inducible TF and cytokinin transport could be necessary for NIN activation. Our results will provide ideas for furthered research.

35. The Binding and Conformational Changes of TSHR with Pbdes and Their Sorption Mechanism by Biocompatible Polymers: A Molecular Dynamics Simulation Study

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TSH (Thyroid stimulating hormone), a glycoprotein hormone, is crucial in the growth and function of the thyroid. It controls the metabolism and secretion of thyroid hormones T3 (triiodothyronine) and T4 (tetraiodothyronine or thyroxine) through its receptor (TSHR). TSHR belongs to the Leucine-rich repeat (LGR) subfamily of G protein-coupled receptors (GPCRs). The TSHR has been targeted by low molecular weight ligands that act as either agonists or antagonists. Polybrominated diphenyl ethers (PBDEs) are widely applied as one of the synthetic brominated flame retardant chemicals with extensive industrial applications in plastics, furniture, textiles, electric appliances and other fields. The high structural stability of PBDEs residues and the long-distance transportation of these compounds has resulted in their presence in many environmental compartments such as soil, air, sediments, animals, house dust, blood, and even human beings. As consumer products may release PBDEs, increasing public health attention has been devoted to their accumulation, metabolism and related toxicity on wildlife and human health over the last decade. Molecular dynamics simulations elucidate the molecular interactions between TSHR and pollutants. According to the simulations, the presence of PBDEs induces changes in the secondary structure of TSHR and enhances its hydrophobicity. Also, TSHR forms a more stable complex with biocompatible polymers than with PBDEs, as indicated by a larger contact area, more adsorption atoms, and higher binding free energies. Our findings provide crucial insights into the distribution pattern, bioaccumulation, elimination, and overall toxicity of PBDEs and biocompatible polymers in humans, a critical consideration for any future applications of these materials.

36. Aldo-keto Reductase1C1 as a Potential Biomarker for Breast and Ovarian Carcinomas

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Breast invasive carcinoma is the most frequently occurring cancer among women, while ovarian serous cystadenocarcinoma is the deadliest gynecologic cancer. Over 75% of these cancer cases

are diagnosed at late stages due to asymptomatic early stages of the disease. AKR1C1 (aldo-keto reductase family 1 member C1) is a member of the human aldo-keto reductase superfamily, which catalyzes NADPH-dependent reductions. Significant differential expression of the AKR1C1 gene has been reported in various cancers. This study aims to evaluate the expression of AKR1C1 in breast-invasive carcinoma and ovarian adenocarcinoma. The expression pattern of AKR1C1 was evaluated in BRCA and OV via GEPIA2, which analyzes the RNA sequencing expression data of tumors and normal samples from TCGA and GTEx projects through a standard processing pipeline. A total of 1,085 tumor samples and 291 normal breast tissue samples were evaluated, along with 426 tumor samples and 88 normal ovarian tissue samples. The results demonstrated that the median expression of AKR1C1 was significantly ($p < 0.001$) higher in normal samples of both breast and ovarian carcinomas compared to their corresponding tumor tissues. Current analysis revealed that the median expression of AKR1C1 was significantly downregulated in tumor tissues in both breast and ovarian cancers, indicating its potential as a biomarker that could aid in the early diagnosis of these malignancies.

37. Bioinformatics Analysis of Mutual *hub* Genes and Signaling Pathways in Leukemia Subtypes

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Leukemia is a complex hematological disease with unique genetic mutations. Identifying hub genes and signaling pathways contributing to cancer development is crucial for understanding the underlying mechanisms and potential therapeutic targets. Furthermore, it provides a comprehensive view of cancer development, aiding in developing targeted therapies and personalized medicine approaches. With bioinformatics analysis, this study aimed to identify mutual hub genes and signaling pathways in different leukemia subtypes. Two microarray data from the GEO datasets (GSE13204 and GSE237029) were analyzed using TAC software to determine differentially expressed genes (DEGs) between each leukemia subtype and healthy tissues. Venn diagrams of leukemia subtypes DEGs were constructed to find affected common genes. In total, 346 upregulated and 929 downregulated genes were detected. Enrichr database was used to conduct a thorough functional and enrichment analysis of DEGs. Protein-protein interactions (PPI) were analyzed using the STRING database. Analysis of pathways and the PPI network revealed that upregulated genes were enriched in the spliceosome and mRNA processing, and the downregulated group was enriched in the immune system and natural killer cell-mediated cytotoxicity. The network was analyzed in Cytoscape to find the hub genes. 12 genes, including H4C6, RBM39, EZH2, JUN, CTNNB1, H3-3B, HSP90AB1 (upregulated), CD4, PTPRC, CD8A, TNF, and IL7R (downregulated), were identified as critical in the development of different types of leukemia. The GENT2 database and existing literature validated the expression levels of the hub genes. Further exploration of these genes could potentially revolutionize leukemia treatment.

38. Proteomic Analysis of Serum Samples in Ovulatory Polycystic Ovary Syndrome and Construction of a Protein Interaction Pathway

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Being a heterogeneous multifactorial disorder, PCOS is still remained with misty etiology whose underlying pathophysiological causes can be further elucidated by proteomic analyses and molecular network analysis to understand the interaction pathways involved in the PCOS-

associated perturbations. We conducted a proteomic study on ovulatory PCOS serum samples using nano-LCMS/MS technique. Then, we analyzed proteomic profiles of significantly dysregulated proteins by projecting them onto the protein interaction mapping and molecular network analysis softwares Gene Mania and STRING. We further investigated the involvement of affected proteins with different PCOS-associated disorders and classified them through the literature along with functional annotation softwares DAVID and Panther. Total of 109 differentially expressed proteins were detected, from which 42 proteins were significantly dysregulated in patients. Among them, 35 affected proteins exhibited association with pathophysiological mechanisms underlying the ovulatory PCOS manifestation and their correlations with PCOS-concurrent disorders was revealed. We further highlighted significant functional hub molecules within protein interaction networks. Our results indicated that the ovulatory PCOS deals with a wide range of functional molecules' derangements, which trigger aberrant biological response and molecular interactions leading to the emergence of complications accounted for the ovulatory PCOS. Further proteomic studies are required to explain different physiological mechanisms of the functional molecules contributing the pathogenicity of this heterogenous syndrome.

39. Comprehensive Transcriptome Analysis to Identify and Investigate the Role of Potential Regulatory Genes in Lung Adenocarcinoma

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Lung cancer is the leading cause of cancer-related deaths worldwide, and the incidence of lung adenocarcinoma (LUAD) of this cancer continues to increase [1, 2]. Investigating the underlying cellular and molecular mechanisms in this type of lung cancer helps to gain more knowledge for its control and treatment. This research was conducted with the aim of investigating the cellular and molecular functions of genes involved in this type of cancer and identifying hub genes. The data of the current research, which has 7 primary adenocarcinoma tissue samples and 9 adjacent normal tissue samples, was selected from the GEO database with the expression profile of GSE62113. Using R, the expression matrix was extracted and parameters equivalent to $P\text{-value} < 0.5$ and $\text{LogFC} > 2$ were applied with Limma Package. The number of 150 and 363 differentially expressed genes (DEGs) in cancer tissue showed an increase and a decrease, respectively. Through gene ontology and KEGG, cellular and molecular processes and important signaling pathways were determined, which are mainly involved in the regulation of cell division and cycle, including: Mitotic Sister Chromatid Segregation and Regulation of Cell Cycle Process for DEGs. Also, important microRNAs including has-miR-193b-3p for inhibiting cancer DEGs were obtained through miRTarBase. TRRUST and X2K-web databases were used to find transcription factors and protein kinases in the list of DEGs, respectively. The interaction between proteins in the list of DEGs was identified with the STRING database and their network was drawn through Cytoscape. Also, their module-networks and GO were drawn for the main networks. Finally, identification of key genes (Hub Genes) including KIF2C, BUB1, and KIF11 and CFAP52, TEK1, and TEK2 genes in cancerous and normal tissues, respectively, was done in the main networks with CytoHubba. The results of this study identified and investigated the regulators of lung adenocarcinoma, which, by comparing and confirming other studies, obtains better perspectives for the control and treatment of this disease.

40. The Induction Effect of an Isoquinoline Alkaloid on Osteogenic Differentiation of Human Mesenchymal Stem Cells

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Bone tissue plays a crucial role in the human body by providing mechanical support, protecting vital organs, regulating mineral homeostasis, and aiding in hematopoiesis. Although bones can heal spontaneously, certain injuries, defects, and diseases require medical intervention for proper healing. Tissue engineering and regenerative medicine, which utilize mesenchymal stem cells (MSCs), offer high-quality solutions with minimal side effects. MSCs are multipotent cells capable of differentiating into various cell types, including osteoblasts, making them ideal for bone regeneration and repair. Palmatine, an isoquinoline alkaloid, is a plant secondary metabolite, has shown significant potential in pharmaceuticals and has recently gained attention for its protective effects on bone tissue. This study investigates the impact of Palmatine on the osteogenic differentiation of human mesenchymal stem cells (hMSCs) in vitro. The optimal concentration of Palmatine was determined using the MTT assay and confirmed with Acridine Orange staining, selecting 1 μ M as the optimal, non-cytotoxic concentration. Differentiation tests were conducted using an osteogenic medium containing ascorbic acid, dexamethasone and β -glycerophosphate. Mineralization of the cellular matrix was assessed through quantitative (calcium content measurement) and qualitative (Alizarin Red staining) assays, showing notable increased cell mineralization with Palmatine. Alkaline phosphatase activity, an osteogenic marker, was measured, revealing enhanced activity at the optimal concentration of Palmatine. These findings demonstrate the inducing effect of Palmatine as an isoquinoline alkaloid on osteogenic differentiation of mesenchymal stem cells significantly. Research on the effect of Palmatine on osteogenic differentiation signaling pathways is suggested.

41. Effect of Long-Term Nitrate Administration on Indices Levels of Oxidative Stress in Insulin Sensitive Tissue of Type 2 Diabetic Male Rats

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Type 2 diabetes (T2D) is associated with decreased nitric oxide bioavailability. Furthermore, T2D is related to oxidative stress. Therefore, this study aims at determining effects of long term nitrate on catalase (CAT), Malondialdehyde (MDA) and total anti-oxidant capacity (TAC) levels in liver, soleus muscle (SM), and epididymal adipose tissue (eAT) in type 2 diabetic male rats. Rats were divided into 4 groups: Control, control+nitrate, diabetes, and diabetes+nitrate. Type 2 diabetes was induced using a high-fat diet followed by a low-dose of streptozotocin. Sodium nitrate (100 mg/L in drinking water) was administered for 6 months. Level of CAT were lower in liver (53%), SM (48%) and eAT (45%) in diabetic rats. As well as liver MDA level were higher in liver (80%) and SM (111%) in diabetic rats. In case of TAC, diabetic rat had lower TAC level in the liver (80%), SM (63%) and eAT (70%). Nitrate administration can restored CAT to normal value in the liver and eAT. Also decreased MDA level in the SM and increased TAC level in the eAT. Nitrate administration decreased oxidative stress in insulin sensitive tissue of rats with T2D by suppressing oxidants and augmenting antioxidants

42. Effect of Sodium Nitrite on the Genes Expression of Nrf2 and Prdx4 in the Isolated Pancreatic Islets of Type 2 Diabetic Rats

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Nitrite is a nitric oxide (NO) donor that increases insulin secretion from pancreatic islets in type 2 diabetes (T2D). The underlying mechanism of this effect is the reduction of oxidative stress. This study aims to determine the underlying mechanism of nitrite in reducing oxidative stress in the pancreatic islets of T2D rats. T2D was induced in male rats by administering a combination of a high-fat diet and a low dose of streptozotocin (25 mg/kg). The rats were divided into three groups (n=6 in each group): control, T2D, and T2D+ Nitrite. The T2D+nitrite group received drinking water containing sodium nitrite (50 mg/L) for eight weeks. At the end of the study, mRNA levels of Nrf2 (nuclear factor erythroid 2-related factor 2) and Prdx4 (peroxiredoxin-4) were measured in the isolated pancreatic islets. In the islets of rats with T2D, mRNA expressions of Nrf2 and Prdx4 were significantly lower by 55% (P=0.005) and 77% (P<0.001) compared to the control group. Nitrite administration in rats with T2D increased the mRNA expression of Nrf2 (61%, P=0.050) and Prdx4 (94%, P=0.009). The beneficial effects of nitrite in reducing diabetes-induced oxidative stress in the isolated pancreatic islets of rats with T2D are associated with increased Nrf2 and Prdx4 mRNA expression.

43. LncRNA PVT1 Gene Knockdown Effect on Immune Checkpoints Expression in MDA-MB-231 Breast Cancer Cell Line

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Cancer kills thousands of people every year, and in 112 out of 183 countries in the world, it ranks first or second, and in 23 countries, it ranks third or fourth as the cause of premature death (before the age of 70). For this reason, the study of cancer is one of the important subjects of medical science research. Breast cancer is a common and deadly disease all over the world and the highest rate of cancer in women belongs to it. Also, its diagnosis and treatment are still facing challenges. Currently, surgery, chemotherapy, radiation therapy, targeted therapy, immunotherapy, stem cell or bone marrow transplantation, and hormone therapy are common tools for cancer treatment. Despite this, due to drug resistance to chemotherapy and the damage of chemicals to healthy cells, these methods are sometimes ineffective and complete cancer treatment fails. Currently, treatments have been proposed to curb these resistances, one of these methods is using the potential of LncRNAs. The effects of LncRNAs in cellular processes such as proliferation, apoptosis and cancer progression have been proven and their use in cancer treatment has been associated with success. One of these LncRNAs is called PVT1, which plays a role in tumor growth, metastasis and resistance to breast cancer treatment. Considering the important role of PVT1 in the spread of cancer and its possible effect on immune control points in breast cancer, investigating the effect of PVT1 gene expression on the expression of immune control points in breast cancer cells can be a valuable achievement about the mechanisms involved in the development of the disease and Identification of therapeutic goals. In this research, MDA-MB-231 cell line was cultured in RPMI-1640 medium. Then, siRNA was transferred into MDA-MB-231 cells using PEI material. Using the extraction kit, RNA was extracted and the quantitative and qualitative analysis of the extracted RNA was evaluated based on the OD value obtained by the Nano Drope device. cDNA synthesis was done using PCR machine. qRT-PCR was used to check the expression level of LncRNA genes PVT1 and B7-H3, Vista, PD-L1. GAPDH internal control gene was used in this research. In examining the results, changes were observed in the expression of B7-H3, PD-L1 and Vista genes.

44. Effect of Methanol and N-Hexane Extracts of *Thymus Vulgaris* on Blood Coagulation

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Thymus vulgaris contains various secondary compounds and many of these compounds are effective in primary and secondary hemostasis of blood coagulation. This plant, having compounds such as flavonoids, tannins, alkaloids, can be effective in blood coagulation. The purpose of this study is to investigate the methanolic and n-hexane extracts of *Thymus vulgaris* and to study the effects of different concentrations of this plant on blood coagulation. The effect of different concentrations (25, 50, 250, 500 and 1000 ppm) of each extract was investigated using prothrombin time (PT) and activated partial thromboplastin time (APTT) test. N-Hexane extract had no significant effect on APTT and PT coagulation time. Methanolic extract decreased APTT at a concentration of 1000 ppm and also decreased Pt at a concentration of 250 ppm. It seems that the compounds of the methanolic extract are effective on the coagulation factors of the internal and external blood coagulation pathway.

45. Effect of Methanol and N-Hexane Extracts of *Medicago Sativa* Leaf on Blood Coagulation

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Medicago Sativa, having potentially effective compounds on blood coagulation, is widely used in traditional medicine to prevent bleeding. The present study evaluated the effect of different fractions of *M. Sativa* extract on the coagulation process. Fresh tender leaf of this plant was collected, air-dried, powdered and percolated in n-hexane and methanol solvents. The effect of different concentrations (1000, 500, 250, 50, 25 ppm) of each extract was assessed by the prothrombin time (PT) and the activated partial thromboplastin time (aPTT) tests. N-hexane extract did not have a significant effect on coagulation time in coagulation tests of aPTT and PT. Methanolic extract had no significant effect on the aPTT time, although reduced PT at a concentration of 50 ppm. It seems that the compounds in the methanolic extract are effective on the coagulation factors of the extrinsic coagulation pathway.

46. The Effect of Sorgolacton Phytohormon on Expression Level of Two MAPK8 and MAPK14 Genes in Ovarian Cell Line A2870S

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Treatment of ovarian cancer patients with chemotherapy causes cell resistance and metastasis and is also associated with severe side effects. Use of phytohormones or plant hormones to treat of many diseases without side effect has been considered. In this research, the effect of sorgolactone on expression level of tow MAPK8 and MAPK14 genes in ovarian cancer cell line A2780s was investigated. Extracted data were adjusted to GraphPad Prism 8.4.3 software and expression level of gene was calculated using $\Delta\Delta\text{ct}$ method. Gene expression analysis of tested genes in treated cells with determined IC50 showed a significant increase (Pvalue ≤ 0.05) for both genes in compared to control group but the highest expression was noted to Mapkinas8 gene in treated cells after 72 treatment. The obtained results confirmed that sorgolactone phytohormone could prevent ovarian cancer cell proliferation and is able to play an important role in controlling the signaling pathways related to apoptosis and cell death. Therefore, the use of sorgolactone phytohormone in the pharmaceutical industry can be useful.

47. Effect of Monoammonium Phosphate Fertilizer on Chromosomal Aberrations in Root Meristematic Cells of *Allium cepa* L.

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Chemical fertilizers have been shown to have negative effects on organisms. It has been reported that they affect mitotic activity and biochemical parameters. The aim of this study is to examine the effects of MAP fertilizer on the rate of cell proliferation and chromosomal aberrations in onion root meristematic cells of *Allium cepa* L. In this research after rooting the onions in distilled water at $21 \pm 1^\circ\text{C}$, the samples were exposed to two different concentrations of MAP (1000 and 4000 mg/L) and distilled water (as a negative control) for 47 hours. After preparing the slides from the meristem region of the roots, more than 1200 cells were examined for mitotic index and chromosomal aberrations (chromosomal breakage, chromosomal bridge, C-metaphase, wandering chromosome, and disrupted mitosis). The experiments were repeated three times. Data were analyzed using SPSS software and the independent t-test with a significance threshold of $P < 0.05$. According to the results, the 4000 mg/L of MAP treated group showed a significant decrease in the percentage mean of the mitotic index ($t=13.787$, $df=4$, $P < 0.001$) and a significant increase in the percentage mean of the total chromosomal aberrations ($t= -5.103$, $df=4$, $P < 0.01$) compared to the control group. There was no difference between the 1000 mg/L of MAP treated and control groups with regard to the above examined variables. The results of this study show that MAP can have cytotoxic and genotoxic effects and emphasize the importance of managing further studies on the effects of chemical fertilizers on cellular and molecular processes.

48. Anti-cancer Effects of Chloroform Extract of *Teucrium Persicum* on Prostate Cancer (PC-3) Cells

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Teucrium persicum is a member of the *Teucrium* genus and Lamiaceae family. It is a native plant of Iran, specifically found in the Fars province. For many years, this plant has been used in traditional Iranian medicine to treat headaches and abdominal pain. In this study, we aimed to investigate the anticancer effects of the *T. persicum* chloroform extract on prostate cancer cells (PC-3). Initially, we examined the chemical profile of the *T. persicum* chloroform extract using the GC/MS test. The extract was found to contain several compounds, with the most abundant ones being Eicosane (an alkane), delta-Amorphene (a compound from the Cadinene family), and Nerolidol (a type of sesquiterpenoid alcohol). Subsequently, different concentrations of the extract were applied to PC-3 cells for 48 hours. The results of the MTT tests revealed that the IC₅₀ of the *T. persicum* plant extract is about 100 $\mu\text{g/ml}$. To further analyze the effects of the extract, PC-3 cells were treated with concentrations of 80 and 100 $\mu\text{g/ml}$ for 48 hours. The nuclei of these cells were then stained with DAPI and examined using a fluorescent microscope. Microscopic observations demonstrated that the chromatin in the extract-treated cells was condensed, and the nucleus was fragmented. These changes were not observed in the control cells. Overall, our results indicate that the chloroform extract of *T. persicum* can induce cell death by activating apoptosis.

49. The Inhibitory Effects of Exosome-Encapsulated MicroRNA-149-3p on the Proliferation and Migration of Endometriotic Menstrual Blood-Derived Stem Cells

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Endometriosis is one of prevalent benign gynecologic disorder. Sex hormone imbalances linked to endometriosis lesions affect the ability of endometrial cells to proliferate, migrate, and infiltrate the mesothelium. Available treatments rely on modulating female sex steroid hormones; nevertheless, they are not enough efficient and have negative side effects. It is shown that menstrual blood-derived stem cells (MenSCs) play a significant role in endometriosis since MenSCs of endometriosis (E-MenSCs) and non-endometriosis women (NE-MenSCs) have different proliferative and migratory ability. Besides, since microRNAs (miRNAs) treatment have shown encouraging outcomes for certain malignancies and chronic illnesses, we decided to assay the miR-149-3p effects on modulating proliferation and migration of E-MenSCs using NE-MenSCs-derived exosomes as the miRNA carriers. Briefly, E- and NE-MenSCs were cultured as controls, and the other experimental groups were as follows: E-MenSCs transfected with empty and miRNA vectors (E-MenSC+BB and E-MenSC+miR), and E-MenSCs treated with exosomes derived from non-transfected and miRNA-transfected NE-MenSCs (E-MenSC+Exo and E-MenSC+T-Exo). Then, the protein level of β -catenin and Ki-67, and migratory ability were assessed through western blot and scratching tests, respectively. The protein levels of β -catenin and Ki67 were significantly lower in the E-MenSCs+T-Exo group compared to the E-MenSCs. miR-149-3p treatment (either directly or via exosomes as a carrier) reduced the ability of E-MenSCs to migrate, but this reduction was not statistically significant comparing to untreated E-MenSCs. So, since exosome-encapsulated mir-149-3p showed better modulating effects on Ki67 and β -catenin protein level, the potential of exosomes as miRNA carriers can be considered in developing novel endometriosis therapies.

50. Integration of Bioinformatics and Computational Biology in Deciphering Molecular Mechanisms of Atherosclerosis: A Novel Approach

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Atherosclerosis, a chronic inflammatory disease of the arteries, remains a leading cause of cardiovascular morbidity and mortality worldwide. Bioinformatics and computational biology offer powerful tools for unraveling the complex molecular mechanisms underlying atherosclerosis. This study investigates the integration of bioinformatics and computational biology in deciphering key molecular pathways associated with atherosclerosis pathogenesis, providing novel insights into disease etiology and potential therapeutic targets. A comprehensive analysis was conducted using bioinformatics and computational biology approaches to elucidate molecular mechanisms involved in atherosclerosis. Genomic data from atherosclerotic plaques and healthy arterial tissues were obtained from public repositories, including the Gene Expression Omnibus (GEO) and The Cancer Genome Atlas (TCGA). Differential gene expression analysis was performed to identify dysregulated genes and signaling pathways associated with atherosclerosis progression. Analysis of genomic data revealed significant dysregulation of key genes and pathways implicated in atherosclerosis pathogenesis. Inflammatory pathways, including NF- κ B and JAK-STAT signaling, were found to be upregulated in atherosclerotic plaques compared to healthy arterial tissues. Moreover, dysregulation of lipid metabolism pathways, such as cholesterol biosynthesis and fatty

acid metabolism, was observed in atherosclerotic lesions. The integration of multi-omics data has identified potential biomarkers and therapeutic targets for atherosclerosis. Combining bioinformatics and computational biology has provided valuable insights into the molecular mechanisms driving atherosclerosis. By leveraging genomic data and computational analyses, researchers can identify novel therapeutic targets and develop precision medicine strategies for treating atherosclerotic cardiovascular disease. This study underscores the importance of interdisciplinary approaches in understanding atherosclerosis and creating effective treatments for this prevalent cardiovascular disorder.

51. The Relationship Between Single Nucleotide Polymorphisms of Interleukin 35 Gene and Preeclampsia

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Preeclampsia (PE) is the most common pregnancy complication affecting about 2 to 8 percent of pregnancies. PE is a major cause of maternal mortality in developed countries. Although the exact cause of this disease is not well understood, there is no doubt that PE is a placental disease. In women with PE, reduced trophoblast invasion and defective remodeling of uterine spiral arteries are observed. The immune system plays a crucial role in establishing a normal pregnancy. The presence of immune cells at the maternal-fetal interface and their role in a normal pregnancy have been elucidated in detail. Interleukin 35 (IL-35), the latest identified cytokine from the interleukin 12 (IL-12) family, consists of two subunits p35 and EBI3, and is secreted by Treg cells and activated B cells. Studies have shown that IL-35 facilitates optimal differentiation and suppression of Treg immune cells and inhibits the proliferation and function of Th17 cells. It has recently been shown that trophoblast cells continuously produce IL-35 during normal pregnancy, which is a critical cytokine for maintaining fetal-maternal tolerance. Some recent reports have indicated elevated serum levels of IL-35 in women with preeclampsia. This study aimed to investigate the relationship between EBI3 rs4740 G>A polymorphism and the risk of preeclampsia in an Iranian population. A total of 240 patients with preeclampsia and 230 control individuals who visited Ali Ibn Abi Talib Hospital in Zahedan were included in the study. Genotyping analysis for all individuals was performed using the Polymerase Chain Reaction-Restriction Fragment Length Polymorphism (PCR-RFLP). The frequency of carriers of the mutated allele A as well as the frequency of allele A of EBI3 rs4740 G>A polymorphism showed approximately a two-fold significant increase in the risk of endometriosis (p= 0.044; p= 0.016, respectively). Notably, the distribution of the mutated allele differed significantly between patients with mild and severe preeclampsia. The results indicated that the single nucleotide polymorphism EBI3 rs4740 G>A is significantly associated with PE. Further studies are needed to confirm these findings

52. Association of Genetic Polymorphism of Alu I/D in tPA Gene with Risk of Colorectal Cancer

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Abstract: Colorectal cancer is the second most common adult cancer in women and the third most common in men. It is the fourth leading cause of cancer death. Colorectal cancer is the result of the accumulation of both acquired genetic and epigenetic alterations that transform normal glandular epithelium into invasive adenocarcinomas. Genetic polymorphisms in the tPA gene are among the genetic factors. The human tPA gene maps to chromosome 8 (8p12-q11.2) and consists

of 14 exons and 13 introns. Serine proteases, particularly the plasminogen-activating plasmin system, are critical players in the ECM remodeling process essential for angiogenesis. This study investigated the association between rs4646972 (Alu) genetic polymorphism in tPA gene and colorectal cancer risk. A total of 200 patients with colorectal cancer and 224 healthy individuals were included in the study. PCR method was used to determine the genotype. The data were analyzed using SPSS statistical software. Logistic regression analysis showed that there was no significant association between ID genotype (OR = 0.97, 95% CI = 0.57-1.67, P = 0.940) and ID + DD genotype (OR = 0.96, 95% CI = 0.58-1.60, P = 0.894,) compared to genotype II and CRC risk. In addition, as expected, those who had two risk factors, i.e., family history of cancer and smoking, had 2.75 times higher risk of CRC compared to those who had one of these risk factors.

53. Relationship Between *Helicobacter pylori* vacA c- Regions and cagPAI Genotypes in Patients of Ardabil

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Abstract: The cag pathogenicity island (cagPAI) and vacA-c region genotypes of *Helicobacter pylori* (*H. pylori*) are involved in the pathogenesis of the bacterium. The aim was to find any associations between cagH, cagL, cagG, and orf17 status of cagPAI and vacA-c region genotypes in *H. pylori* strains from Ardabil. A total of 188 isolates were cultured from the biopsies of Ardabil patients, DNA extracted, and genotyped. Data were collected and analyzed. The total frequency of cagH+, cagL+, cagG+, orf17+, vacA c1, and vacA c2 genotypes were 65, 129, 101, 62, 79 and 109, respectively. The cagL+ genotype was predominant among *H. pylori* isolates. When vacA c- genotypes were compared with the status of the cagH, cagL, cagG, and orf17 genes, there were no significant relationships between the presence of these genotypes. When the status of the cagH, cagL, cagG, and orf17 genes were compared with each other, there were significant relationships between cagH+ genotype and cagL+, cagG+, and orf17+ genotypes (p < 0.05); the odds ratio (OR) were 9.391, 9.207, and 12.222, respectively. The results of simple logistic regression analysis showed that the cagL+ genotype were significant relationships with cagG+, and orf17+ genotypes (p < 0.05); OR were 4.210, and 2.214, respectively. The cagG+ genotype was linked to orf17+ genotype; OR were 4.787 (p < 0.05). These findings may reveal a coordinated relationship between cagPAI genotypes in *H. pylori* strains from Ardabil.

54. Association of AKT1 rs1130233 Polymorphism with Increased Susceptibility to Breast Cancer: A Case-control Study with Genotype and Haplotype Analysis

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Breast cancer is a common type of cancer in the adult population, with an annual incidence exceeding 2.3 million cases. Moreover, it has a significant impact on the overall mortality rates of female cancer patients, emerging as the primary or secondary cause in 95% of nations. Various research studies have proposed the involvement of AKT1 kinase in intercellular communication among neurons, neuronal survival, and memory formation. The AKT1 gene is categorized as an oncogene, which, when mutated, can induce the transformation of normal cells into cancerous ones. Mutations in AKT1 are frequently detected in breast cancer cases, indicating their potential utility as clinical biomarkers for cancer diagnosis and therapy. A thorough understanding of AKT1 mutations in breast cancer remains inadequate, particularly in the Iranian population. To address

this gap, a case-control study was conducted involving the examination of 100 breast cancer patients with confirmed pathology and an equal number of control subjects. The analysis of AKT1 rs1130233 was performed using polymerase chain reaction-restriction fragment length polymorphism (PCR-RFLP). Under the models of co-dominant, dominant, and recessive inheritance, an assessment was made regarding the genotypic and allelic correlations of the AKT1 SNP in relation to the susceptibility to breast cancer through the utilization of logistic regression analysis. An examination of haplotypes was conducted on the AKT1 SNP to ascertain their collective impact on the risk of developing breast cancer. It was determined that the AKT1 rs1130233 exhibited a notable association with susceptibility to breast cancer under the co-dominant and dominant inheritance models ($P < 0.05$). To sum up, these findings represent the initial proof indicating that the AKT1 rs1130233 polymorphism is linked to susceptibility to breast cancer among Iranian females.

55. Genetic Variation in Interleukin 17-RA is Associated with Endometriosis Susceptibility: A Preliminary Study

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Preeclampsia (PE) is one of the most common medical complications in pregnancy and one of the three causes of maternal mortality. Preeclampsia occurs at 20 weeks of pregnancy and is associated with high blood pressure. Preeclampsia symptoms include a range of symptoms such as high blood pressure, swelling in the face or hands, headaches, etc. The prevalence of preeclampsia in pregnant women varies between 3 and 8 percent and is higher in some regions of the world than in others. Interleukin 17 is a cytokine with strong pre-inflammatory properties that in various studies increases the proportion of Th17 subpopulations causing the onset and exacerbation of the cascade of inflammatory cytokine production in adverse pregnancy consequences such as spontaneous miscarriage, intrauterine growth restriction, PE, and premature birth. Study method: In this case-control study, 470 participants including 230 healthy individuals and 240 patients were enrolled with preeclampsia and referred to Ali ibn Abi Taleb Hospital, Zahedan, Iran. The genotypic analysis was performed for all the subjects using the polymerase chain reaction-restriction fragment length polymorphism method. Results showed that the AG genotype of rs4819554 increased the PE risk (OR 1.618, 95% CI 1.096-2.388, $P = 0.015$). The dominant genetic model analysis found that AG+GG of rs4819554 was associated with the risk of PE (OR 1.835, 95% CI 1.267-2.656, $P = 0.001$). Discussions and suggestions: The results showed that the rs4819554 single nucleotide polymorphism was prominently associated with PE. Further studies are required to confirm the findings.

56. Relevance of *Helicobacter pylori* Plasticity Region Genes to Risk of Histologic Types of Gastric Cancer in Iran

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Abstract: *Helicobacter pylori* (*H. pylori*) plasticity region which contains strain-specific genes transferred from other species may involve in the pathogenesis of gastrointestinal disease. In the present study, we aimed to examine the associations of jhp0940, jhp0945 and jhp0947 genotypes of *H. pylori* plasticity region genes with histologic subtype gastric cancer (GC) in Iran. A total of

151 *H. pylori* strains that were isolated, including 114 (75.5%) with non-atrophic gastritis (NAG) and 37 (24.5%) with GC, were genotyped. Histopathological examinations were then performed. Of the 37 GC patients, 17 (45.95%) with diffuse-, and 20 (54.05%) with intestinal-type gastric cancer. The total frequencies of jhp0940, jhp0945 and jhp0947 were 44.4%, 17.2%, and 53.0%, respectively. The results of simple logistic regression analysis showed that jhp0940+ genotype was significantly associated with an increased risk of the intestinal- type carcinoma; the OR (95% CI) was 7.122 (2.232-22.730 ($P = 0.001$)). When diffuse-type carcinoma was considered as a dependent factor by the simple logistic regression analysis, only the jhp0947+ genotype was linked to an increased risk of this disease; the OR (95% CI) was 3.611 (1.110–11.745). It is proposed that the jhp0940+genotype of *H. pylori* plasticity region genes might be important for the risk of intestinal-type gastric cancer. Keywords: plasticity region genes; diffuse-type gastric cancer; intestinal-type gastric cancer.

57. The Correlation of Serum Levels of Long Non-Coding RNA ANRIL with Susceptibility to Diabetic Nephropathy in Iraqi Patients

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Diabetic nephropathy, also known as diabetic kidney disease, is a serious complication of both type 1 and type 2 diabetes. This condition affects the kidneys' normal function of removing waste products and excess fluid from the body. ANRIL (Antisense Noncoding RNA in the INK4 locus) is a long noncoding RNA (lncRNA) that plays a significant role in regulating the expression of other genes. This lncRNA has been linked to various diseases, including cancer, cardiovascular diseases, and diabetes. The long noncoding RNA ANRIL has been shown to be involved in the pathogenesis of diabetic nephropathy. However, the clinical significance of ANRIL in patients remains unclear. In this study, to investigate the correlation between ANRIL expression levels and the likelihood of developing diabetic nephropathy, 40 healthy individuals (controls) and 80 patients of both sexes were examined. RT-qPCR was used to measure ANRIL expression levels. cDNA was synthesized first, followed by quantification of the target gene expression using specific primers. SPSS software and the t-test were used to analyze the data and extract meaningful information. The results showed that ANRIL expression was significantly higher in diabetic nephropathy patients compared to the control group, and it can be concluded that high ANRIL expression in peripheral blood of patients is associated with the progression of diabetic nephropathy and is an independent risk factor for diabetic nephropathy.

58. Inverse Relationship Between Combination of the *vacA* c2 and *cagPAI* Genotypes with Risk of Gastric Cancer risk in Ardabil

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Abstract: *Helicobacter pylori* (*H. pylori*) infection is the main cause of gastric cancer (GC) in Iran. The *cag* pathogenicity island (*cagPAI*) and *vacA*-c region genotypes of *H. pylori* are associated with the development of GC. The aim was to determine the impact of *H. pylori* *cagH*, *cagL*, *cagG*, and *orf17* genes of *cagPAI* and *vacA*-c region genotypes in the development of GC in Ardabil. A total of 188 *H. pylori* isolates from 250 patients with non-atrophic gastritis (NAG) and GC were obtained, DNA extracted, and genotyped. Histopathological evaluations were also performed. The subjects included 65/188 with NAG and 123/188 with GC. There was not a significant difference

between the frequencies of *cagH*, *cagL*, and *orf17* genes in isolates from GC and those from NAG ($P > 0.05$). The results of simple logistic regression analysis showed that the *cagG*⁺, *cagH*⁺/*vacAc2*, *cagL*⁺/*vacAc2*, *cagG*⁺/*vacAc2*, and *orf17*⁺/*vacAc2* genotypes were inversely associated with GC in Ardabil; the odd ratio (95% confidence interval) was 0.295 (0.154-0.565), 0.152 (0.045-0.507), 0.161 (0.056-0.465), 0.140 (0.046-0.423), and 0.258 (0.080-0.834), respectively (P -values = 0.000, 0.002, 0.001, 0.000, and 0.032, respectively). The presence of the *c2* genotype of the *vacA* gene in combination with *cagH*⁺, *cagL*⁺, *cagG*⁺, and *orf17*⁺ genotypes showed strong inverse relationships with the risk of GC.

59. Assessment of Resistant and Susceptible Alleles of Exon 2 BOLA-DRB3 Gene to Bovine Leukemia Disease by Modelling and Molecular Docking

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The aim of this study was to evaluate and compare detected alleles of MHC-II gene which susceptible and resistant to disease bovine leukemia via modelling of protein structures. Therefore, different alleles of this gene and surface protein of bovine leukemia virus were used for advanced molecular docking to identify the importance of each allele at molecular and atomic level. Thus, the protein sequences of resistance (DRB3.2*11, DRB3.2*23, DRB3.2*28) and susceptible (DRB3.2*8, DRB3.2*16, DRB3.2*22) alleles to bovine leukemia disease and protein sequence of bovine leukemia virus were obtained from IPD-MHC and NCBI databases respectively. Then, modeling of 3D structure of proteins were constructed via Modeller software and protein-protein docking was conducted by HADDOCK program, then binding energy of each pair interaction between protein structure of MHC gene and leukemia virus was recorded. The result indicated that, protein binding affinity of DRB3.2*11 allele (-1163.2 KJ/mol) to surface protein of bovine leukemia virus was higher than others (-1023, -976.5, -865.5, -859.5 and -793.2 for DRB3.2*28, DRB3.2*23, DRB3.2*16, DRB3.2*22, DRB3.2*8 alleles respectively). So, can play an important role for resistance of animals against diseases leukemia and could be used for selection strategy of resistant animals to BLV as well as designing vaccine based on genomic information in the future. Also, considering to innovation of present study, using of molecular docking could be, as an interdisciplinary science, provide a new area for acquaintance and understanding of researchers in order to investigation of interaction between molecules that may be used in their study.

60. Evaluation of the Effect of Melatonin Antioxidants on Human Arrested Embryos *In Vitro*

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In vitro fertilization (IVF) is often challenging due to embryonic developmental arrest. Disruptions in the cell cycle are frequently observed in these embryos. The improvement of culture media is one way to address this issue. This study is focused on examining the impact of melatonin, which is an antioxidant, on the development of type II arrested human embryos *in vitro*. This study utilized 72-hour 4-5 cell human embryos from the embryology department of the Royan Research Institute. After ascertaining the ideal concentration, the embryos were cultivated in control and melatonin groups and incubated for 48-72 hours. Morphological assessments, gene expression, and protein expression were carried out. The data analysis involved the Tukey test, one-way ANOVA, and Chi-square. The significance threshold was set at $P < 0.05$. Approved ethical code:

Tehran, Iran; Approval number: IR.ACECR.ROYAN.REC.1402.008. Results show that 0.002mM is the optimal concentration for the melatonin. A significant decrease in the arrest rate ($p < 0.0001$) was followed by an increase in the development rate ($p < 0.0001$) and develop up to the pre-morula stage ($p < 0.0001$) compared to the control group (non-treated arrested embryos). Compared to the control group (normal blastocysts), there was no significant difference in the expression of the OCT4, NANOG, CCNA2, and CDKN1A genes in the melatonin group. However, the SOX2 level expression was significantly higher than control ($p < 0.0001$). Confirmation showed that the NANOG protein expression in the melatonin group matched those of the control group (normal blastocysts). According to the findings, melatonin antioxidant, results in the formation of embryos with a standard cell cycle and morphology. It has been suggested by studies that the melatonin antioxidant triggers this effect by activating the Phosphoinositide 3-kinases pathway through PTEN inhibition.

61. Evaluation of the Effects of Lutein on Improving Sperm Parameters and Reducing Oxidative Stress in Male Mice

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Infertility is a complex issue affecting millions of couples worldwide and can be emotionally challenging. Understanding the causes, factors, diagnosis, and prevention and treatment methods of infertility can empower individuals to take steps toward reproductive health. To date, the protective effects of a natural carotenoid called lutein have been proven on eye, brain, and skin health. In this study, its protective effect on male fertility factors in mice was investigated. For this purpose, 40 male NMRI mice received different doses of lutein and titanium dioxide for 35 days. Then, blood factors such as testosterone hormone, superoxide dismutase enzyme, malondialdehyde, and total antioxidant capacity were measured. Sperm factors including sperm motility, viability, DNA integrity, morphological changes, and sperm count were also measured. The results showed that the levels of testosterone hormone, superoxide dismutase enzyme, and total antioxidant capacity, as well as sperm motility, viability, DNA integrity, normal morphology, and sperm count decreased in mice exposed to titanium dioxide. However, these factors showed a significant increase in mice simultaneously exposed to titanium dioxide and lutein compared to the group receiving titanium dioxide. It is noteworthy that the level of malondialdehyde in this group decreased compared to the group receiving titanium dioxide. Therefore, it can be concluded that lutein, with its protective effect against free radicals, can reduce oxidative stress and improve factors related to male fertility.

62. The Evaluation of Therapeutic Effects of Green Tea Extract on PC3 Prostate Cancer Cells Through Analysis of SGK223 Expression and Cell Invasion

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Prostate cancer is the most prevalent cancer among men in 112 countries. It is the cause of one out of every 14 cancers diagnosed worldwide and 15% of all male cancers. The use of current treatments for prostate cancer, which include radiotherapy and chemotherapy, can have a negative impact on patient's quality of life. The use of medicinal plant compounds and targeted therapies based on cellular pathways seems to be a promising approach to treating prostate cancer. The polyphenolic compounds in green tea have beneficial effects on decreasing the risk of human cancer. Moreover, it was demonstrated that SGK223 is a protein that is involved in oncogenic

tyrosine kinase signaling and is overexpressed in various types of cancer. Our study is focused on evaluating the expression of SGK223 and invasion of PC3 prostate cancer cells after green tea extract treatment. In this regard, PC3 prostate cancer cells were cultured and treated with green tea extract for 48h. Western blot was used to analyze SGK223 expression in the PC3 prostate cancer cells and a wound healing assay was used to evaluate cell migration and invasion. Our results revealed that green tea extract may have therapeutic effects on migration of prostate cancer cells. Moreover, inhibition of SGK223 expression was detected in PC3 prostate cancer cells after green tea extract. Also, our findings suggest that green tea consumption may be highly beneficial and a promising option for treating prostate cancer. However, more experiments will be required to find details of cellular signal transduction pathways.

63. Evaluation of the Relationship Between Serum Spexin Levels and its Single Nucleotide Gene Polymorphisms with Susceptibility to Type 2 Diabetes Mellitus in Iraqi Woman Population

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Type 2 diabetes typically manifests in adulthood but has been increasingly observed in younger individuals due to rising obesity rates and sedentary lifestyles. Its prevalence in Iraq ranges from 8.5% to 13.9%. Genome-wide association studies (GWAS) have identified numerous genetic variations linked to an increased risk of type 2 diabetes. The SPX gene plays a crucial role in regulating energy and glucose metabolism. Single nucleotide polymorphisms (SNPs) within this gene can affect the function of the spexin protein, thereby elevating the risk of developing type 2 diabetes. This study examined 100 Iraqi women with type 2 diabetes and 100 healthy controls for five SNPs in the SPX gene. PCR and Sanger sequencing were employed to investigate the correlation between serum spexin levels and the different genotypes of these five SNPs. While one SNP (rs780278792) showed no significant association with increased diabetes risk, the remaining four SNPs (rs1413328860, rs772766676, rs761986956, and rs1214680179) were significantly associated with a higher risk of type 2 diabetes. Comparisons of allele frequencies between the patient and control groups revealed significant differences in spexin levels. Overall, the findings of this study suggest that specific genetic variations within the SPX gene are linked to the risk of type 2 diabetes in Iraqi women, which could potentially serve as biomarkers for predicting diabetes susceptibility.

64. Evaluation of the Potential of VCAM-1 as a Biomarker for Predicting Alzheimer's Disease in Diabetic Patients Using Microarray Analysis

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Alzheimer's disease (AD) is the leading cause of dementia, characterized by cognitive decline and loss of independence due to the degeneration of brain cells. AD is associated with various factors, including age, genetics, and environmental influences (1). The aim of this study is to identify differentially expressed genes (DEGs) that significantly contribute to the development of Alzheimer's disease. Raw microarray data from GSE36980, including 80 paired expression data sets from the brains of Alzheimer's patients and non-Alzheimer's individuals post-mortem, were obtained from the GEO database. Analysis of these two groups was performed using the GEO2R tool, considering $\text{adj.p.value} \leq 0.05$ and $\log_{2}\text{FC} \geq 0.4$. In this study, the STRING database was used to construct the PPI network, which was further analyzed using the Cytoscape application. The

gene VCAM-1 was identified as a hub gene in this study, and further extensive studies were conducted on this gene. In one study, scientists demonstrated that in plasma samples from individuals, increased expression of VCAM-1 combined with ApoE4, education, age, and MMSE could predict AD with high accuracy without imaging diagnosis (2). Additionally, other studies showed that higher serum levels of VCAM-1 were significantly associated with a higher risk of developing AD in patients with diabetes (3). As a result, it can be suggested that serum VCAM-1 measurement may serve as a good biochemical parameter for predicting AD, especially in diabetic individuals. Further research is needed to validate its clinical application.

65. Analysis of Genetic Variation of *Gypsophila vaccaria* (L.) Sm. (Caryophyllaceae) Using Internal Transcribed Spacer 2 (ITS 2) Sequence Data

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The molecular approach is the preferred method for investigating the relationships among plant species. There is conflicting data on the relationships of Caryophyllaceae species and the *Vaccaria hispanica* is currently considered synonymous with *Gypsophila vaccaria*. We obtained internal transcribed spacer 2 (ITS 2) sequences of 14 samples related to *G. vaccaria* and one sequence of the same DNA sequence in *Gypsophila elegans* as an outgroup from the NCBI database. These sequences were then aligned with Bioedit ver.7.7.1. and analyzed using the MEGA Ver.11.0.13. The phylogenetic tree was depicted using the maximum parsimony (MP). Based on the tree, two groups of *G. vaccaria* are separated and both of them supported with a bootstrap value above 95%; however, there was no significant correlation between the genetic variation and geographical location of different populations. Our analysis showed that *G. vaccaria* was not supported as a monophyletic group with high bootstrap value.

66. Cytotoxic Evaluation of Cumin Essential Oil on Breast Cancer Cell Line (MCF-7)

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Cancer can be considered as one of the genetic diseases that reduces the mortality rate in cancer cells in this disease. Today, new therapies have been found for cancer. Cumin (*Cuminum cyminum*) is a fragrant herb, while cuminaldehyde is main components of its essential oil. In this research, the toxicity of cumin essential oil was investigated. Seed of *cuminum cyminum* was collected from sabzevar city, and then essential oil was extracted by hydrodistillation. The cytotoxic effect of essential oil on the MCF-7 cell line was evaluated by MTT assay. A solution of 1000 mg/liter of cumin essential oil was prepared, the cultivated cells were exposed to various dilutions of (5, 10, 30, 50, 75, 100, 130, 170, 200) for 24 and 72 hours. The results were analyzed by GraphPad Prism 6 software. The results showed that the essential oil of the *C. cyminum* has cytotoxic effects on the MCF-7 cell line in 24 hours and inhibition of cell growth in 72 hours. The IC₅₀ of cumin seed essential oil was and 83.30 ± 1.31 and 165.05 ± 4.36 $\mu\text{g} / \text{ml}$, respectively.

67. From Aging to Atherosclerosis: The Interplay of mTOR, FOXO3A, and PI3K in Cardiovascular Disease

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The global population is experiencing rapid aging, and atherosclerosis is recognized as a disease closely linked to this demographic shift. Advancing age serves as an independent risk factor for developing atherosclerosis, which is also associated with premature biological aging. Atherosclerotic plaques exhibit cellular senescence marked by diminished cell proliferation, irreversible growth arrest, increased apoptosis, heightened DNA damage, epigenetic alterations, and telomere shortening. Research has identified a set of 432 effective markers related to cardiovascular aging from 27 studies, revealing ten common genes associated with atherosclerosis. Notably, FOXO3 and mTOR are two genes whose expression increases with age and are linked to critical signaling pathways in cardiac aging. Studies indicate that reducing the expression of these genes can positively influence heart aging. FOXOs play vital roles in various physiological processes, including oxidative stress response, DNA repair, autophagy, and cell cycle regulation. The mammalian target of rapamycin (mTOR) is a key regulatory factor in aging across different organisms; its suppression has been shown to extend lifespan. Furthermore, mTOR regulates aging by influencing autophagic functions. Additionally, PI3K, a lipid kinase enzyme, inhibits both FOXO3 and mTOR. This suggests that targeting PI3K may help mitigate the effects of these two factors, potentially preventing heart aging and atherosclerosis. Overall, understanding the genetic underpinnings of cardiac aging and atherosclerosis could lead to novel therapeutic strategies.

68. From Genes to Tumors: Decoding AURKA's Impact on Hepatocellular Carcinoma

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Hepatocellular carcinoma (HCC), the most frequent type of primary liver cancer (PLC), is one of the rapidly growing and lethal malignancies worldwide. The present study aimed to identify differentially expressed genes (DEGs) between tumor and non-tumor tissues from HCC samples. Raw microarray data of GSE76427, including 115 HCC tissues and 52 samples corresponding non-cancerous tissue samples, were obtained from the GEO database. DEGs were obtained using R and three related packages: limma, umap, and Geoquery. The DEGs were screened out according to adjusted P-value < 0.05 and -logFC- ≥1. In this study, the STRING database was used to construct a PPI network of DEGs. Cytoscape software was used to visualize the PPI network. In the present study, five hub genes were identified: AURKA, KIF20A, PRC1, UBE2T, and PTTG1. The GEPIA database was utilized to establish the expression level of genes in cancer tissue compared to normal tissue; All genes exhibited significant expression patterns, and among them, AURKA was selected. based on four different centrality measures, including eigenvector centrality (EGC), degree centrality (DC), betweenness centrality (BC), and closeness centrality (CC). Gene set enrichment analysis was performed using the GSEA software, and GO, KEGG and Hallmark results were obtained. The studies suggest that AURKA might be associated with radiation-induced epithelial-mesenchymal transition (EMT) and cancer stem cell (CSC) features in HCC; so targeting AURKA reduced irradiation-mediated cell invasion as well as EMT and CSC features in HCC and can be a promising therapeutic approach in future

69. Efficient Protein Extraction from Eggshell Membrane for Industrial Applications

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The eggshell membrane (ESM) is a fibrous and proteinaceous microstructure situated between the inner layers of the mineral shell and the egg white. The proteome of ESM comprises several proteins, predominantly collagen, which is responsible for the mechanical strength, thermal stability, and structural flexibility of the ESM fibers. The ESM comprises a number of additional proteins, including lysozyme, ovocalyxins, ovotransferrin, fibronectin, and osteopontin. These proteins have been demonstrated to possess beneficial biological activities, including the promotion of wound healing and the inhibition of bacterial growth. Furthermore, due to their high biocompatibility and ability to stimulate the formation of new tissues, these proteins are highly efficacious in the treatment of joint injuries and connective tissue repair. However, ESM is highly insoluble in water and has poor stability. The objective of this study was to set a convenient and cost-effective method for protein extraction from ESM. In this approach, ESM was initially treated with pepsin at 37°C in the presence of 0.5 M acetic acid at a molar ratio of 1:10. Following the enzymatic treatment and filtration of the protein solution by filtration, the pH was adjusted to neutral. Subsequently, protein precipitation was achieved through the addition of two salts: 2 M sodium chloride and 50% ammonium sulfate, which were added separately. The final yields were 95mg/g and 115mg/g, respectively. The success of protein extraction was also confirmed by the results of SDS-PAGE and FTIR analyses. These findings may have positive implications for the use of ESM as a protein source in medical, dental, and food industry applications, given its easy availability, low cost, and non-toxic nature.

70. Using Python Code to Determine the Percentage of Amino Acid Residues in Biology

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Python plays a role, in the field of biology by facilitating the analysis of biological data, such as sequencing genomes and modeling protein structures. This advancement significantly speeds up discoveries in areas like genetics and molecular biology. Amino acid residues stand as the units of proteins remaining after peptide bonds form during protein synthesis. Each residue brings chemical properties that impact the structure and function of the protein. Understanding these residues holds importance in fields like protein engineering and drug design, where modifying residues can influence protein behavior and therapeutic effectiveness. Identifying amino acid residues poses challenges due to the nature of protein sequences, which can span thousands of residues making analysis complex. Managing these sequences demands computational tools for precise counting while accommodating variations and modifications. In this study Python code was utilized to process and analyze these sequences. Initially a code snippet was used to determine the sequence of a protein along with its amino acid composition; this snippet was later transformed into a function. Calculating percentages mirrors calculating AT content; multiplying the result by 100 yields the percentage value. The code involved two variables; 'protein' and 'amino acid list'. Through a loop iteration occurrences of each amino acid residue, within the protein sequence were tallied to ascertain their count. This program accurately computes the proportion of amino acid components, in sequences aiding in a range of tasks that benefit from this type of data.

71. Usage Python Code for Phylogenetic Trees (Case Study: Browsing Phylogenetic trees)

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Phylogenetic trees are essential for understanding evolutionary relationships among species. The use of Python in constructing, analyzing, and visualizing these trees has significantly advanced phylogenetic studies. This paper explores the diverse applications of Python in phylogenetic tree analysis, including representation, construction, and visualization techniques. Trees are a widely used type of data structure that emulates a tree design with a set of linked nodes. Formally, a tree is considered an acyclic and connected graph. Each node in a tree has zero or more child nodes, which are below it in the tree (by convention, trees grow down, not up as they do in nature). Phylogenetic trees are one of the most important trees. Phylogenetic trees are diagrammatic representations that show the evolutionary relationships among various biological species based on similarities and differences in their genetic characteristics. Python offers numerous tools and libraries to construct, analyze, and visualize these trees, making the process more efficient and accurate. The Environment for Tree Exploration (ETE) offers various methods to search for specific nodes and navigate through the hierarchical structure of a tree effectively. The traversal method determines the order in which child nodes are visited. ETE supports the three most common strategies: preorder, levelorder, and postorder. We use `TreeNode.traverse()` in our Python code instead of `TreeNode.iter_descendants()`, `TreeNode.traverse()` method to visit each node in the current partition sequentially. The main difference between `TreeNode.traverse()` and `TreeNode.iter_descendants()` is that the former includes the root node in the iteration.

72. Increased PLP2 Gene Expression in Thyroid Cancer and its Relationship with Tumor Invasion

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Thyroid cancer (THCA) is a common endocrine cancer, accounting for 2% of all malignancies in Iran. While various factors contribute to its occurrence, changes in gene expression are a significant factor. The proteolipid protein (PLP2) gene has been linked to breast cancer, but its role in THCA is unclear. We analyzed microarray data from the GEO database and used Limma to evaluate the relationship between PLP2 gene expression and THCA incidence. We also examined the relationship between PLP2 gene expression and patient characteristics, including age, gender, tumor malignancy, metastasis, and disease subtypes. We collected tissue samples from 25 patients with THCA from Sina Hospital in Isfahan and performed RNA extraction, cDNA production, and qPCR reactions. Our results showed that PLP2 gene expression was increased in THCA tissue compared to adjacent healthy tissue. Promoter methylation of the gene was decreased in patients compared to healthy individuals. We also found a correlation between increased PLP2 gene expression and age, tumor malignancy, and disease subtypes. Furthermore, we observed a higher expression of PLP2 gene in tumors with extensive metastasis compared to those with close metastasis. This suggests that PLP2 gene may be a marker of THCA tumor invasion

73. Enhancing β -Galactosidase Stability and Activity with Betaine-Sorbitol NADES for Industrial Applications

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The use of NADESs in biocatalysis has emerged as a promising approach to improve enzyme performance. This study investigates the effects of a betaine-sorbitol NADES on the activity, thermal stability and structure of β -galactosidase, an enzyme of considerable industrial significance, particularly in the dairy industry due to its role in the hydrolysis of lactose to glucose and galactose. NADESs are attractive alternatives to conventional solvents due to their biocompatibility, low toxicity, and environmentally friendly properties, offering a potential medium for enzyme stabilization. In this experiment, Betaine-Sorbitol NADES was prepared in a 1:2 molar ratio by heating and stirring. β -galactosidase was then incubated in varying concentrations of NADES, and its activity was assessed using ONPG as a substrate. Enzymatic activity assays were performed at 45°C for 10 minutes. Thermal stability tests were performed by pre-incubation of the enzyme in NADES at 50°C for various intervals (0-60 min), followed by measuring the residual activity. The results demonstrated that Bet-Sor NADES increased the thermal stability of β -galactosidase at concentrations below 50%, with residual activity preserved after 30 minutes at 50°C compared to the free enzyme. The enzyme activity showed that this solvent increased the catalytic efficiency of β -galactosidase up to 1.5 fold at low concentration (12.5%). Furthermore, the fluorescence spectra indicated structural changes in β -galactosidase showing an increase in intrinsic fluorescence intensity due to an increase in the compactness of the enzyme structure in the presence of the NADES. These findings suggest that Betaine-Sorbitol NADES provides a protective medium for β -galactosidase, which may broaden the application of the enzyme in industrial processes requiring high temperatures

74. Significant Increase of BDNF-AS1 Expression in Children with Autism: A Potential Biomarker for Early Diagnosis

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Abstract: Early intervention for early detection of autism improves patients' quality of life. Long non-coding RNAs (lncRNAs) play a role in various neurological disorders. BDNF-AS1 is a lncRNA that regulates the expression of the BDNF gene. BDNF is crucial for neuron survival, differentiation, and synaptic plasticity. BDNF-AS1 modulates these functions. Dysregulation of BDNF-AS1 has been associated with disorders like schizophrenia. We examined the expression level of BDNF-AS1 in the blood of a population of 30 autistic patients compared to a healthy group of 41 individuals using Real-time PCR. Statistical analysis was performed to determine the significance of expression differences and identify a potential biomarker for autism diagnosis. The results showed that BDNF-AS1 gene expression in autistic patients was nearly 4 times higher than in the healthy group (P-value = 0.0024). The area under the ROC curve (AUC) for this gene was 0.7098, statistically significant with a P-value of 0.0027 (sensitivity = 66.67% - specificity = 65.85%). These findings suggest that BDNF-AS1 could serve as a potential biomarker for autism diagnosis with high accuracy. BDNF-AS1 appears to prevent the reduction of mTOR mRNA levels through RNH1 degradation, thereby maintaining mTOR signaling activation. Excessive activation of this pathway during brain development may lead to brain abnormalities and, consequently, autism symptoms. Therefore, BDNF-AS1 may play a significant role in the onset

and development of autism. However, further research is necessary to confirm the involvement of this lncRNA in autism pathogenesis.

75. Selection of Superior Populations of the *Nepeta Crassifolia* Species Based on Chromosome Number Index

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The primary goal in medicinal plant breeding is to develop populations that exhibit high performance in terms of biomass, yield, and key phytochemical compounds in essential oils. *Nepeta crassifolia*, also known as “Poonesaye alborzi”, is a medicinal plant that belongs to the *Nepeta* genus and the Lamiaceae family. This research investigates, for the first time, the impact of different ploidy levels on the yield and essential oil composition of this species. The ploidy levels of two populations from the Mazandaran and Gilan provinces were determined using root tip meristems. The yield and phytochemical compositions of their essential oils were extracted from a study conducted by Hadi et al. in 2018. The findings revealed that the essential oil yield in the diploid population ($2n=18$) was more than twice that of the tetraploid population ($2n=36$). Additionally, with genome doubling, the essential oil content decreased by 57%. In the diploid population, hydrocarbon monoterpenes and oxygenated monoterpenes were present, while the tetraploid population also contained oxygenated sesquiterpenes. Among the hydrocarbon monoterpenes, α -Pinene and Limonene (each at 0.3%) were found solely in the tetraploid population, whereas *p*-Cymene (3.5%) was exclusive to the diploid population. Given that selection is the initial step in breeding programs, these comparisons suggest that indirect selection based on chromosome number could be a quick and effective method for identifying superior populations within the studied species.

76. Diagnostic Value of HOXB-AS1 in Breast Cancer: A Promising Regulator of Key Signaling Pathways

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Antisense long non-coding RNAs (AS-lncRNAs) have emerged as significant regulators in cancer progression, exerting their effects at both the nucleic and cytoplasmic levels through cis and trans-acting mechanisms. AS-lncRNAs are involved in modulating various signaling pathways, influencing tumor proliferation and invasion. HOXB cluster antisense RNA 1 (HOXB-AS1), transcribed from chromosome 17, is one such AS-lncRNA implicated in multiple cancers, including glioblastoma and endometrial cancer. Despite its known oncogenic roles in these cancers, the function of HOXB-AS1 in breast cancer (BC) remains unclear. This study aims to elucidate the expression and potential clinical relevance of HOXB-AS1 in BC. We began our investigation by performing an in-silico analysis of microarray data from three datasets (GSE45827, GSE79058, and GSE36295) retrieved from the GEO database. This analysis revealed differentially expressed genes (DE genes) in BC. Subsequently, we experimentally evaluated the expression level of HOXB-AS1 in tumor and normal tissue specimens collected from Iranian patients. The experimental findings were validated using data from The Cancer Genome Atlas (TCGA) Network platform. Our results demonstrated a significant downregulation of HOXB-AS1

in BC tissues compared to normal tissues, a finding consistent with the TCGA data. To assess the clinical implications of HOXB-AS1 expression, we conducted Kaplan-Meier survival and Receiver Operating Characteristic (ROC) curve analyses. Lower levels of HOXB-AS1 were associated with decreased relapse-free survival (RFS) but not overall survival (OS), suggesting that HOXB-AS1 expression could serve as a prognostic marker for BC. The ROC analysis further indicated that HOXB-AS1 has significant diagnostic potential, with the TCGA data showing a higher area under the curve (AUC) compared to our experimental data, likely due to a larger sample size in the TCGA cohort. Further analysis identified 22 common DE genes across the three GEO datasets, with a subset of these genes showing significant expression changes. Protein-protein interaction (PPI) network analysis highlighted 11 hub genes, including CDH1, CCNE2, CCNB2, and EZH2, which have oncogenic functions and were found to have a negative correlation with HOXB-AS1 expression. Pathway enrichment analysis indicated that these genes are involved in key signaling pathways such as cell cycle regulation, P53 signaling, adherent junctions, cellular senescence

77. Biological Importance of Perovskites and Their Potential Therapeutic Applications

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Stomach cancer is one of the most common diseases in the world. Although there are many treatment methods for this cancer, the limitations of the treatment, the complications caused by them, and the late symptoms of this cancer have caused the research to find new effective methods to continue. One of the recent research methods to treat this disease is using nanoparticles. Although perovskite family nanoparticles have been used in the manufacture of solar cells due to their high electrical conversion power, research on their use in cancer treatment has proven their use in treating some cancers. This project aimed to investigate the effect of model perovskite (BA)₂FeCl₄ nanoparticles on AGS gastric cancer cells. In this research, the clonogenic test and MTT assay were used to investigate the ability to form colonies and survive as a result of the effect of the treatment. The findings indicated the impact of the mentioned perovskite in reducing the viability and the ability to form colonies with an optimal concentration of 5 micrograms per millilitre in the studied cancer cells. Studying the path of apoptosis induction and how the treatment with this nanoparticle works can help clarify the mechanism of action and find ways to enhance this effect and treatments that can be integrated with it.

78. The Importance of Genetic Counseling and Whole Exome Sequence in Families with Recurrent Miscarriage

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Whole Exon Sequencing (WES) is a novel method to identify pathogenic mutations in the heterogeneous genetic diseases that means several genes are involved in causing one disease. In this research, the whole exon sequencing test was performed in an aborted fetus resulting from a consanguineous marriage, and after filtering the variants, suspicious variants were analyzed and interpreted. In this study, in addition to identifying the homozygous mutation in KIF7 gene that led to abortion and adapted with clinical findings in aborted fetus; We also detected 8 mutations that could potentially result in abortion. These mutations include NF1:c.2893A>T; SCN8A:c.2726A>G; RINT1:c.165T>A; POLR3A:c.1909+22G>NCAPD3:c.4468_4480del;

OTOGL:c.4702G>T; LDOA:c.226C>T; KIF14:c.2125G>A. Of course, these mutations were heterozygous and were categorized as Pathogenic, Likely Pathogenic, VUS. Our observations show the importance of genetic counseling and whole exome sequencing (WES) in families with recurrent miscarriages.

79. Restoring EF-handII Function Using L97S Mutation and Evaluation of the Functionality of the Photoprotein Mnemiopsin 2 Using Modeling and Bioinformatics Calculations

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Bioluminescence is the ability of living organisms to emit visible light through biochemical luminescence reactions. Mnemiopsin 2 is a photoprotein that, like other members of this family, is capable of emitting light in the presence of coelenterazine as a substrate and calcium ions. In this study, the leucine residue at position 97 in the EF-hand II of Mnemiopsin 2 was replaced with serine, and its structure and function were examined using bioinformatics studies. For this purpose, the sequence and structure were first analyzed using the ProtParam program to evaluate the mutation in terms of parameters such as isoelectric point and instability. Subsequently, the tertiary structure of the mutated proteins was modeled using the MODELLER software and the molecular graphic model was drawn using the Chimera software. To identify the best model, parameters such as RMSD, ERRAT, VERIFY3D, and Z-DOPE were used. Finally, changes in the physical and chemical properties of the wild-type and mutated proteins were examined using ProtScale, showing that the data indicated the desirability of the mutation from an evolutionary perspective compared to the physical and chemical properties approach.

80. Molecular Assessment of the pfk13 Gene Associated with Artemisinin Resistance in Plasmodium Falciparum Isolates from Southeasten of Iran

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Malaria is an infectious disease caused by parasites of the genus Plasmodium, which is transmitted to humans by the bite of an infected female Anopheles mosquito. Plasmodium falciparum is responsible for most of the deaths caused by malaria. Artemisinin-based combination therapy is the recommended first-line treatment against Plasmodium falciparum. The emergence of Plasmodium falciparum resistance to Artemisinin in different parts of the world is a serious challenge for malaria control. Therefore, molecular assessment of Artemisinin resistance markers is very important. This study was conducted with the aim of molecular assessment of pfk13 gene as the main markers of Artemisinin resistance in Iranian Plasmodium falciparum isolates. The study was conducted on 30 blood samples of Plasmodium falciparum patients who lived in the southeastern regions of Iran. After designing the primers and Nested-PCR amplification, the samples were sequenced with designed Nested primers. The quality results of the sequences were checked with Chromas software and sequence alignment in comparison to reference strain (PFD7_134370) was done with Clustalw. The results of the sequence assessment of the 30 analyzed samples indicated no mutation in comparison to reference strain. Considering that pfk13 gene is the main marker of resistance to Artemisinin and none of the 30 analyzed samples had mutation, this indicates that the genotypic resistance to Artemisinin was not confirmed in Iranian Plasmodium falciparum isolates. It is suggested that more samples are assessed for molecular

assessment of pfk13 gene. In addition, other molecular markers of Artemisinin resistance such as pfmrp1 and pfmdr1 genes are assessed in future studies in Iran

81. Investigating the Effect of CTAB Buffer and Water on the Quality of Extracted DNA for Telomere Study in q-PCR Reactions

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Telomeres are repetitive DNA sequences that require special precision to extract the DNA needed to study them. Studies have shown that the method of DNA extraction can be effective in measuring telomere length by quantitative chain reaction (q-PCR). To study telomere length by q-PCR, telomere specific primers and a single copy gene such as HBG are used. In this study, DNA was extracted from blood samples using water as cell lyser and CTAB as extraction buffer with chloroform. DNA integrity was checked by gel electrophoresis, quantity by absorbance at 260 nm, and its purity by A260/280 and A260/230 ratios. The quantitative evaluation of the effect of each buffer in q-PCR and the reproducibility of the results were performed by calculating the reaction efficiency and the coefficient of determination (R²), respectively, using the regression equation in Graph Pad Prism v9.0 software. The average amount of extracted DNA was 142.34 ng/μL and it was favorable in terms of purity and integrity. The efficiency of the q-PCR reaction was 105% (R²= 99%) for HBG gene and 122% (R²= 98%) for telomere. Water extraction may remove white blood cells and thus remove DNA, but it performed well in terms of purity and PCR efficiency because it does not contain q-PCR inhibitors. As a cationic detergent, CTAB adsorbs polysaccharides and lipids, disrupting cell membranes and releasing internal contents, including DNA. While this study investigates the effect of extracting DNA from blood with water and CTAB for telomere study, it is suggested that the results be compared with commercial kits.

82. Investigation of the Effect of the Gastrointestinal Drug Bismuth Oxide on the Liver and Kidneys Tissue

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One of the widely used gastrointestinal drugs is bismuth oxide, which is used in the treatment of bacterial infections, especially those caused by *Helicobacter pylori*, the main causative agent of stomach ulcers. In addition to this drug, bismuth has numerous applications in the cosmetics, metallurgy, and other industries. Alongside these extensive applications, the toxicity of bismuth is under investigation. In this study, NMRI mice were divided into 3 groups. Groups 1 and 2 were gavaged with bismuth oxide nanoparticles at concentrations of 200 and 800 mg/kg, respectively, and group 3 served as the control group and was gavaged with normal saline for 30 days. After dissection, blood sera were separated and blood factors related to the liver (ALT and AST) and kidney (urea and creatinine) were measured. The results showed that the levels of ALT and AST in the serum of both bismuth groups increased compared to the control group, but the amount of change in urea and creatinine was not significant compared to the control group. ALT and AST are biological markers of the liver that are released into the bloodstream in case of liver damage. As a result, bismuth was able to increase their serum levels while causing liver damage. Urea and creatinine are excreted through the kidneys, and when kidney function is impaired, their serum levels increase as the glomerular filtration rate decreases. This was not observed in our study, and

it is suggested that the liver and kidneys be examined histopathologically in future studies to investigate the potential effects of this substance more accurately.

83. Investigating the Cytotoxic Effect of *Capparis spinosa* L. Plant Extract on HT-29 Cell Line

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Colorectal cancer is the third most common cancer worldwide and the leading cause of death in gastrointestinal cancer. Medicinal plants have therapeutic properties due to their diverse chemical compounds. The caper medicinal plant with the scientific name *Capparis spinosa* L. is one of the most common medicinal plants. Different parts of *Capparis spinosa* L. plant have an essential role in cancer prevention and treatment due to their anti-inflammatory and antioxidant properties. The purpose of this study is to evaluate the toxicity of the acetone extract of *Capparis spinosa* L. on human cell line HT-29. In order to investigate the effect of cytotoxicity, MTT colorimetric method was used. Acetone solvent was used in a ratio of one to five for extraction. First, the cells were cultured in the wells of the 96-well plate and kept in the incubator for 24 hours. After the formation of precipitate, the supernatant was removed. Then the extract with different concentrations was added to the wells, kept in an incubator for 48 hours and the supernatant was removed. After that, MTT solution was added and DMSO was added after 3 hours. Absorbance was read by ELISA reader at a wavelength of 570 nm. In the MTT assay, the IC₅₀ for HT-29 was reported to be 791.5 µg/mL. The present study showed that this plant species has a significant antioxidant and inhibitory effect on the HT-29 cancer cell line, which can be due to the presence of high amounts of flavonoid compounds in the extract.

84. Investigating the Anti-amyloidogenic Effect of Bisdemethoxycurcumin on ALS-associated hSOD1 Mutant: An Experimental and Molecular Dynamics Simulation Studies

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Protein misfolding is a biological process that leads to protein aggregation. The aggregation of human superoxide dismutase (hSOD1) causes a neurodegenerative disease known as amyotrophic lateral sclerosis (ALS). Our study aims to investigate the potential of bis-demethoxycurcumin (BDMC) as an anti-amyloidogenic polyphenol against the L38R mutant aggregation using molecular dynamics (MD) simulation and experimental methods. Through molecular dynamics simulation and molecular docking, we observed that the binding of BDMC to the mutant SOD1 induces changes in protein compactness and flexibility. The molecular docking results highlighted the specific amino acids involved in hydrogen and hydrophobic interactions between BDMC and the L38R mutation. Experimental findings showed a decrease in fluorescence intensity of the DTT-treated L38R mutant with increasing BDMC concentration, while λ_{max} remained constant. The fluorescence quenching data suggested a static quenching process in the L38R-BDMC interaction. Additionally, the presence of BDMC led to increased compaction and reduced structural flexibility in the L38R mutant, as supported by RMSD and Rg values. This research holds promise for the development of treatments for ALS and other neurological diseases, with BDMC emerging as a potential candidate for preventing amyloid aggregation.

85. Studying the Effect of Physical Factors on the Morphology of *Streptomyces pilosus* Bacteria and the Production of Desferrioxamine B

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Desferrioxamine-B (DFB) is the only siderophore used for the treatment of thalassemia patients, to chelate excess iron. *Streptomyces pilosus* is the most common strain used in DFB production. The life cycle of *Streptomyces* is periodic spore-mycelium-spore, which causes round and small colonies to appear in the liquid culture medium. The formation of these pellets reduces nutrients and oxygen transfer in their center, which causes a great reduction in the growth rate of hyphae. As a result, DFB production decreases. In this research, the effect of four effective parameters, including Erlenmeyer flask type, pH, temperature, and stirring speed, on the morphology of *Streptomyces pilosus* bacteria and DFB production, was investigated in 3 levels based on the Taguchi method. In optimal growth conditions, the problem of bacterial pelleting was solved, and the uniform growth of bacteria occurred throughout the culture medium. Analysis of Variance (ANOVA) of results showed that flask type has the most effect (81.4%.) on increasing DFB production. After that, temperature, the stirring speed and pH, are in the next ranks with less influence on the DFB production. In addition, under the optimal conditions, the use of baffled flasks, pH 3.7, temperature 29 °C and stirring speed 150 rpm in the MYB culture medium (malt 10 g/l, yeast extract 10 g/l, and dextrose 4 g/l) DFB production increased the to 0.64 gL⁻¹, that was about 3 times compared to before optimization. To increase DFB production, it is suggested that the obtained result was investigated in the bioreactor.

86. Investigating the Effect of Time Phase in the Stabilization of Labeled DNA Sequences on the Surface of Graphene Oxide Nanoparticles

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Graphene oxide (GO) is an oxidized form of graphene obtained by oxidative stripping of graphite. GO, has large surface, fluorescence quenching, high temperature resistance and free electrons π . These properties of GO have provided a lot of opportunities for the development of novel biological sensing systems. Optical biosensors based on graphene and its derivatives make nondestructive detection of biomolecules possible. Graphene-based nanomaterials are used as transducers of biosensors, which are involved in converting the interactions between the receptor and the target molecules into detectable measurements. The early diagnosis of diseases, e.g., Parkinson's and Alzheimer's disease, diabetes, and various types of cancer plays a critical role in clinical treatment. Biosensors are simple, rapid, cost-effective and presents good sensitivity and they with high sensitivity and specificity can significantly enhance early diagnosis of diseases and pathogen detection. Preferential binding of single stranded nucleic acid (NA) on GO compared to double-stranded NA was one of the most popular principles in the fluorescent GO utilized biosensors. In this study, to obtain the best sensing performance of nanosensor, the adsorption time of probe on surface of GO was optimized. To determine the optimum time, reaction was performed by mixing 10 μ l (10 pM) of probe (labeled ssDNA) with 15 μ l of GO (1 mg/ml) and fluorescence emission was monitored at different times to obtain the optimized time. in a constant concentration of GO, with the increasing incubation time, fluorescence intensity decreased and reached equilibrium in 16 min. Thus, 16 min was considered the optimal absorption time.

87. The study of the Impact of Bismuth Oxide Nanoparticles on Testicular Tissue

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Studies have shown that metal nanoparticles induce toxicity in testicular tissue. One such nanoparticle, with applications in both therapy and industry, is bismuth oxide nanoparticle. There has been no extensive research investigating the effects of these nanoparticles on testicular histology. Therefore, in this study, we examined the effects of this substance on the testicular tissue of male NMRI mice. Mice were divided into 7 groups, with a treatment duration of 35 days. Groups 1 to 6 were treated with bismuth oxide nanoparticles at concentrations of 25, 50, 100, 200, 400, and 800 mg/kg, respectively, while group 7 served as the control group, receiving daily physiological saline. After 35 days, the mice were euthanized, and their testicular tissues were extracted, fixed in a specific fixative (MDF), and processed for sectioning and staining. Testicular changes were then evaluated using stereological techniques. The findings revealed a significant decrease in the total volume of testicular tissue, seminiferous tubules, and the number of spermatogonia, spermatocytes, spermatids, Sertoli cells, and Leydig cells in the bismuth-treated groups compared to the control group. Conversely, the volume of the interstitial tissue showed a significant increase compared to the control group. However, there were no significant changes in the length, diameter, and thickness of the basement membrane of seminiferous tubules compared to the control group. Therefore, bismuth oxide nanoparticles can cross the blood-testis barrier and induce toxicity in testicular tissue. It is recommended that future studies be conducted on human testicular tissue.

88. Evaluation of the Effect of the Ni-Thiosemicarbazones on Expression of TUG1 in Acute Lymphoblastic Leukemia

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The aberrant proliferation and differentiation of a clonal population of lymphoid cells are involved in the pathogenesis of ALL. Thiosemicarbazones are a type of Schiff base made by combining thiosemicarbazone with an appropriate aldehyde or ketone. Scientists have been studying Thiosemicarbazones because of their diverse pharmacological properties. The goal of this study was to see how Ni-thiosemicarbazone complexes affected the expression of the TUG1 in cell line that had been diagnosed in ALL. In this research, two doses of Ni-Thiosemicarbazone were prepared: 100.5 μ M and 104 μ M at 24h. The Jurkat E6.1 cell line was purchased from Pasteur Institute and treated with prepared concentrations of the Thiosemicarbazones Ni at 24h after cell passage. The expression changes of TUG1 was studied using Real-Time PCR after RNA extraction and cDNA synthesis. The results showed that the expression of TUG1 in comparison with the GAPDH housekeeping increased after 24h of Ni-Thiosemicarbazone complexes treatment at concentration of 104 μ M. According to the findings, changes in TUG1 gene expression increased after 24 hours at a concentration of 100.5 μ M were statistically significant. These changes included 100.5 μ M (1.239) and 104 μ M (0.371) at 24 hours, respectively. ($P < 0.001$). According to the present study results, alternation in TUG1 expression after treatment with Ni-Thiosemicarbazone complexes, at 100.5 μ M concentration was effective in increase of TUG1 expression. Evidence showed that the Ni-Thiosemicarbazone complexes has positive potential and efficacy because the drug was ineffective in increasing gene expression in low concentrations in 24h.

89. Investigating the Effects of Amitraz on Human Serum Albumin: Molecular Docking, UV-visible Absorption Spectroscopy, Fluorescence Spectroscopy

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Amitraz, a member of the formamidine group, functions as an agricultural insecticide and veterinary ectoparasiticide. Despite its utility, amitraz poses a risk to non-target species, including humans. Human exposure to amitraz can occur through ingestion, inhalation, or dermal contact, allowing the pesticide to enter the bloodstream. The distribution of pesticides in the blood is influenced by their binding affinity to human serum albumin (HSA), the most prevalent plasma protein. This study examines the interaction between amitraz and HSA using UV-Vis absorption spectroscopy, molecular docking, and fluorescence spectroscopy. Upon adding amitraz to HSA, a hypochromic shift was observed in the absorption spectrum at 280 nm, indicating complex formation. Fluorescence spectroscopy revealed static quenching with a decrease in emission intensity. Analysis of entropy and enthalpy changes, alongside molecular docking results, indicated that the interaction is predominantly driven by hydrogen bonds and van der Waals forces. Free energy analysis further confirmed the spontaneous nature of the amitraz-HSA interaction. Understanding amitraz's binding mechanism and structural impact on HSA is crucial due to the potential alterations in protein function upon toxin binding.

90. Investigating the Antioxidant and Anti-Alzheimer Effects of Silver Nanoparticles Synthesized with Rosemary (*Rosmarinus officinalis*) Extract

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The aim of this study was to investigate the antioxidant and anti-Alzheimer effects of silver nanoparticles synthesized with rosemary extract. Extraction of this plant was done by soaking with water and alcohol. The amount of compounds in the extract of rosemary plant was determined by gas mass chromatography method, inhibition of free radicals by DPPH method, inhibition of amyloid fibers production by transmission electron microscope (TEM) and visible spectroscopy method. Production of silver nanoparticles by visible and infrared spectroscopy, structural characteristics by dynamic light scattering (DLS), electric charge (Zeta Potential), scanning electron microscopy (SEM), X-ray energy diffraction spectroscopy (EDX) and beam diffraction X-ray (XRD) was performed. According to the results of gas-mass chromatography, the most compounds found in rosemary plant extract were Camphor and Bourneol. Investigating the antioxidant activity of rosemary plant using the DPPH method showed that the percentage of antioxidant activity increases with increasing nanoparticle concentration of rosemary plant extract. UV-Visible spectrophotometric analysis showed the highest amount of absorption in the wavelength range of 270 nm. The results of the zeta potential test showed this number to be -78.4 ± 0.25 . Morphological examination with SEM showed spherical particles. The results showed that rosemary plant has the lowest percentage of production of amyloid fibers at the concentration of 54 mg/ml and the highest at the concentration of 270 mg/ml. The results of the TEM method showed that the size of the amyloid filaments is about 50-100 nm. Nanoparticles obtained from rosemary plant have antioxidant and anti-Alzheimer effects and according to these properties, it can be introduced as an agent controlling the complications caused by Alzheimer's disease.

91. Investigating the Biological Effects of Zinc Oxide Nanoparticles (Zno) on the Reproductive System of Male Flies (*Dacus ciliatus*) in Laboratory Conditions

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Due to their special physical and chemical properties, nanoparticles have been widely used in cases such as drug delivery, vaccine production, and agriculture. Many nanoparticles have a harmful effect on spermatogenesis. Today, the use of pesticides, because they contain toxic chemicals to kill pests, can affect non-target species such as humans, plants, and animals. (*Dacus ciliatus*) is an invasive pest whose larvae attack a wide range of Jalizi fruits, including melons. And it causes spoilage of fruits and causes a lot of economic damage in Jaliz farms. In this research, the toxicity effect of zinc oxide nanoparticles on the male flies of this pest was investigated in laboratory conditions using cultivated flies. Bioassay experiments were performed at concentrations of 0.1 and 0.2 grams of zinc oxide nanoparticles. In the experiments, nanoparticles were mixed with the solid food of adult male flies. The photoperiod was 12-12 and the temperature was 30 degrees Celsius. After 7 days, the number of sperms was counted. The results of the study showed a decrease in the number of sperms in the experimental groups compared to the control group. In addition, the reduction of sperms was observed in higher doses of nanoparticles. Zinc oxide nanoparticles have a negative effect on the number and morphology of sperms. Zinc oxide nanoparticles can be used to produce new pesticides, insecticides and insect repellants. Nano insecticides not only increase the effectiveness but also reduce their adverse effects on non-target organisms. Keywords: pest, nanoparticles, toxicity

92. Examination of Radiation and Drug Program on NO

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Cancer is a genetic disease that manifests as uncommon hereditary tumors or as acquired abnormalities in somatic cells. Among all cancers, stomach cancer ranks second globally in terms of incidence and mortality. The main treatment is surgery, and chemotherapy and radiation therapy are the next lines of treatment. Within physiological processes, nitric oxide (NO) is a crucial signaling chemical. One of the ten small molecules found in nature is nitric oxide (NO). It is expressed in various isoforms by a family of nitric oxide synthases in a variety of mammalian cells by means of converting L-arginine to L-citrulline. Based on research, NO has a dual effect on tumors: at concentrations less than 100 nm, it promotes angiogenesis, proliferation, and metastasis of the tumor; at higher concentrations of 400–500 nm, it inhibits tumor growth. Variations in NO concentration, cell microenvironment, tumor cell cycle stage, and the frequency of oxidizing and reducing factors are among the factors that influence NO. We investigated the simultaneous effect of doses of 10, 30 and 90 µg/ml of silymarin and 0.5 G of X-ray and measured the amount of NO and checked the viability of AGS cells with MTT. With the simultaneous effect of a high dose of medicine and radiation and the subsequent increase in the concentration of NO, its cytotoxic property was able to overcome the characteristic of increasing tumor proliferation and we hope it can be used to treat stomach cancer.

93. Investigating the Quenching Effects of Graphene Oxide Nanoparticles

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The nanostructures of carbon in their different forms have been used in development of nanosensors. graphene oxide (GO) is attractive biomaterial from the carbon family, which is capable of dynamically interacting with the probe (labeled targets). Accordingly, GO is widely used in biosensors. One of the main applications of biosensors is the detection of biomolecules that are either indicators of a disease or targets of a drug. graphene oxide can act as a quencher in the transducer to generate fluorescent biosensors. The most common attachment method used for ssDNA immobilization onto graphene oxide is EDC/NHS chemistry. In the electrochemistry approach, the immobilization of DNA is done via π - π interactions on the surface of graphene oxide. GO with its functional groups (carboxylic, hydroxyl groups) can also be used to covalently interact with the DNA. The labeled ssDNA is mounted on GO and making the fluorescent signal off, in the presence of target DNA, the single-stranded DNA sequence could bind to the complementary sequences, as a result ssDNA release from GO and fluorescence is restored. In this study to determine the optimum concentration of GO for quench the fluorescence of labeled probe, 10 μ l (10 pM) of labeled probe was mixed with different concentration of GO and fluorescent quenching measured by fluorescence spectrometry. In optimization of GO concentration with increasing the amount of GO, the fluorescence intensity of labeled probe was gradually decreased and completely quenched at a concentration of 35 μ g/ml. Thus, concentration of 35 μ g/ml were chosen as the functional GO concentration.

94. Investigation of the Cytotoxic Effects of Gold (III) Complex Conjugated with Hydantoin Derivatives on Human Gastric Cancer AGS Cell Line

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Gastric cancer is considered one of the most common cancers worldwide. Today, early diagnosis and effective treatment of gastric cancer, are a crucial health challenge for developed societies. By discovery of cisplatin as a potent chemotherapy medicine, application of metal components as an anticancer drug has been noticed. Hydantoin derivatives have biological properties and their combination with gold elements enhances pharmacologic effects of gold metal components. Our aim in this research was investigation of cytotoxic effects of gold (III) complexes conjugated with Hydantoin derivatives on human gastric cancer AGS cell line. In this study, AGS cell line was cultured in DMEM media with 10% FBS, in 37°C and 5% CO₂. The cells were seeded in 96 wells culture plate, with 6×10^3 cell/ml per each well. After 24 hours, the cells were treated with 250 μ g/ml, 300 μ g/ml, 400 μ g/ml, 500 μ g/ml, 600 μ g/ml, 700 μ g/ml, 800 μ g/ml, 900 μ g/ml concentrations of the complex solution for 24 hours. Cell viability analysis was performed by MTT assay. Achieved data were analyzed using Graphpad Prism 10 software. MTT assay results clarified that the gold complex with various concentrations have potent cytotoxic effects on AGS cell line after 24 hours. The comparison of treated groups with control group showed a significant difference with P value<0.001. The results of this study revealed that the Gold complex conjugated with Hydantoin, has cytotoxic effects on AGS cell line and in order to investigate the mechanism of action of this complex, more cellular and molecular studies are needed.

95. Investigating the Cytotoxic Effects of Ethyl Acetate Extract of Shirazi Pea Plant (*Teucrium persicum*) on Breast Cancer Cells (MCF-7)

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Teucrium persicum is a well-known native Iranian plant that grows in the southern regions of Iran. In traditional Iranian medicine, it is used as a decoction to treat abdominal pain, blood lipids and diabetes. We have previously found that the methanolic extract of *Cleopore* has significant cytotoxicity and inhibitory effects on various cancer cells. This study was conducted with the aim of identifying the chemical components of *T. persicum* ethyl acetate extract and investigating its effects on MCF-7 cells. Experiments included MTT, DAPI staining. Chemical analysis of the extract using GC/MS identified 30 compounds. N-hexadecane, phytol, salvin and eicosan were the most abundant compounds in the extract. The extract had a significant cytotoxic effect on MCF-7 cells with an IC₅₀ value of 50 µg/ml for 48 hours. DAPI staining assay showed that the extract caused morphological changes, chromatin condensation and nuclear fragmentation. In general, the strong cytotoxic and inhibitory effects of ethyl acetate extract of *T. persicum* on MCF-7 cells can be attributed to the presence of some phytochemicals that may regulate the expression of genes related to cell death. However, more extensive investigations are necessary to identify the active component(s) and elucidate the underlying molecular mechanism(s).

96. Investigating the Inhibitory Effects of Pyrogallol on *Tau* Protein Fibrillation: Implications for Alzheimer's Disease Therapy

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The accumulation of numerous tau protein fibrils plays an important role in the development of Alzheimer's disease in humans. The natural tau protein is disordered and untangled, with a low tendency to aggregate. Tau is one of the most important microtubule-associated proteins that stabilizes microtubules in the central nervous system, primarily found in axons. The accumulation of tau protein leads to the formation of two types of filaments, which ultimately contribute to the construction of neurofibrillary tangles (NFTs), resulting in disruption of the microtubule network and defects in cellular cytoskeleton function. Pyrogallol, an aromatic trihydroxy phenol, possesses antifungal and anti-psoriasis properties and does not cross the blood-brain barrier. In this study, after purifying tau protein (isoform 1N4R), the effect of pyrogallol on its fibrillation was examined using spectroscopic techniques and computational methods. The results indicated that pyrogallol inhibits amyloid fibril formation in a dose-dependent manner under in vitro conditions. Molecular dynamics/docking simulations showed that the hydroxyl groups attached to the aromatic ring of pyrogallol stabilize the structure of the tau protein through hydrogen bonding interactions, thereby preventing the formation of amyloid fibrils. Considering the results observed in vitro conditions, the synthesis of compounds with structures and functional groups similar to pyrogallol that can cross the blood-brain barrier may play a significant role in reducing tau aggregation in vivo conditions.

97. Investigating the Effects of Fullerene Nanoparticles (C60) on the Amount of NO *In Vitro*

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Exposure to radiation due to the creation of free radicals can lead to cell damage and death. Fullerenes are the third natural allotropic species of carbon with an aromatic structure that are usually soluble in organic hydrocarbons and halogenated solvents. Fullerene nanoparticles (C60), as the most important member of the fullerene family, consist of 60 carbon atoms, which with unique physical and chemical properties, are a candidate material for many applications of nanotechnology and drug delivery in industrial and medical fields. Fullerenes are powerful antioxidants that readily and rapidly react with free radicals that are often the cause of cell damage or death. In this research, the cultured Adipose stem cells were divided into 4 groups. The first, second, third, and fourth groups are associated with 0, 5, 10, and 15 micrograms of fullerene nanoparticles (C60), respectively. After 1 hour of incubation, the plate containing cells treated with nanoparticles was exposed to X-rays for half an hour. Then, the amount of nitric oxide, which is secreted as a free radical in the immune response, was investigated using the NO assay kit. The results indicate that during the treatment of cells with fullerene nanoparticles, the amount of NO produced decreased. And as the dose of fullerene nanoparticles used increased, the amount of NO produced decreased. These nanoparticles act like a "radical sponge" and can neutralize more than 20 free radicals. They protect the Adipose stem cells exposure to ionizing radiation.

98. Coupling of Ascorbyl Palmitate and Vitamin E Succinate in the Paclitaxel-HSA Formulation

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The treatment of breast cancer, a life-threatening disease more prevalent in women, typically involves conventional therapies such as chemotherapy drugs. However, this treatment can also harm normal cells. Therefore, targeting drug delivery to cancer cells remains a significant challenge in this therapeutic approach. Polymeric nanoparticles, due to their remarkable properties like biodegradability and biocompatibility, are employed in drug delivery systems, with protein-based polymeric systems being particularly prominent. In this study, we aim to enhance solubility and reduce toxicity by incorporating two antioxidant substances, Vitamin E succinate and ascorbyl palmitate, into paclitaxel bound to human serum albumin nanoparticles (nab-ptx). To achieve this, paclitaxel and alpha-tocopherol succinate (a derivative of Vitamin E succinate) are dissolved in an ethanol-based solvent. This solution is then homogenized with an aqueous solution containing human serum albumin nanoparticles and ascorbyl palmitate to synthesize the targeted polymeric nanoparticle. The nanoparticles were studied by Uv-vis spectroscopy, fluorescence, DLS and FTIR. We anticipate that the synergistic effects will enhance apoptosis induction and improve drug delivery, leading to better therapeutic outcomes.

99. The Effect of Hydralcoholic Extract of Daphne Plant on Expression Level of Some Apoptosis Related Gene in Ovarian Cancer Cell Lines (A2870)

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Ovarian cancer is an aggressive epithelial ovarian tumor and remain one of the leading causes more deaths of the affected women with this disease. Currents treatment methods are a combination of surgery, drug and radiation therapy that the effect post-therapy could affect the

patients. *Daphne* species with the scientific name *D. mucronata* is an evergreen shrub of the Thymelaeaceae family which consists of approximately 90 species and is native to Pakistan. This plant is found in some mountainous areas of Iran. Research studies have shown that leaf extract of *daphne* had antibacterial and antifungal properties and also had an inhibitory effect on esophageal, stomach, hepatoma, and cervical cancer cells. In this research, the lethal effect of the hydroalcoholic extract of *daphne* plant on the survival of A2870s cancer cells by MMT assay and the expression of MAPK8 and PTK2 genes in the treated cells using qRT-PCR in 3 time periods (24, 48 and 72 hours) was investigated. The results of the cell survival indicated that the concentration of the plant extract that can inhibits 50% of the cells was determined as 105.40, 85.98 and 81.38 $\mu\text{g/mL}$ for the time periods of 24, 48 and 72 hours, respectively. Examining the expression of the tested genes showed that the hydroalcoholic extract of *daphne* has not remarkable effect on expression level of MAPK8 (1.1) and PTK2 (0/9) genes. So that there was no significant difference in expression compared to the control. According to the results, it can be concluded that *daphne* extract had a negative effect on the survival of A2870s cancer cells. But did not show a significant increase ($P\text{value} \leq 0.05$) in expression level of involved genes in anticancer activities and molecular pathways in compared to control cells. The use of markers and other gene pathways is suggested for additional studies.

100. Investigating the Association Between Ellis-van Creveld Syndrome (EVC) Gene Missense SNPs with Mandibular Prognathism: An In-silico Study

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Class III malocclusion is a special type of jaw deformity that can result in mandibular prognathism (MP). The Ellis-van Creveld syndrome (EVC) genes encoded two EVC ciliary complex subunits 1 & 2 proteins. EVC-1 contains a leucine zipper and a transmembrane domain in the primary cilium basal body and is expressed in the developing skeleton. This study aimed to investigate the association between EVC-1 gene missense single nucleotide polymorphisms (SNPs) and mandibular prognathism by computational and in-silico studies. All missense SNPs with a minor allele frequency (MAF) ≥ 0.1 were selected in the NCBI-dbSNP database. The effect of SNPs based on functional, structural, and stability aspects of the protein and mRNA were investigated by online softwares: SIFT, Polyphen-2, Mutation Assessor, PantherDB, PROVEAN, PhD-SNP, I-mutant, iStable, MUpro, RNAsnp, GorIV, and HOPE. Analysis of missense SNPs by SIFT, Polyphen-2, PhD-SNP, and PantherDB showed that rs1383180 (c.1727G>A; p. R[Arg]576Q[Gln]), is a deleterious SNP. The prediction effects of this loci by I-mutant, iStable, and MUpro also showed p.R576Q substitution may decrease the stability of EVC protein. The GorIV and HOPE analysis showed that this substitution directly impacted the second structure at that specific point and altered the coil and helix structures of the amino acids. Furthermore, c.1727G>A transition has been significantly associated with structural changes in mRNA (p-value: 0.6583), potentially emphasizing the translation of EVC gene. Since EVC contain a key-role in skeletal development, mutant individuals may be susceptible to MP. These findings could be opportunity for future studies in the MP's management.

101. Association of DRD2, DRD4 and COMT Genes Variants and Their Gene-Gene Interactions with Antipsychotic Treatment Response in Patients with Schizophrenia

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Antipsychotic drugs are the first line of treatment in schizophrenia; although antipsychotic responses indicate a wide interindividual variety in patients with schizophrenia. This study aimed to investigate the association between four polymorphisms in DRD2, DRD4 and COMT genes and their gene-gene interactions with antipsychotic treatment response in patients with schizophrenia. A total of 101 patients with schizophrenia were recruited and stratified in treatment responder and treatment resistant groups based on the published criteria of resistant to treatment using PANSS. Clinical and demographic factors were analyzed. Genomic DNA was extracted from whole blood and genotyping for the four polymorphisms were done by ARMS-PCR, PCR-RFLP and gap-PCR. Gene-gene interactions were analyzed by logistic regression. In case of DRD2 A-241G, G allele was significantly associated with resistant to treatment. Regarding DRD4 120-bp duplication, 240/240 genotype was significantly associated with resistant to treatment comparing to other genotypes in a dominant model. The genotype combination of DRD4 240/240 and COMT Val/Val was significantly associated with treatment resistant. Among DRD2 AA genotype, COMT met allele carriers which also had a 120 bp allele of DRD4 had a significantly better response to antipsychotics. Moreover, analysis of clinical and demographic factors demonstrated a significantly longer duration of hospitalization and higher chlorpromazine-equivalent daily dose in resistant to treatment patients. Discovering the polymorphisms which effect treatment response to antipsychotics will provide the possibility of genetic screening before starting an antipsychotic treatment which enhances the chance of responding to antipsychotics and decreases drugs side effects and costs.

102. Association between Genetic Polymorphisms of 40 bp Ins/Del in Promoter of MDM2 Gene with Risk of Colorectal Cancer

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Colorectal cancer is the third most common malignancy and the fourth leading cause of cancer death in the world. This cancer is a multifactorial disease in which factors such as genetics, environment and lifestyle are very significant. Genetic factors include genetic polymorphisms. One of these genes is the MDM2 gene, which is located on the short arm of chromosome 12 (12q14.3 – q15.1). This gene has two promoters. Genetic polymorphism in any of the promoters may alter MDM2 expression. In this study, the association between 40 base pairs of deletions and insertion in this gene and the risk of colon cancer was investigated in case_control methode. The study included 200 patients with colorectal cancer (72 females and 128 males) and 226 healthy individuals (66 females and 160 males). PCR_ Electrophoresis method was used to determine the genotype and the data were analyzed by SPSS statistical software. Logistic regression analysis showed that there was a significant correlation between ID genotype (P= 0.008, CI = 0.38-0.86, OR = 0.57) and ID + DD genotype (P = 0.007, CI = 0.40-0.86, OR = 0.59) compared to genotype II and risk of colorectal cancer. The D allele are associated with a reduced risk of susceptibility to colorectal cancer

103. Investigation of the Correlation Between Serum Levels of lncRNA MALAT1 and the Risk of Type 2 Diabetes in Postmenopausal Iraqi Women

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MALAT1, initially identified in association with lung cancer, plays a significant role in regulating gene expression and cellular processes. This study aimed to investigate the correlation between the long non-coding RNA (lncRNA) *MALAT1* and type 2 diabetes mellitus in postmenopausal Iraqi women. The study included 50 postmenopausal women with type 2 diabetes and 30 healthy controls, aged between 48 and 77 years. The expression levels of lncRNA *MALAT1* in serum were measured using RT-qPCR. Results showed that the level of *MALAT1* expression in the serum of women with type 2 diabetes was significantly higher (4.46-fold) compared to the healthy control group. Moreover, a significant correlation was observed between elevated *MALAT1* expression and several diabetes risk-factors such as hypertension, high triglycerides, and total protein ($P < 0.05$). These findings suggest that *MALAT1* may contribute to the pathogenesis of type 2 diabetes and could serve as a potential biomarker for its early detection. Furthermore, the study indicated that lifestyle factors, such as weight loss and smoking cessation, can influence *MALAT1* expression. Given the crucial role of *MALAT1* in diabetes, this molecule could not only be used for the early diagnosis of type 2 diabetes in postmenopausal women but also as a novel therapeutic target for this disease. However, further studies are required to confirm these findings and develop *MALAT1*-based therapies.

104. Investigation of Unsaturated Fatty Acids Alpha-Linolenic Acid and Linoleic Acid on Catecholase Tyrosinase Activity of Edible Mushroom (*Agaricus bisporus*)

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Tyrosinase enzyme is one of copper-containing enzymes that has cresolase and catecholase activity on tyrosine substrate and is widely present in microorganisms, animals and plants. This enzyme plays an important role in the biosynthesis of melanin in hair color, mammalian skin and related disorders. Tyrosinase inhibitors are used to prevent severe skin diseases, in skin whitening creams and to prevent browning of fruits. In this study, the effect of alphalinolenic acid and linoleic acid on catecholase tyrosinase activity of edible mushroom was investigated by double beam UV-vis spectroscopy method. Catecholase activity was measured by extracting the caffeic acid substrate at its maximum absorption wavelength, i.e., 311 nm, time 2 minutes and enzyme concentration 11.8 micromolar or 40 enzyme units per milliliter and in phosphate buffer with pH = 6.8 and temperature 293 K. The effect of fatty acids alpha-linolenic acid and linoleic acid on catecholase activity showed a mixed mode of inhibition, the constant value of inhibition was 0.34 and 0.53 mM, respectively, and α value (substrate and inhibitor interaction coefficient) for alpha-linolenic acid and linoleic acid, respectively. 2 and 1.5 were determined. Further study on the production of pigment in mouse melanoma cells and human melanocyte cells under the influence of these inhibitors is suggested. Keywords: Tyrosinase, mixed inhibition, catecholase activity, caffeic acid, spectroscopy

105. Investigating the Immunogenicity of Corona Vaccine Candidate (S1) Produced in Prokaryotic Host

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Since the new human corona virus has a very high treatment cost and still shows a high death rate in infected people. If the vaccine is widely used, we will have a lower rate of corona infection. Making this vaccine is important and its results can be used in research centers and pharmaceutical companies. Several laboratories around the world have begun conducting studies to develop a vaccine to prevent the disease. Most of the vaccines targeted the specific protein subunit of the glycoprotein of SARS-CoV (S1). Corona virus uses this glycoprotein to bind and enter host cells. Therefore, a vaccine that creates a strong immune response against this p protein will have a significant effect in preventing the virus from entering host cells during natural infection. In short, the goals of the upcoming research are: creating maximum immunogenicity using protein (S1) against corona in the presence of suitable adjuvant, reducing the country's treatment costs in dealing with corona by creating immunity against corona virus, optimizing the method to improve the quality of the produced vaccine By conducting animal tests (mouse) to ensure the accuracy of the function of the recombinant protein (S1) of the corona virus, the production of a recombinant protein vaccine that has an appropriate ratio of (S1) adjuvant that stimulates the immune system well and can be used on an industrial scale. The implementation steps of the research are: 1. The production of protein conjugated with aluminum hydroxide (adjuvant) 2. Injection into the animal 3. Taking blood from the animal 4. ELISA kit in order to determine the antibody titer are generally the steps of this research. Corona virus is a very dangerous virus that has a high cost of treatment and a high mortality rate, that's why it is very important to produce a vaccine that causes immunity against the virus, which can reduce the number of infections and deaths. As a result of reducing the rate of infection and death due to corona virus and reducing the medical costs of the country, it is possible that the surface polysaccharide of corona virus (S1) is a suitable candidate for making a vaccine and creating immunity against corona virus.

106. Evaluation Expression COX-2 in Prostatic Carcinoma by PCR and Immunohistochemistry and Its Relationship with Gleason Score

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Prostate cancer is among the most common malignancies. Despite the high prevalence and importance of prostate cancer, the molecular mechanisms underlying its development and progression remain poorly understood. This cross sectional study was conducted on 50 cases of prostatic carcinoma with different Gleason score referred to Sina hospital in Tehran in Iran in 2016. The gene expression was assessed by using the immunohistochemistry staining and PCR technique. The presence of neoplasia on prostatic biopsy induced strong staining and increased in mRNA level of COX-2 expression when compared to normal tissue (P-Value >0.05). The expression is not well associated with different Gleason grades of prostatic carcinoma. The expression of COX-2 protein by immunohistochemistry staining and PCR technique in our study offers the valuable diagnostic information. Thus, we think this marker might be studied in larger series of patients for its further validation as diagnostic factor in prostate biopsies.

107. Investigating the Expression of miR-34c-5p in the Seminal Fluid of People with Non-Obstructive Azoospermia Individuals

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Non-obstructive azoospermia (NOA) is the most severe clinical diagnosis in cases of male infertility. Investigate has appeared that miRNAs play a pivotal part in spermatogenesis and can serve as potential biomarkers for diagnosing NOA and foreseeing results of helped regenerative innovations. Furthermore, differential expression of miRNAs in seminal plasma has been connected to the nearness of leftover spermatogenesis in testicular tissue, advertising potential experiences into foreseeing the victory of testicular sperm extraction methods in NOA patients. miRNAs play a crucial role in male infertility. miRNA expression profiles in the seminal plasma of patients with NOA are distinguished by histopathological patterns. This study examines the alterations in the expression of miR-34c-5p in the semen of non-obstructive azoospermic individuals compared to those with poor sperm quality and normozoospermic controls. The study population consisted of 35 individuals with normal spermatogenesis, 35 individuals with poor spermatogenesis, and 15 individuals with non-obstructive azoospermia (NOA). RNA was isolated from the seminal plasmas, and complementary DNA (cDNA) was synthesized. Quantitative real-time PCR (qRT-PCR) analysis was employed to measure the expression levels of miR-34c-5p. miR-34c-5p expression was significantly lower in the seminal plasma of patients with NOA and poor than normal fertile controls. Our results indicate that miR-34c-5p in seminal plasma may serve as a potential biomarker.

108. Investigation of miRNA-371b-5p Expression in Serum Samples of Breast Cancer Patients

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Breast cancer (BC) is one of the most common malignancies diagnosed in women worldwide, which has the highest incidence and mortality rate. For women, breast cancer alone accounts for nearly a third of all new cancer diagnoses. MicroRNAs (miRNAs) are a large family of small (20-22 nucleotides) non-coding RNAs, which regulate approximately 30% of the protein-encoding genes in the human genome at the post-transcriptional level by binding to the 3'-UTR sequences. This leads to mRNA degradation or inhibition of the protein translation. Further investigations at the genome levels have shown that many miRNA genes are located in cancer-associated genomic regions and therefore can be considered as potential biomarkers and therapeutic targets. For this purpose, miRNA-371b-5p was selected by using bioinformatic analysis. Serum samples taken from 26 breast cancer patients and 26 healthy people were examined for the miRNA-371b-5p expression levels by using real-time PCR experiments. The expression levels of miRNA-371b-5p in the serum samples of breast cancer patients were found to be significantly higher compared to those of healthy individuals. We suggest that expression of this miRNA can be considered for early prognosis of breast cancer.

109. The Evaluation of MIM (Missing in Metastasis) Protein Expression Involving in Regulation of Cell Migration After Treatment with Stem Cell Secretome in Breast Cancer Cells (MDA-MB-231)

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Metastasis in breast cancer (BC) is deadly and accounts for over 90% of cancer-related deaths in women. Due to ineffectiveness of current treatment methods for metastatic BC, there is an urgent need to discover new therapeutic approaches. Despite their dual effects on growth or suppression of cancer cells, mesenchymal stem cells and factors they secrete (called “secretome”) have shown interesting potential for therapeutic uses in cancer. Meanwhile, MIM (Missing in Metastasis), a multi-functional protein of I-BAR (Inverse BAR) domain family of proteins which plays a role in metastasis, actin cytoskeleton, and plasma membrane regulation, can exhibit suppressive effects on metastasis in BC. In this research, we investigate the effects of human amniotic mesenchymal stem cells’ (hAMSCs) secretome on BC cells (MDA_MB_231) and their cell migration by evaluating the expression levels of MIM protein. First, to treat MDA_MB_231 cells with hAMSCs’ secretome, they were co-cultured for 72 hours using Transwell 6-well plates. Then, proteins from control and treated cells were extracted, and through western blotting, expression levels of MIM protein were determined. Furthermore, motility of co-cultured MDA_MB_231 cells was evaluated after 24 hours using invasion assay. Our findings illustrated that expression of MIM protein was increased in treated MDA_MB_231 cells. Also, invasion assay showed that, compared to control cells, migration of treated MDA_MB_231 cells was reduced. These results suggest that secretome of hAMSCs can potentially suppress metastasis in BC cells through up-regulation of MIM, serving as a new potential treatment method to prevent metastasis in BC. Our results suggest that secretome of stem cells may be a new platform in breast cancer therapy.

110. Bioinformatic Investigation of Gefitinib Effect on Cell Cycle Related Genes in PC3 Cell Line

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Prostate cancer is a frequently diagnosed cancer in men. Gefitinib, a common chemotherapeutic drug, is used alone or in combination with other treatments in several cancers such as prostate cancer. Previous studies confirmed its inhibitory effect on cell cycle in PC3 prostate cancer cell line. This study aimed to evaluate the expression level of cell cycle related genes in the PC3 cell line under gefitinib treatment. GSE53181 dataset was selected from GEO database. Differentially expressed genes (DEGs) between control and treatment groups were identified via GEO2R online tools and R program. STRING database was used to construct a protein–protein interaction (PPI) network of DEGs. The hub genes were obtained using the cytoHubba plugin in Cytoscape. Cyclin A2 which is required for S to G2/M transition of cell cycle was identified as a hub gene with logFC = -3.8 and adj p-value < 0.05. Cyclin A2 related genes based on the STRING database include SKP2, CDC6, CDC20, CDK1, and CDK2 which their expressions were also decreased under gefitinib treatment in PC3 cells. All the mentioned genes were enriched in cell cycle progression. In conclusion, our data identified some molecular mechanisms of gefitinib effect on cell cycle inhibition in PC3 cells.

111. A Bioinformatics Analysis on Representative Photoproteins

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Mnemiopsis leidyi contains similar variants of photoproteins which are selected based on the evolutionary adaptation. Differences between these photoproteins are physical properties of emitted light including initial intensity, decay rate and characteristic wavelength as well as the stability of photoprotein. In current work, we analyzed the sequence and structure of photoproteins from Mnemiopsis leidyi and two other photoproteins using various bioinformatics tools. Similarity search between the sequence of the target and other photoproteins was performed by the BLAST program, and the selected sequences were used for multiple sequence alignment by the Clustal Omega program followed by the EsPript program. The Multiple sequence alignment file then were used as input for the phylogenetics analysis by the Phylip program. It was found that variable positions in the conservation lines is greater than those of highly conserve line, demonstrating high tolerability of the ancestor sequences to random mutations. It was also found that photoproteins from Mnemiopsis leidyi have a common ancestor sequence with the photoprotein obelin from Obelia longissimi, while Aequorin from Aequorea Victoria occupy the root of the phylogenetics tree. Structural models of several photoproteins were constructed by the MODELLER program, and comparing the structures with the Chimera program showed that the main difference between the structures is the number of stabilizing interactions between the photoprotein and substrate which is reflected in the stability of the activated complex for light emission.

112. Bioinformatics Analysis on the Sequence and Structure of Chondroitinase ABC I for Site directed Mutagenesis

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Chondroitinase ABC I from Proteus Vulgaris (UniProt ID: P59807) is a broad-specific glycosaminoglycan lyase which degrades several types of the respective compounds. Sequence analysis by the ProtParam server shows that the total number of negatively charged residues is 103 which is only one unit greater than those of negatively charged. Here, we used the crystal structure of protein and examined it by the VADAR server. It was found that Alanine at position 360, located in the helix fragment at the beginning of the catalytic domain, is in contact with the polar solvent molecule. Accordingly, we changed it into Glutamic acid as a negative charged residue. The structural models of mutant protein were constructed by the MODELLER program Ver. 10.4, and the best structure for further analysis was selected according to the Z-Dope score. Superposition of the structures (wild-type and mutant) showed that the mutation does not change the whole structure of protein. However, comparing the contact maps of structures indicated that inter-residue distances in central domain is slightly decreases toward structural compactness in mutant protein compared with those in the wild-type enzyme. It can be said that replacement of a surfaced-exposed hydrophobic residue with a negatively charged one has two important consequences. Firstly, the interaction of the charged residue with the electric dipole of water molecules is thermodynamically more favorable. Secondly, increasing the net charge of protein increases the solubility of proteins via creation of the repulsive electrostatic interaction which prevent the protein aggregation at higher temperatures.

113. Bioinformatic's Investigation of Apyrase Protein Structure in *Aedes Aegypti* Mosquito

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The *Aedes aegypti* mosquito is found in warm and temperate regions all over the world. This dark mosquito measures between 4 and 7 millimeters in length and is distinguishable by the white markings on its legs. After puberty, female mosquitoes acquire the ability of hematophagy, during hematophagy, the mosquitoes penetrate the skin of their hosts using specialized mouthparts, releasing chemical agents that facilitate feeding on blood. While feeding, these mosquitoes can transmit viruses and pathogens, leading to numerous diseases. One key gene highly expressed in female mosquitoes post-maturity is the APY gene, which encodes the apyrase protein. This protein, composed of 562 amino acids, plays a crucial role in hematophagy by preventing ADP-, collagen- and thrombin-dependent platelet aggregation in the host. As the functionality of proteins is largely determined by their secondary and tertiary structures, understanding these structures is essential for grasping protein function. The three-dimensional configurations of numerous proteins have been elucidated in laboratories using techniques like X-ray diffraction or NMR. Many proteins remain uncharacterized due to insufficient properties for analysis using standard methods, and Apyrase is one such protein. This study aimed to predict the structure of the Apyrase protein using the Phyre2 Server, a platform for fold recognition. The amino acid sequence of the Apyrase protein, designated as P50635, was extracted from the NCBI protein database. Then it was compared with a library of structure and folding of all proteins in the Phyre2 Server. Ultimately, the crystal structure of the 5'-nucleotidase precursor protein from *Thermus Thermophilus* HB8, consisting of 499 amino acids and displaying the highest similarity and overlap with the target protein, was identified as a model. This model was evaluated by uploading its PDB file to the ProSA-Web server and subsequently refined using Swiss-PdbViewer software. The findings indicated that the reported model has good stability and spatial structure. Apyrase protein primarily consists of alpha-helix and beta-sheet structures, with a high percentage of hydrophobic amino acids. This investigation demonstrated that identifying the type and quantity of amino acids in this protein's specific structure can lead to various applications. For example, enables the development of engineered drugs for preventing blood clots or engineered drugs for inhibition of hematophagy.

114. Bioinformatic Investigation and Analysis of Myoz2 Protein Network in Poultry

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The Myozenin 2 gene (Myoz2) belongs to a family of sarcomeric proteins that convert calcineurin to alpha-actin at the Z-sarcomere and skeletal muscle cell lineage, and in particular plays a key role in skeletal muscle differentiation, growth and homeostasis the pectoral muscle. The aim of this research is the bioinformatic analysis of the Myoz2 gene in poultry and its network enrichment analysis. The protein sequence of Myoz2 in poultry was collected from the Uniprot database, and the physicochemical properties of Myoz2 were also studied and analyzed by ProtParam and ProtScale servers. The mutual effects and protein network interactions were examined using the STRING online tool. The results of the assessment of the physicochemical properties of Myoz2 showed that this protein with 263 amino acids and a molecular weight of 30041 Da is generally a relatively hydrophilic protein with an average hydrophobicity index (GRAVY) of -0.786 and a stability index of 54.23. The results of protein-protein interaction networks analysis for Myoz2 indicate that this protein plays a crucial role in interacting with LMOD2, TNNI1, MYL10, MYOT, MYL2, ACTN2, MYBPC1, MB, and MYBPC3 proteins in skeletal and cardiac muscles. These interactions contribute to the stability, regulation and correct contraction of muscles and underline

the great importance of the Myoz2 gene for muscle function. The results of this research show that changes in Myoz2 gene expression can influence muscle mass size.

115. Investigating the Stability of Alpha-amylase Enzyme Produced by Bacteria Isolated from Bakery and Rice Milling Factory Soil

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Alpha-amylase is one of the most important industrial enzymes that has many applications in textile, food, bakery, papermaking, animal and poultry feed and detergent industries. Therefore, it is important to find strains that are able to produce amylase enzyme with high activity in different temperature and pH conditions from cheap production sources. The aim of this study was to investigate the stability of alpha-amylase produced by bacteria isolated from cheap sources. Alpha-amylase producing strains were screened and isolated from sources including bakery soil and rice milling factory. The selected colonies were transferred to the production medium and centrifuged after 24 hours. Then, the supernatant was placed in separate test tubes at pH 5 to 10 and temperatures 40 to 70 degrees Celsius for 30 minutes in a shaker incubator. Enzyme activity was measured by the Dinitrosalicylic acid method, reading absorbance at 540 nm and using a standard curve. The results showed that the maximum amylase activity of the soil bacteria of the rice milling factory was at 50°C and pH 8 and from the bakery soil at 40°C and pH 6. The stability of enzyme activity in this temperature and pH range can be interesting from an industrial and economic point of view, and enzymes that are active at temperatures of 50 degrees Celsius and/or 6-8 pH are used in various industries such as starch gelatinization.

116. Investigating the Antioxidant Potential of Celery Extract and its Chitosan-loaded Nanoparticles Against Busulfan-induced Testicular Toxicity in Male Mice

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Busulfan (BSF), as a chemotropic drug, has side effects on spermatogenesis by increasing oxidative stress. Celery (*Apium graveolens* L.) has been used in traditional medicine to treat impotency. In this study, in order to preserve the biological properties of Celery extract, Chitosan nanoparticles (CSNP), which have an antioxidant effect, were used as a coating of the active substance. For these purpose 25 male mice was divided in five groups. The first group was kept as control, while mice of four other groups received a dosage of 40 mg/kg of Busulfan intraperitoneally. After four weeks, the second group considered as BSF-induced control and received only water. Other three groups received orally 200 mg/kg of Celery extract, 200 mg/kg CSNP and 450 mg/kg Celery extract-loaded chitosan nanoparticles (AG-CSNP), respectively, for four weeks. Based on results, in Busulfan-treated groups many vacuoles were observed in the seminiferous tubules and the number of sperm decreased significantly. The thickness of the testicular capsule also increased compared to the control group. The expression of Nrf2 and CAT was significantly reduced ($p \leq 0.05$). Histological evaluation showed that celery extract neutralized the harmful effects of busulfan to some extent, so that testicular regeneration and resumption of spermatogenesis was started. Chitosan nanoparticles administration had more rejuvenating effects on spermatogenesis. AG-CSNP treatment provided significant protection against BSF-induced oxidative stress by increasing catalase levels in the serum and the expression of Nrf2 and CAT ($p \leq 0.05$) so that the appearance of the tubules was more similar to the control group and has sperm.

117. Exploring the Therapeutic Potential of Mesalazine in Targeting *Tau* Aggregation in Neurodegenerative Diseases

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The formation of amyloid is the main characteristic of a wide spectrum of neurodegenerative diseases including Alzheimer's. Alzheimer's disease is a progressive condition characterized by the formation of nerve plaques by amyloid beta, neurofibrillary tangles composed of phosphorylated *tau*, and neuronal loss. There is a strong relationship between tau fibrillar aggregates, the development, and progression of neurological disorders. Tau plays a crucial role in microtubule assembly in the brain. Tauopathies encompass almost more than 20 different degenerative disorders, especially Alzheimer's disease. One small molecule containing a ring and a hydroxyl group is mesalazine (5-amino-2-hydroxybenzoic acid). Mesalazine serves as a potential anti-inflammatory and non-steroidal drug for patients with Crohn's disease and ulcerative colitis, and it has apoptotic effects on colon cancer cells. In this study, after tau protein purification (isoform 1N4R), the effect of mesalazine on its fibrillation was investigated using various spectroscopic techniques as well as molecular dynamics/docking computational methods. The results showed that mesalazine reduces the formation of tau amyloid fibrils under in vitro conditions. This inhibitory effect is likely due to the presence of an amine group on the aromatic ring. Based on the observed results under in vitro conditions, compounds with similar structures and functional groups to mesalazine can be synthesized that can cross the blood-brain barrier and consequently be investigated for their effects on reducing tau aggregates under in vivo conditions.

118. Evaluation of the Cytotoxic Potential of *Artemisia sieberi* Extract Against Breast Cancer Cell Line 4T1

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Breast cancer is one of the most common types of cancer among women. Much research is focused on finding new treatment methods with less side effects to treat this disease. *Artemisia sieberi* is one of the medicinal plants containing many secondary metabolites. The goal of this research is evaluation of the effect of the extract of the *A. sieberi* on breast cancer. First, extract of this plant was obtained by Soxhlet method with water, 60% and 80% hydroethanolic solvents. Then, by using MTT Test, the toxicity effect of the extract on 4T1 cancer cell line and MCF-10A normal cell line was studied. The results demonstrated that the extract of the *A. sieberi* has toxicity effect on the 4T1 cell line, while plant extract didn't show any toxicity effect on healthy cells. The highest toxicity effect was related to 60% hydroethanolic extract (IC₅₀:61.2 µg.ml⁻¹). IC₅₀ for 80% hydroethanolic extract and water extract were 63.4 and 79.8 µg.ml⁻¹. This study suggests, the extract of the *A. sieberi*, especially its hydroethanolic extract, has a high potential for inhibition of breast cancer cells growth. This plant represents a promising source for the development of new anti-cancer drugs. In order to confirm the results and evaluation of the mechanism of the effect of the extract on cancer cells, more studies are required.

119. Identifying the Expression Profile of Genes Involved in Human Brain Development Using Transcriptome Data

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In this research, transcriptome data (RNA-Seq) from four patient samples with neurological disorders (improper brain development) and four samples from healthy individuals were collected

from the NCBI-SRA database and initially quality-assessed. The quality-checked data were analyzed using specific RNA-Seq guideline. Finally, genes and molecular pathways involved in the pathogenesis related to disorders in brain development were reported. The study highlighted pivotal genes such as LMX1B, EN1, FOXA2 and NTSR1 and signaling pathways that linked to brain development, emphasizing their roles in processes like cortical formation and neuron differentiation. Moreover, pathways like Wnt/ β -catenin and Sonic hedgehog were crucial for neural patterning, while mTOR was key for synaptic modulation, underscoring the complexity and precision of genetic orchestration in brain maturation. The study's findings underscore the critical role of specific genes and signaling pathways in the intricate process of brain development. It revealed how deviations in these genetic mechanisms are closely associated with severe neurodevelopmental disorders, highlighting the significance of precise genetic regulation in brain maturation and the potential for targeted therapeutic.

120. Investigation of *pfmrp* Gene Mutation at Position 191 in *Plasmodium falciparum* and Its Association with Chloroquine Resistance

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The emergence of Chloroquine-resistant *Plasmodium falciparum* poses a significant challenge to malaria control efforts. The *pfmrp* gene in *P. falciparum* encodes the multidrug resistance-associated protein (MRP) involved in Chloroquine efflux. This study examined the frequency of H191Y mutation in the *pfmrp* gene among *P. falciparum* parasites from southeastern Iran. The significance of this study was to investigate the return of sensitivity of Iranian *P. falciparum* isolates to Chloroquine, considering its potential replacement for the current first-line drug. A total of 50 blood samples were collected from patients infected with *P. falciparum* in southeastern Iran from 2021 to 2023. DNA was extracted, and the *pfmrp* gene was amplified using Nested-PCR. The amplified DNA was analyzed through restriction fragment length polymorphism (RFLP) with the NsiI restriction enzyme. The PCR-RFLP analysis revealed that 43 isolates (86%) exhibited the mutant allele at position 191 of the *pfmrp* gene, which indicated an increase from the 76.5% frequency in comparison to previous study from the same area in ten years ago. This indicates the fixation of the mutant allele in the Iranian *P. falciparum* population. Despite the absence of Chloroquine pressure since 2007, the persistence of the mutant allele supports the hypothesis that the *pfmrp* gene is also implicated in resistance to the current first-line drug. These findings suggest that returning to Chloroquine may not be effective at this time. However, further analysis of other critical Chloroquine resistance markers in the *pfmdr1* and *pfert* genes with a larger sample size is recommended to confirm these results.

121. Investigation of Missense Polymorphisms in the *MTHFR* Gene with Risk of Preeclampsia: An In Silico Study

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Preeclampsia (PE) is a multi-system disorder characterized by hypertension and proteinuria. Multiple genes or single nucleotide polymorphisms (SNPs) may contribute to the incidence and development of PE. Elevated plasma homocysteine (Hcy) levels influence PE development through various mechanisms such as oxidative stress and imbalance of plasma NO/endothelin levels. Methylenetetrahydrofolate reductase (MTHFR) is crucial in Hcy metabolism. Furthermore,

polymorphisms in gene encoding enzymes involved in the methionine and homocysteine metabolism such as MTHFR could play a primary role in PE development. In silico studies can help to identify effective SNPs in the structure and function of MTHFR protein and could predict their association with PE. In this study, missense SNPs of the MTHFR and their effects on PE were investigated. At first, all common missense SNPs of the MTHFR gene monitored and SNPs with a minor allele frequency (MAF) ≥ 0.1 were selected from the NCBI-dbSNP database. The effect of each selected SNPs based on functional, structural, and stability aspects of the protein were investigated by the ten following online software: SIFT, Polyphen-2, SNPs & GO, PROVEAN, fathmm, PhD-SNP, I-mutant, MUpro, HOPE, and PSIPRED. Analysis of missense SNPs by SIFT, Polyphen-2, and PantherDB showed that rs1801133 (677C>T, A222V) could be as a deleterious SNP. The prediction of the effects of this SNP by I-mutant, MUpro, and PSIPRED also showed that the A222V substitution may decrease the stability of the protein. Based on this study, MTHFR-rs1801133 polymorphism could be correlated with the altered risk of PE.

122. Investigating the Effect of Hesperidin on the Expression of Apoptotic Genes in the Ovaries of Nickel-Treated Rats

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Environmental changes can increase the risk of exposure to heavy metals such as nickel, causing serious health damage, particularly to the ovaries. Due to its specific physical and chemical properties, nickel is widely used in industry; however, its excessive accumulation can damage body tissues and cause reproductive issues. In this study, 48 female rats were divided into six groups and treated with nickel and hesperidin for 21 days. Gene expression was analyzed using Real-Time PCR. The results indicated that nickel significantly decreased Bcl2 gene expression compared to the control group ($p < 0.05$) and significantly increased Bax ($p < 0.05$) and Caspase-8 ($p < 0.001$) gene expression, indicating a strong apoptotic response. The hesperidin-treated groups (HD50, HD100, and HD200) showed a significant reduction in Bcl2 expression compared to the control group ($p < 0.05$) and effectively reduced the expression of apoptotic genes such as Caspase-3, Caspase-8, and Bax compared to the nickel group. Immunofluorescence results also showed that nickel significantly increased Caspase-3 expression compared to the control group ($p < 0.0001$), while hesperidin reduced this increase compared to the nickel group. This study evaluates the ability of hesperidin to protect the ovaries from nickel-induced damage and provides scientific evidence for the use of this natural compound as a potential protective agent

123. Investigating the Effect of Pycnogenol on Nrf2 Gene Expression and Improving Memory Destroyed by Bbeta-amyloid in Male Wistar Alzheimer's rats

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Alzheimer's disease is a neurodegenerative brain disease that is the most common cause of dementia in the elderly. Natural compounds have been considered as an alternative therapy for the treatment of Alzheimer's disease. Traditional herbs and formulations which are utilized in neurodegenerative disease treatment are rich sources of antioxidant, anti-amyloidogenic, and anti-inflammatory compounds. This study examined the Investigating the influence of Pycnogenol on Nrf2 gene expression and improving memory destroyed by beta-amyloid in male Wistar Alzheimer's rats. All Rats were randomly divided into the following groups, (n=7 in each group): control group, Alzheimer group and Pycnogenol group. In the test groups, ketamine-xylazine intraperitoneal injection was performed to create an Alzheimer's model. Pycnogenol was

administered to the rats in the Pycnogenol group by oral gavage at a dose of 40 mg/kg and the control was gavage with normal saline in an amount of 0.5 ml for 21 days. Shuttle boxes are used in passive avoidance tests and Nrf2 gene expression using the Real-Time PCR method. Pycnogenol solution cause to a dimenished in Alzheimer's effects in the Pycnogenol group compared to the control group in the shuttle box test. In addition, Pycnogenol increased the expression of the Nrf2 gene (p-value <0.001). The results showed that pycnogenol can reduce memory and molecular disorders in Alzheimer's disease. In addition, the level of Nrf2 gene expression in the brain of the Alzheimer- model should be significantly increased. Pycnogenol as an herbal compound can increase the recovery or treatment of Alzheimer's disease.

124. Evaluation of Effect of the Transanthole on the Expression of The Pro-inflammatory Factor Interleukin-6 In the Hippocampus of Male Rats with Inflammation

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Interleukin-6 (IL-6) is one of the most important cytokines in the human body. which has a fundamental role in inflammatory and immune responses. Abnormal expression of IL-6 gene is related to various infectious and inflammatory diseases. Transanthole is the main compound of some medicinal plants such as cloves, cinnamon and thyme. and has an important role in inhibiting inflammation, the purpose of this study is to investigate the effect of Transanthole on the level of IL-6 expression in the hippocampus of mice with inflammation with Acrylamide. 16 male Wistar rats have been placed in 4 groups. Trans-anthole Treatment have been done for two groups and 28 days. Then the rats were anesthetized and the hippocampal tissue was removed. RNA extraction and cDNA synthesis were performed according to the kit protocol. IL-6 gene expression was measured with specific primers and β . Actin internal control using Real time PCR. The results have shown 50% redaction of IL-6 gene express compared to the control groups. According to the results of this study, Transanthole is an effective drug in reducing inflammation and can play an effective role in treating diseases caused by inflammation.

125. Investigating the Effect of FIDAS on Glutamate and Glutathione Reductase Levels in Gglioblastoma Tumor Cells

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Glioblastoma is one of the deadliest types of brain cancer, which has created great challenges for research and treatment due to its aggressiveness and resistance to treatment. Investigating metabolic and enzymatic mechanisms in this type of tumor can help to understand tumorigenesis and develop new treatment methods. This study investigated the role of glutamate metabolism and glutathione reductase activity in glioblastoma and evaluated the effect of FIDAS drug on these processes. In this research, the glioblastoma model was injected with c6 glioblastoma cancer cells (1x10⁶) in the parietal cortex of the rat brain. The desired ones were created. Glutamate level was measured using ELISA technique and glutathione reductase activity with enzymatic methods. Also, the effect of FIDAS drug on apoptosis, necrosis and angiogenesis in brain tissue was evaluated. The results showed increased glutamate levels and glutathione reductase activity in cancer tissue samples. Treatment with FIDAS decreased glutamate levels, decreased glutathione reductase activity, increased apoptosis and necrosis, and decreased angiogenesis in tumors. The findings of this study show an important role for glutamate metabolism and glutathione reductase activity in glioblastoma tumorigenesis, and the use of FIDAS drug is suggested as a new therapeutic approach.

126. Evaluation the Effect of Different Concentrations Methotrexate on Expression of CPEB2 in Leukemia

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In acute lymphoblastic leukemia (ALL), early lymphoid pioneer cells multiply and take the place of healthy hematopoietic cells in the bone marrow. Methotrexate, formerly known as amethopterin, is a chemotherapy agent and immune-system suppressant. It is used to treat cancer, autoimmune diseases, and ectopic pregnancies. The goal of this study was evaluation the effect of different concentrations methotrexate on expression of CPEB2 in leukemia. Methotrexate was prepared at dosages of 1 and 10 μ M in this investigation. The Jurkat E6.1 after cell passage was bought from the Pasteur institute of Iran at the passage and treated by methotrexate for 24h at the indicated concentrations. The expression variations of CPEB2 and the housekeeping GAPDH gene were then assessed by Real-time PCR. According this research, the expression of CPEB2 was 24 h of treatment with Methotrexate drug. According to the findings, a concentration of 1 and 10 at 24h was the expressions of CPEB2 at 1 and 10 μ M dosages were 1.7 and 2.7, respectively (p-value < 0.001). Results showed methotrexate doesn't have impact on the CPEB2 oncogene reduction process. The result suggests that Methotrexate doesn't have potential for controlling CPEB2 in ALL. More research is needed to provide more accurate results for oncogene expression changes studied in leukemia.

127. Investigating the Effect of Ferroptosis Inhibitor on Glutathione Peroxidase Enzyme Activity and Heme Oxygenase 1 Gene Expression Level in U_87MG Cancer Cells Under Hypoxia and Normoxia Conditions.

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Tumor cells have distinct metabolic characteristics compared to normal cells. Although normal cells usually suppress glycolysis under normal conditions (i.e., the Pasteur effect), tumor cells preferentially use glycolysis in the presence of oxygen, a phenomenon known as the Warburg effect. Accumulation of lactic acid due to the Warburg effect is a metabolic hallmark of the tumor microenvironment (TME), leading to low pH. Essentially, these unique metabolic properties can inhibit anti-tumor immune responses and make the TME more favorable for tumor progression. Therefore, a detailed understanding of metabolic programming in the TME is essential for the development of effective antitumor therapy. This research was conducted with the aim of investigating the effect of ferroptosis inhibitor on glutathione peroxidase enzyme and heme oxygenase 1 gene expression in U_87MG cancer cells under hypoxia and normoxia conditions. . The findings show that in the presence of iron, ferroptose can have a significant effect on the activity of glutathione peroxidase and heme oxygenase 1 enzymes in hypoxia and normoxia conditions, reducing tumor growth and increasing cell death in U_87MG cancer tissue, and reducing tumor growth and Increase cell death in U_87MG cancer tissue and also reduce tumor spread and increase cell death in U_87MG cancer tissue. The graph shows that both GPX and HMOX activities are significantly higher under hypoxic (low oxygen) conditions, especially in the presence of a specific compound called frustatin 1. This finding supports the concept that ferroptosis (a type of death. In addition, when GPX or HMOX levels decrease under normal conditions, it may indicate that tumor metabolism is affected by changes in oxygen levels.

128. Investigating the Effect of Methionine S-adenosyltransferase Inhibitor on the Level of Malondialdehyde and Caspase-3 in Glioblastoma Tumor Tissue

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Glioblastoma is one of the most aggressive brain tumors and is difficult to treat and is associated with oxidative stress and cell damage caused by free radicals. As an amino acid, methionine plays a role in building proteins and regulating biochemical processes. Methionine antagonists can have therapeutic effects on tumor cells by disrupting metabolic pathways. In this research, the rats were divided into three groups: model, sham and treated with methionine antagonist. After 14 days, the brain tissue of the rats was examined. Evaluations included measurement of malondialdehyde, general oxidant status, caspase-3 enzyme level, and histological analyses. The results showed that malondialdehyde in the model group with an average concentration of 2.904 $\mu\text{M/L}$ was significantly higher than the sham group with an average concentration of 0.4615 μM . The group treated with methionine antagonist with an average concentration of 6.912 $\mu\text{M/L}$ compared to the model group. and Sham showed a significant increase in the level of malondialdehyde. The general state of oxidants in the group treated with methionine antagonist increased significantly with an average concentration of 6.246 nM/ml. The level of caspase-3 enzyme in the group treated with methionine antagonist was significantly higher than the other groups with an average level of 30.05 ng/mL. The amount of apoptosis in the group treated with methionine antagonist was significantly higher than the model group and the sham group. These findings show that methionine antagonist can reduce tumor growth and increase cell death in tumor tissue by increasing oxidative stress and apoptosis.

129. Investigating the Effect of Hesperidin on Superoxide Dismutase Gene Expression in the Brain of Rats Treated with Nickel

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Nickel is a heavy metal with wide industrial uses. The accumulation of nickel and nickel compounds in the body through chronic exposure may be responsible for a variety of adverse effects on the health of human beings. Nickel is a potent neurotoxin and the role of free radical-mediated oxidative stress in nickel toxicity has been suggested. The aim of this research is the ability of hesperidin (as a flavonoid antioxidant) to express the superoxide dismutase gene in the brains of rats treated with nickel. The daily intraperitoneal injection of nickel was administered to rats in a dose of 20 mg/kg for 21 days. After extracting RNA from the brain and synthesizing cDNA, expression of the superoxide dismutase gene was measured using the real-time PCR method. Gene expression analysis results in brain tissue showed that nickel can significantly reduce the expression of this gene in the brain tissue ($P < 0.001$). On the other hand, the simultaneous effect of nickel and hesperidin (once daily) that hesperidin in doses of 50 ($P < 0.05$), 100 ($P < 0.01$) and 200 ($P < 0.01$) mg/kg could significantly increase the expression of this gene compared to the group receiving nickel. These results suggest that hesperidin may have a beneficial role against nickel-induced oxidative stress in the brain, which is mainly attributed to the antioxidant properties of hesperidin.

130. The Effects of Snail Caviar and Mucus on Human Skin

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Abstract: The purpose of this study was to evaluate and compare the therapeutic effect of Achatina fulica snail mucus and caviar on human skin. To perform this experiments, snail mucus and caviar were placed in the cream base, which contained avocado oil, argan oil, exfoliating wax, dried marigold flowers (Calendula officinalis), a few drops of frankincense resin, and lemon extract. The results showed that snail mucus hydrates the skin, reduces wrinkles, and heals scars, which in our tests were completely confirmed. The mucus left over from the snail contains nutrients such as hyaluronic acid, glycoprotein enzymes and peptides, which are used to eliminate wrinkles. Snail mucus has another property that leads to the fading of hyperpigmentation, and for this reason, it is used to treat acne scars and skin redness. The results of this experiment showed that snail caviar reduces skin itching, improves skin darkening, turbidity and skin spots. It enhanced the antimicrobial substances of skin, subsequently preventing skin rashes and infections. Therefore, we can have bright and fresh skin and hair by using caviar and snail mucus products.

131. Investigating SPI1 Gene Expression in Patients with COVID-19 Under Treatment with Remdesivir

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Coronaviruses are single-stranded RNA viruses by binding to ACE2 receptors in airway lining cells, can activate T and B lymphocytes, monocytes, and Macrophages, produce many pro-inflammatory factors, and finally lead to severe inflammation and respiratory symptoms. This reaction of the immune system, which is called a "cytokine storm", causes injury to the involved tissues. The SPI1 transcription factor belongs to the ETS (Erythroblast Transformation Specific) transcription factor family and is responsible for regulating the expression of genes related to the differentiation of blood cells. Remdesivir is a nucleotide analog drug with broad therapeutic effects as a candidate drug for the treatment of this disease. In this study, blood samples were randomly taken from 30 patients infected with the Omicron strain of coronavirus, before receiving the remdesivir drug as the patient group and after receiving the last dose of the drug as the treatment group and from 20 healthy people as the control group. After receiving the samples, RNA extraction and cDNA synthesis were performed. SPI1 gene expression was investigated by real-time PCR. SPI1 gene expression in corona patients has increased 90 times compared to the control group ($P < 0.001$). In the treatment group, the expression level of this gene showed a five-fold decrease compared to the patient group ($P < 0.001$). Our results showed that the remdesivir drug was effective in reducing the expression of the SPI1 gene in patients with corona, whereas it might not diminish the expression of this gene to the level of the control group.

132. Investigation of Kinetics and Physicochemical Changes of *Lepidium draba* Peroxidase Enzyme Mutant (N255R)

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Lepidium draba peroxidase (LDP) is a member of class III plant peroxidases. This group of enzymes extensively applied in medicine and environment. The main goal of this study was investigation of kinetic and physicochemical changes of LDP upon substitution of Asn with Arg

at position of 255. After enzymes expression in the presence of IPTG and purification using Ni-sepharose, kinetic and physicochemical parameters of the mutant enzyme were analysed in comparison with the native one. The results showed mutation at this position lead to significant increases of the mutant activity (more than 1.5 fold) in comparison to the native one and lead to decrease of Km value for TMB and H₂O₂ substrates. Optimum pH (5.5) and temperature (30 °C) were also decrease in comparison to the optimum pH (6.5) and temperature (35 °C) for the native enzyme. It deduced, alteration in the mentioned parameters may be occurs due to some changes in the enzyme structure upon mutation.

133. Study on Changes in Malondialdehyde (MDA) as Oxidative Stress After Receiving Different Levels of Ionizing and Non-Ionizing Radiation in Rats

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Nowadays, as the science is progressing, the use of radioactive materials in various fields such as medicine, industry, agriculture and research has increased dramatically. Technetium radiopharmaceutical is one of the most important radiopharmaceuticals that is used in most cases to diagnose and treat diseases. Non-ionizing radiations emitted by Wi-Fi router devices are a part of everyday life. Despite the importance of using positive part of the technology, the risk of exposure to radiation should also be taken into account. 120 male rats were randomly divided into five groups; the first group as control group in natural standard conditions, the second group that exposed to 1 mCi of technetium-99m; the third group was exposed to one kilogram of Ramsar soil (8000 Bq average) in each cages; the fourth group were placed five hours every day on Wi-Fi device (2.4-2.48 GHz); the fifth group were exposed to both Wi-Fi and technetium-99m. After four weeks, blood was collected for MDA analyses by One-way ANOVA tests. There is not any significant difference in groups technetium-99m, Ramsar soil and Wi-Fi waves than the control group, but when two sources of radiation were used simultaneously, significant differences could be detected. Accordingly, MDA level in Wi-Fi-Technetium-99m treated group has been significantly increased compared to the control groups. Exposure to ionizing radiation form technetium-99m and non-ionizing radiofrequency waves emitted by Wi-Fi router devices has the ability to induce accumulation of free radicals that should be seriously taken into account by Tc-99m injected patients that are exposed to Wi-Fi radiation from router devices.

134. Investigation of Kinetic and Electrochemical Properties of Biosensor Based on Tyrosinase Immobilized Using Modified Magnetic Nanoparticles

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The role of tyrosinase in the biosynthesis of melanin in mammals (1), the investigation of the conversion of L-tyrosine to L-dopa in the pharmaceutical industry, and phenolic compounds in the environment and various industries due to the two activities of monophenolase and diphenolase of this enzyme, which has led to the design of biosensors based on tyrosinase enzyme (2). Today, nanotechnology has been effective in the development of biosensors (3). In 2019, Youngho et al. designed a tyrosinase biosensor immobilized on carbon nanotubes for phenol sensing (4). This research is reported by designing an electrochemical biosensor based on tyrosinase immobilized on amine-modified iron magnetic nanoparticles in the form of physical adsorption on magnetic carbon paste electrode for phenol and L-dopa measurement. In the cyclic voltammetry (CV)

technique, the apparent rate constant of electron transfer (KS) equal to 0.073 s^{-1} and $E^{\circ'}$ equal to 0.2 V was obtained. In differential pulse voltammetry (DPV), the response of the biosensor to phenol with limit of detection (LOD) of $7.99 \mu\text{M}$ (in the linear range of $9\text{-}38 \mu\text{M}$), sensitivity $3.07 \mu\text{A} \cdot \mu\text{M}^{-1} \cdot \text{cm}^{-2}$ and K_m equal to $22.31 \mu\text{M}$ and for L-DOPA, LOD was $15.05 \mu\text{M}$ (in the linear range of $1\text{-}38 \mu\text{M}$), the sensitivity was $1.08 \mu\text{A} \cdot \mu\text{M}^{-1} \cdot \text{cm}^{-2}$ and K_m was calculated as $19.62 \mu\text{M}$. It seems that the use of compounds such as glutaraldehyde for the covalent immobilization of the enzyme on the nanoparticles can improve the quality and quantity of the kinetic and electrochemical properties of the biosensor.

135. Investigating the Antibiotic and Antioxidant Properties of Zein-polyvinylpyrrolidone (PVP) Nanocomposites Encapsulating the Extract of *Salvia officinalis* L.

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In recent years, due to the increase of resistance genes among pathogenic bacteria, there have been widespread challenges and concerns regarding the occurrence of epidemics. Bacterial resistance is one of the most important threats to human health, which necessitates research to identify and produce effective antimicrobial compounds. Nanotechnology has found many applications in different sciences and the use of plant secondary metabolites in the biosynthesis and structures of nanoparticles is very significant. In order to investigate the antimicrobial effects of Zein-PVP nanocomposites, *Pseudomonas aeruginosa* bacterium was used. In order to investigate the synthesis of nanoparticles and evaluate their properties, spectrophotometry and electron microscopy techniques were used. After confirming the synthesis of nanocomposites, their minimum inhibitory concentration (MIC) and minimum lethal concentration (MBC) on *Pseudomonas aeruginosa* bacteria were estimated by microdilution and disk diffusion methods, and finally the antioxidant potential of nanoparticles was determined. Based on the electron microscope results, the average size of nanoparticles was estimated to be 250 nm. It was also found that the nanocomposites containing essential oil had an uneven surface, while in the case without essential oil, a smooth and uniform surface was observed. The antimicrobial activity of Zein-PVP nanocomposites containing sage essential oil showed that the maximum inhibition of the growth of *P. aeruginosa* bacteria was at a concentration of $200 \mu\text{g/ml}$ with a growth halo diameter of 19.5 mm. In relation to the antioxidant capacity, the IC₅₀ values for nanoparticles were equal to 15.5, which indicated significant amounts of antioxidant potential in the synthesized nanocomposites.

136. Molecular Docking Analysis of Compounds from *Ferula persica* with Penicillin-Binding Protein 2a in Methicillin-resistant *Staphylococcus aureus*

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Staphylococcus aureus bacterial infections pose a major concern for the healthcare system as this bacterium has developed resistance to common antibiotics. One of the main factors of this resistance is a protein called Penicillin-binding protein 2a (PBP2a). Previous studies have shown that extracts from various plants are capable of eliminating resistant strains of this bacterium. Therefore, the aim of the present study was to perform molecular docking of compounds from the plant *Ferula persica* with PBP2a to identify potential inhibitory compounds within this plant. Using the Lotus and NPASS databases, compounds from *Ferula persica* were extracted and stored in sdf format using the PubChem database. The structure of PBP2a was obtained from the PDB database with the ID 1VQQ and saved in pdb format. Molecular docking between the plant compounds and

the active site of the enzyme was then performed using PyRx software. The results showed that two compounds with PubChem IDs 5317322 and 11892267 had the highest binding affinity (-8.5 kcal/mol) with the active site of the target enzyme. Additionally, these two chemical compounds did not exhibit any adverse pharmacokinetic or toxicity characteristics in online studies. Consequently, these two selected compounds from *Ferula persica* likely possess inhibitory properties against PBP2a and can be introduced as drug candidates. However, in vitro and in vivo studies are necessary to confirm this hypothesis.

137. *In-silico* Investigation of Bioactive Peptides with Anti-Alzheimer's Potential Derived from Bovine Milk Beta-casein Protein

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Milk is the main source of energy, protein and fat in the human diet. Bovine milk contains about 32 g protein/l, and about 80% of milk protein is casein. Bioactive peptides derived from milk proteins have been the subject of numerous researches in the last two decades due to their various biological properties in human health. Alzheimer's disease (AD), which has become a global problem due to the aging of the population and the lack of effective treatments, is in urgent need of innovative treatments based on natural substances. According to reliable sources, bioactive peptides with antioxidant, anti-inflammatory, anti-amnestic and cholinesterase inhibition properties have anti-Alzheimer potential. *In silico* simulation of the effect of 6 selected enzymes, pepsin (pH 1.3 and pH>2), trypsin, chymotrypsin A and C, thermolysin and leukocyte elastase, was performed on bovine milk beta-casein. In this process, 14 peptide fragments (non-toxic) with anti-Alzheimer's potential were created and the abundance, activity potential and digestive absorption of these peptides were also investigated. As a result of enzymatic decomposition by thermolysin, the largest number of peptides (5 pieces) with favorable properties compared to other enzymes were obtained. Also, peptides with antioxidant properties were more abundant than other peptides. Beta-casomorphin-7 peptide (YPFPGPI) has antioxidant properties and cholinesterase inhibition, and has the highest biological activity potential compared to other peptides. With further investigations, the results of this study can be used to make medicine or food supplements.

138. Investigating the Philogenic Relations of the HSF Gene Family Compared to the Anartops in the Sesame Plant Using Bioinformatical Software

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Sesame *Indicum* is an important crop that has high nutritional and medicinal value due to its variety of oil seeds and active ingredients, including unsaturated fatty acids, ligament, protein, minerals, nutrients and phytosterols. HSF transcription factors play a vital role in regulating the plant response to Abiotic stresses such as salinity, drought, osmotic stress, cold and HS. HSF genes have a positive effect in response to other stresses in addition to heat stress, for example the HSF8 gene is activated in response to dehydration in rice cultivars. Protein sequences of HSF genes imported in sesame and *Arabidopsis* in Mega7 software and then the clustalw sequences were performed and for examination of evolutionary relationships, the phylogenetic tree based on the Maximum Likelihood method with 1000 bootstrap was drawn. The phylogenetic diagram was divided into 10 groups and each group was distinguished by different colors. In this diagram, the lowest number of genes are in group 6 with 2 genes and the highest number of genes are in groups 1 and 8 with 10 genes. According to this phylogeny tree, it can be concluded that the genes that are placed in different groups in the phylogenetic tree are functionally different and the genes have assumed

different biological roles during evolution. Also, the genes that are placed in the same group have similar biological functions.

139. Structural Investigation of CST-Polymerase α -primase Complex (CST-Pol α) Active Site

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Telomere shortening is linked to cellular senescence, various cancers, and age-related diseases. The CST-Polymerase α -primase complex (CST-Pol α) and telomerase play critical roles in maintaining the protective caps at the ends of eukaryotic chromosomes. While CST-Pol α supports DNA replication and telomerase directly lengthens telomeres by adding repetitive nucleotide sequences, recent discoveries have emphasized the crucial role of CST in telomere integrity. This study delves into the structural features of the CST-Pol α active site, specifically focusing on the CTC1OB-F, CTC1OB-G, and STN1N domains. We compared these features with the active site of telomerase to identify key residues that contribute to their distinct functional roles, providing novel insights into telomere maintenance mechanisms and potential therapeutic applications. Protein structures were obtained from the protein data bank (PDB). PyMOL, VMD, and BIOVIA discovery studio were used for molecular visualization and structural analyses. Our study examined the interaction between DNA and the CST complex within a 3-angstrom radius, categorizing them based on polarity. Specifically, we compared the behavior of telomerase and CST-Pol α . Telomerase exhibited 56 hydrophilic and 12 hydrophobic amino acids contacting DNA. In contrast, CST-Pol α forms 22 hydrophilic and 6 hydrophobic interactions with DNA, suggesting a stronger interaction between DNA and telomerase in the active site. This study highlights CST-Pol α 's role in DNA replication and telomere protection rather than maintaining strong binding. Telomerase and CST-Pol α have distinct amino acid distributions near DNA, with CST-Pol α supporting DNA replication and telomere protection, and telomerase enriched in hydrophilic residues for direct telomere elongation, highlighting their specialized roles in genomic stability research.

140. Evaluating Serum Levels of Interleukin-8 and Interleukin-17 in Patients with COVID-19 and Their Correlation with Disease Severity

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In COVID-19 patients, those with underlying disease are relatively more susceptible to respiratory viral infections and are more likely to develop severe symptoms compared to people without underlying disease. This study aimed to evaluate the serum levels of IL-8 and IL-17 in patients infected with SARS-CoV-2 and patients with underlying disease. Serum samples were collected before administration of any antiviral and/or immunosuppressive drug. Around 64 adult patients with COVID-19 and 12 adult patients with underlying disease were compared with 16 healthy subjects as controls. The cytokine levels were assessed by ELISA method and the statistical analysis was carried out using the ANOVA. The average levels of these cytokines in the severe group were significantly higher than those in the mild and control group ($r = 0.48$, $P < 0.016$); it is worth noting that patients with underlying disease also displayed a higher level of these cytokines than those with mild and control groups ($r = 0.283$, $P < 0.049$). No significant differences were observed between severe and other patients with underlying disease and also between mild and control groups. Our data indicate that IL-17 and IL-8 are involved in inducing and mediating proinflammatory responses and that the elevated level of these inflammatory cytokines could be

the effective ground in the severity of COVID-19 and being susceptible in people with underlying disease. Thus, providing a platform of inflammatory signature cytokines in COVID-19 patients with underlying co-morbidities or without as well as in non-COVID-19 patients with underlying diseases might provide a promising solution to COVID-19 disease.

141. Exploring the Regulatory Network of Circrna-miRNA-mRNA in Thyroid Carcinoma Through Bioinformatic Analysis

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Thyroid carcinoma is a common cancer with multiple types, each influenced by different genes. According to the ceRNA hypothesis, circRNAs regulate the activity of miRNA, which affects the levels of gene expression. Identifying the circRNA/miRNA/mRNA network provides information on thyroid cancer diagnosis and therapy. Initially, circRNA data were obtained from the GEO database, and the Limma package in R was used to identify circRNAs that were differentially expressed (DECs). Furthermore, the CSCD and circInteractom were applied to recognize the microRNAs controlled by these circular RNAs, specifically those associated with cancer. Afterwards, the miRWalk was used to predict specific genes, which were then intersected with genes that showed differential expression in TCGA datasets to determine associated genes. A functional enrichment analysis, including GO and KEGG analyses, was conducted to identify hub-gene regulatory influences linked to cancer. Additionally, a PPI network was created using Cytoscape software that revealed ten hub-genes. Subsequently, a regulatory network involving circRNA/miRNA/mRNA was developed. Thirteen circRNAs that were upregulated in thyroid cancer were linked to seventeen downregulated miRNAs. This connection was used to predict 626 genes that were upregulated in thyroid carcinoma. Among these genes, ten associated genes were selected as hub-genes for further analysis (COL4A1, SPARC, POSTN, COL3A1, COL1A1, FN1, TIMP1, COL1A2, TGFB2, and LOX). Based on the functional enrichment analysis, these genes are mainly involved in regulating cancer development. In this study, the circRNA/miRNA/mRNA network was used as biological markers to help in the thyroid carcinoma diagnosis and development.

142. Evaluation of Sperm DNA Failure in Oligoastospemia Subjects and Its Effect on ICSI Surgery and Embryo Formation in Karaj Royesh Infertility Center

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About half of the causes of infertility are related to men. Sperm in infertile men often has different functional and structural defects. One of these defects is sperm DNA damage which can be due to DNA metagination, inappropriate chromatin packaging and epigenetic defects. There is some degree of damage to sperm DNA in all men. However, if the percentage of this injury increases greatly, it causes pregnancy disorders, miscarriages and failures in assisted reproductive techniques. Therefore, identifying sperm DNA damage and studying its effect on the success rate of assisted reproductive techniques such as microinjection in infertile couples with the aim of improving sperm quality before starting the cycle of treatment and imposing high costs on couples is essential. Material and method: In this study, 60 infertile couples (30zoi as positive control sample and 30zoi as test sample including oligostaspermia men) were selected. The ovarian reserve hormone of the men's wives was all higher than 2. Siman samples were examined and their sperm DNA staining was performed and the percentage of failure was taken. On the day of surgery, ICSI was performed on ovulation of women and on the same day, intracytoplasmic injection of

sperm with the best appearance was done into the eggs. Finally, on the third day, the number and quality of embryos were evaluated and comparisons were made including comparison of fetal quality and sperm DNA failure percentage. The frequency of sperm DNA failure was lower in healthy subjects than those tested. Data analysis showed that there was a significant difference ($P < 0.05$) between sperm DNA failure percentage and fetal quality, and it was found that there was no significant difference between the mean fetal quality in other categories of sperm DNA failure percentage (good and moderate) ($P > 0.05$). Sperm DNA failure can also reduce normal sperm speed, sperm shape and sperm count drastically. The results show that DNA failure in oligospermia is more than healthy people and this failure has a significant effect on fetal quality. Using experiments to evaluate sperm DNA is useful for predicting success rate in assisted reproductive techniques. Also, before starting treatment period and imposing costs on couples, appropriate methods and drugs such as antioxidants should improve sperm DNA quality

143. Genotype Frequency Analysis of rs2025804 LEPR Genetic Variant in Iranian Population

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The LEPR gene is a key focus in obesity research, with studies linking its polymorphisms to various diseases like polycystic ovarian syndrome and energy intake disorders. This study aims to investigate the prevalence of the rs2025804 variant within LEPR and its distribution among healthy individuals across diverse ethnic groups in Iran. Methods: The frequency of the rs2025804 genotype in the LEPR gene was analyzed in 1142 healthy adults representing different ethnicities in Iran. Saliva samples were randomly collected, and genomic DNA was extracted using a standard kit. Genotyping was performed using the Illumina Infinium Global Screening Array-24 BeadChip. Genotype and allele frequencies were calculated using SPSS software version 22, with a 95% confidence level. Among the 1142 individuals surveyed across 29 provinces, 683 (59.81%) had genotype AA, 408 (35.73%) had genotype AG, and 51 (4.47%) had genotype GG. The allele frequencies for A and G were found to be 1774 (77.67%) and 510 (22.32%), respectively. Our findings show a unique allele distribution compared to other ethnic groups, with genotype AA being the most prevalent (59.81%), followed by AG (35.73%) and GG (4.47%). Allele frequencies are A (77.67%) and G (22.32%). This study documents the genotype and allele frequencies of rs2025804 in the LEPR gene among healthy Iranians for the first time. Routine LEPR genotyping could potentially serve as a screening tool for obesity-related disorders, given these results. This enhances our understanding of genetic diversity and holds promise for targeted healthcare interventions.

144. Characterization of a Venom Metalloprotease Isolated from Iranian Yellow Scorpion Venom Glands cDNA Library

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Scorpion venoms are rich sources of biologically active peptides, some of which have enzymatic potency. Venom metalloproteases are such enzyme venom peptides being evaluated for use as anticancer agents in healthcare. Anticancer activities of these venom peptides involve pro-inflammatory effects and apoptotic activity. The cDNA encoding *odontobuthus doriae* venom peptide 4 (ODVP4) (Gene Bank ID: KU365871), a metalloprotease-like venom peptide, was

isolated from the *Odontobuthus doriae* venom gland cDNA library that was constructed previously by Naderi et al. In 2016 and its putative peptide was characterized by some bioinformatic softwares. cDNA sequence of one positive clone from the library after similarity searching by protein blast tools in NCBI and Uniprot showed similarity to venom metalloprotease-1 from “*Mesobuthus eupeus*” scorpion by 84% identity. The length of its ORF was 143 amino acids. No signal peptide and disulfide bonds were detected in ODVP4 using some tools such as DISULFIND and SignalP 4. Molecular weight and theoretical pI are 15973 and 6.87 respectively due to ExPASy/ProtParam tool. Based on homology modeling assessments by some tools such as ExPASy/SWISS-MODEL and Nature/Phyre2, this peptide has a conserved domain belonging to ZnMc Superfamily (Zinc-dependent metalloprotease) which is involved in vertebrate development and disease. There has been few little toxicological and molecular research about this type of peptide in Iranian scorpion species until now. Considering the role of such peptides in new cancer research and with the knowledge acquired in this project about venom peptide 4 (ODVP4), some targeted tests can be performed, including peptide expression for invitro study on cancer cell lines and finally invivo study on animal models Suggested to get accurate results.

145. Exploring Neratinib's Mechanisms in HER2-Positive Cancer: An *In-silico* Study

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Neratinib, an irreversible tyrosine kinase inhibitor, targets the human epidermal growth factor receptor 2 (HER2) and is employed in treating HER2-positive breast cancer. This study explores neratinib's molecular interactions with HER2 and its impact on cancer signaling pathways using in silico methods. Utilizing AutoDock Vina for molecular docking, we investigated neratinib's interactions with the extracellular domain of HER2, with its three-dimensional structure sourced from the PubChem database. The HER2 structure, with PDB ID 1N8Z, was obtained from the Protein Data Bank. Interaction analyses employed UCSF Chimera, the Protein-Ligand Interaction Profiler (PLIP), and the PDBsum server, revealing hydrophobic interactions and hydrogen bonds. Key residues identified include Trp444 and 455Leu in the first interaction complex and 282Leu and 283Val in the second. Binding affinities of -7 kcal/mol indicate strong interactions. Pathway analysis using Reactome and KEGG databases highlighted neratinib's effect on signaling pathways, such as RAF/MAP kinase and PI3K/Akt, critical for tumor proliferation and survival. The Reactome database further emphasizes the role of neratinib in modulating HER2-mediated heterodimerization with other EGFR family members, thus inhibiting trans-autophosphorylation and downstream signaling. The study demonstrates neratinib's potential in targeting HER2, disrupting critical signaling pathways in cancer progression. These findings underscore the importance of further in vitro and clinical evaluations to validate neratinib's efficacy and explore combination therapies to overcome resistance. Future research should focus on neratinib's long-term effects and optimal therapeutic strategies for HER2-positive cancers, aiming to improve patient outcomes and minimize adverse effects.

146. Investigation Expression Levels of miR-103a-3p and its Target Genes in the Hippo Signaling Pathway in Chronic Myeloid Leukemia Cell Line Under Treatment with NVP-AUY922

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Chronic Myeloid Leukemia (CML) characterized by the oncogenic BCR-ABL1 protein, activates multiple downstream proliferative signaling pathway. The Hippo signaling cascade, pivotal in

organ development and diseases such as cancer, consist of STK3/4, MOB1A/B, LATS1/2 kinases, and YAP/TAZ coactivators. MicroRNAs are small non-coding RNAs that regulate gene expression post-transcriptionally, playing crucial role in cancer development. Here, we explore the expression of miR-103a-3p and its target gene LATS2 in K562 cells under treatment with NVP-AUY922, a heat-shock protein 90 (HSP90) inhibitor. K562 cells were cultured and then treated with different concentration of NVP-AUY922. To obtain IC50 concentration of NVP-AUY922, Trypan Blue exclusion dye was applied after 48hour treatment. Expression level of miR-103a-3p and its Hippo target gene were evaluated after 48hour treatment with NVP-AUY922(250nM) by Real-time PCR technique. NVP-AUY922 treated cells exhibited a decrease in miR-103a-3p expression level along with an increase in LATS2 level compared to nontreated cells. However, expression of YAP significantly decreased. In conclusion, treatment with NVP-AUY922 suppresses CML progression by targeting miR-103a-3p and consequently activation of LATS2, suggesting a novel therapeutic strategy. Further studies are needed to confirm our findings. It is also recommended to evaluate expression levels of our targets after transfecting cells with specific anti microRNAs.

147. Exploring STAT1's Role in Inflamm-aging: Genetic Intersection of Melanoma and Skin Aging

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Melanoma is responsible for over 90% of skin cancer deaths. UV exposure Triggers skin inflammation, which is known to be a risk factor for skin cancer and skin aging, which is not only a physiologic phenomenon but also a health risk, resulting in increased incidence of inflammation and skin cancers. The study aimed to identify differentially expressed genes (DEGs) contributing to melanoma development and skin aging. Using raw microarray data from the GEO database (GSE31909), DEGs were identified between normal melanocytes and melanoma cell lines through R packages—limma, umap, and Geoquery—based on specific criteria (adjusted P-value < 0.05 and -logFC- ≥1). The STRING database helped construct a PPI network of these DEGs, which was visualized using Cytoscape, leading to the identification of ten hub genes. Further analysis incorporated data from GSE39170 and senescence-associated genes from the CellAge database, focusing on 279 genes driving cellular senescence. STAT1 emerged as a key gene associated with inflammation pathways, potentially exacerbating both melanoma and skin aging. Based on the studies, the phosphorylation and activation of STAT1, along with other STAT family members, inhibit JAK-STAT pathway signaling, leading to increased inflammation. Moreover, STAT1 phosphorylation, particularly through IFNG pathway, enhances melanoma cell tumorigenicity and metastasis. In conclusion, these findings indicate that targeting STAT1 could be a promising therapeutic approach for treating both melanoma and the hallmarks of skin aging.

148. Investigation of the Synergistic Effect of Microgravity and Doxorubicin on the Expression of CD40 and LEF1 Genes

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The microgravity condition offers a unique environment for studying cellular interactions, particularly in cancer research. Accordingly, this study aims to investigate the effects of microgravity and doxorubicin (a chemotherapy drug) on CD40 and LEF1 gene expression in the

K562 cell line. These genes play important roles in cancer treatment; the upregulation of LEF1 and CD40 contributes to tumor progression by promoting cell proliferation and cancer cell survival, respectively. The two-dimensional clinostat was applied for simulating microgravity. Quantitative PCR (qPCR) was utilized in this research. Our results indicated a significant decrease in CD40 and LEF1 gene expression in microgravity conditions with doxorubicin treatment compared to normal gravity conditions. This study demonstrates that simulated microgravity conditions enhance the cytotoxic effects of doxorubicin in the K562 cell line, which is associated with a significant decrease in CD40 and LEF1 expression. These results suggest that microgravity may modulate cancer cell responses to chemotherapy, possibly through key signaling pathways. Further research is warranted to elucidate the mechanisms underlying these effects and their potential implications for cancer treatment strategies.

149. Investigation of the Synergistic Effect of Microgravity and Hydroxyurea on the Expression of *KLF10* and *PDGFA* Genes in the K562 Chronic Myeloid Leukemia Cell Line

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This study aims to investigate the synergistic effects of simulated microgravity and hydroxyurea on the expression levels of genes. *Klf10* and *pdgfa* In the K562 blood cancer cells. Cell line k526 is for a patient with chronic myeloid leukemia (CML). Chronic Myeloid Leukemia (CML), also known as "chronic myelogenous leukemia," is a type of cancer that starts in the blood-forming cells in the bone marrow and infiltrates the blood. We want to investigate the effect of the drug on gene expression under normal conditions and microgravity conditions in order to help with cancer treatment. These genes play an important role in cancer, which has been studied in this research. The *klf10* gene acts as a tumor suppressor and its expression decreases in cancer. In this study, the administration of hydroxyurea increases its expression, and it is effective in eliminating cancer cells. The *pdgfa* gene is normally expressed at low levels in cells, but under cancerous conditions and in cancer cells, this gene is overexpressed, leading to the growth and proliferation of cancer cells. With the administration of hydroxyurea, the expression of this gene decreases, helping to inhibit cancer cells. These findings suggest that microgravity may enhance the effects of hydroxyurea on cellular viability and either suppress or increase gene expression, highlighting the potential significance of gravity-modulated cancer therapies. The significant reduction of *pdgfa* expression and the increase of *klf10* in treated cells under microgravity conditions provide insights into the underlying molecular mechanisms of these effects and pave the way for future research in space-based cancer therapies.

150. Histopathological Effects of Titanium Dioxide Nanoparticles on Male Mice Testes

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Nanoparticles have found extensive use in various industries due to their unique physical and chemical properties. Among these, titanium dioxide nanoparticles have garnered significant attention owing to their exceptional properties such as photocatalytic activity, whiteness, refractive index, and high stability. So, they have become the fifth most widely used nanoparticle globally, finding applications in diverse sectors including food, cosmetics, and medicine. Therefore, it is imperative to elucidate the impacts of nanoparticle consumption on human health. Numerous studies in the past decade have examined the effects of various nanoparticles on the health of the

gastrointestinal tract, liver, brain, and other organs. This research investigates the effects of TiO₂ on the testicular tissue of male mice. To this end, doses of 50, 150 and 300 mg/kg.bw were orally administered to male mice for 35 days. Subsequently, quantitative and qualitative factors of the testicular tissue were examined. The results revealed tissue edema, vacuolation, and loss of integrity of the germinal epithelium in the testicular tissue of male mice. Additionally, an increase in the volume of the interstitial tissue and a decrease in the volume of seminiferous tubules, the height of the germinal epithelium, as well as a reduction in Leydig cells and spermatocytes, round spermatids, and elongated spermatids in the seminiferous tubules of mice treated with TiO₂ NPs compared to the control group were observed. It can be concluded that TiO₂ by inducing oxidative stress, lead to apoptosis of Leydig cells and damaging spermatogenic cells, reduce the number of immature sperm and can compromise male fertility.

151. Investigating and Predicting the Structure of Bacterial Keratinase Enzyme Using Artificial Intelligence Based on Deep Learning Model

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Keratinous materials, like bird feathers from poultry farms, cause significant environmental issues. Keratinase, an extracellular enzyme, can break down keratin into peptides and amino acids. This study aimed to predict and assess the structure of bacterial keratinase using artificial intelligence (AI) and deep learning. Keratinase sequence was sourced from the GenBank database, and its 3D structure was predicted with AlphaFold version 2.3.2. The model's performance was evaluated using pLDDT and PAE metrics, with structure validation through the Ramachandran plot via the RAMPAGE server. Multiple sequence alignment (MSA) analysis and the PAE matrix confirmed the model's high accuracy in predicting the protein's structure. The high pLDDT score (90) indicated high accuracy in protein folding prediction. Results showed that 89.3% of amino acids are in the most favored region, 10% in the allowed region, and 0.7% in the generously allowed region, with none in the disallowed region. The fact that about 90% of amino acids are in the most favored region, along with their clustered distribution, demonstrates the high accuracy and reliability of the structure predicted by AlphaFold. The obtained results indicated that the stability and order of the keratinase enzyme's tertiary structure is fine. This research highlights AlphaFold's capability, with its advanced AI and deep learning techniques, to accurately and quickly predict protein structures. This can enhance the design and engineering of new recombinant proteins and enzymes in the future.

152. Investigating and Comparing the Expression Changes of *KDM1A* and *KDM1B* Genes in Cumulus Cells After *In vivo* Aging and *In vitro* Aging in Ovulated Mice.

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Infertility is one of the most important life crises that can lead to psychological problems and serious stressful experiences for affected people. Assisted reproductive technologies (ART) include medical procedures that are mainly used to treat infertility. Cumulus cells are somatic cells that surround the egg. If the oocytes are not fertilized in time, the oocytes undergo a process of time-dependent aging (POA). Considering the importance and role of cumulus cells in the growth, maturation, and fertility potential of the egg, as well as the effectiveness and success of assisted reproductive technologies, We decided to evaluate the expression changes of *KDM1A* & *KDM1B* genes in cumulus cells after *in vivo* and *in vitro* aging in ovulatory stimulated mice (Balb/c)

compared to the control group for the first time. In this study, after isolating RNA from cumulus cells, we made its cDNA then We used quantitative real-time PCR to quantitatively evaluate the expression of KDM1A and KDM1B genes in in-vivo and in-vitro conditions. The results showed us that KDM1A and KDM1B were significantly upregulated under in vivo conditions. Differential expression of KDM1A and KDM1B in cumulus cells indicates stronger activation of epigenetic mechanisms under in vivo conditions. These findings increase our understanding of the molecular mechanisms of oocyte aging and provide potential targets for improving ART outcomes by targeting epigenetic regulators to enhance oocyte quality and developmental potential.

153. Interaction Between Myoglobin and Endosulfan Using Spectroscopy and Molecular Modeling Simulation

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The expansion of agriculture has led to a significant increase in the use of pesticides. However, excessive use of these pesticides poses a great threat to human health. One such pesticide, endosulfan (END) is an organochlorine pesticide used to control insects. It can threaten humans and animals through food intake, inhalation, and skin contact, and is easily absorbed through the digestive tract. Scientific studies have shown a potential link between endosulfan and cardiovascular disease. In addition, endosulfan is an endocrine disruptor that can accumulate in the liver and have carcinogenic effects. In this study, the toxicity of endosulfan on myoglobin (Mb) was evaluated using multispectral techniques and molecular modeling. The results of the ultraviolet-visible spectrum showed that myoglobin forms a complex with endosulfan and interacts with each other. Molecular modeling revealed that hydrogen bonding and van der Waals were dominant in this reaction, which confirmed the experimental result. Fluorescence spectroscopy showed that adding endosulfan at neutral pH caused the quenching of Mb. The alignment between the theoretical studies and experimental findings demonstrates that the method proposed in this study could offer a valuable approach to investigating protein-ligand complexes.

154. Interaction of Phosalone with Human Serum Albumin: Molecular Docking and Multiple Spectroscopy Analysis

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Phosalone, a member of the family of organophosphorus insecticides, is extensively utilized for controlling agricultural pests and as a household insecticide. However, its extensive application poses risks of environmental contamination and possible negative impacts on human health. In this research, we examined the interaction of phosalone with human serum albumin to evaluate its molecular-level toxicity using spectroscopic techniques (ultraviolet-visible and fluorescence spectroscopy) and molecular docking. Ultraviolet-visible spectroscopy revealed hypochromicity in the human serum albumin spectrum upon phosalone addition, indicating the formation of a complex between the protein and phosalone. Fluorescence spectroscopy data suggested that the quenching process was static. Moreover, the negative sign of the free energy changes signifies a spontaneous binding process. Also, the negative sign of thermodynamic parameters, namely enthalpy and entropy, demonstrate the importance of hydrogen bonding and the forces of Van der Waals in the interaction between human serum albumin and phosalone. The findings of the research above were validated using molecular docking investigations. This research enhances our

understanding of phosalone's toxic effects on human health and contributes to the process of ensuring food safety.

155. Interaction of a Novel Protein Retrotransposon Gag-like 1 with Protamine 1 Involved in Human Sperm Development by Multi-omics of Single-cell RNA Sequencing and DNA Methylation

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Retrotransposon Gag-like 1 (RTL1/PEG11) emerges as a paternally expressed, imprinted gene, crucial in human developmental processes. Recently studies show that disruptions in the expression of RTL1 lead to abnormalities in development because of irregularities in genomic imprinting. This study elucidates RTL1's contribution to spermatogenesis, particularly its interplay with Protamine 1 (PRM1), crucial for DNA compaction in sperm cells. Using single-cell RNA sequencing (scRNA-seq) and Python's Scanpy package, we analyzed publicly available data (GEO accession number: GSE106487). We characterized tissue microenvironments at a molecular and single-cell resolution, focusing on protein expression, protein-protein interactions (PPIs), and DNA methylation dynamics throughout spermatogenesis. We analyzed 12 adult testicular samples with normal spermatogenesis. RTL1 protein expression varied across spermatogenesis stages, with reduced levels in spermatogonia and spermatocytes but increased in round cells and mature sperm. DNA methylation was higher in spermatogonia and spermatocytes than in sperm and round cells. RTL1 showed significant protein interactions with PRM1, RTL6, RTL4, TP53, and PEG3, suggesting its role in spermatocyte differentiation into sperm. This research underscores the pivotal role of identified proteins and their interactions in sperm development and genomic integrity preservation during meiosis. The interplay between these components orchestrates DNA packaging, facilitating transcriptional silencing in sperm cells. These insights enhance understanding of male reproductive biology's fundamental mechanisms.

156. Applying the Designed Biosensor for Clinical Neurodegenerative Diagnosed Individuals

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Regarding the increasing rate of Alzheimer's disease among elderly people, there is an urgent need to develop a biosensor to diagnose. The aim of this project is to design a biosensor for clinical diagnosed people. Gold nanoparticles are able to change color in case of sediment. If a designed probe attaches to nanoparticles, due to its charge, no attachment and no agglomeration is observed, so the color remains red, however in case of existence of the biomarker in serum and through a complementary binding, the agglomeration occurs and purple color is observed. The biosensor is designed based on gold nanoparticles to detect a specific nucleic acid biomarker in serum. It was applied for a negative and a positive person. The binding of the probe and nanoparticles verified by changing the absorbance from 0.039 to 0.063 in 550 nm and 0.039 to 0.028 in 650 nm. Regardless to the capability of mentioned color changing, a color shift from red to purple is expected. The absorbance results of the wavelength 550 and 650 were monitored as indications for red and purple color. For the positive sample, the absorbance for 550 and 650 was reported 0.098 and 0.091, respectively and for the negative sample, the absorbance for 550 and 650 was reported 0.1 and 0.05, respectively. The results significantly demonstrate the color shift from red

to purple in positive sample and the designed biosensor is able to be applied as a tool to diagnose sick and even potentially sick people precisely.

157. Optimization of Guide RNA Design for CRISPR-Cas12-based Identification of *Vibrio cholera* O1

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Today, gene editing technology is also used to identify gene-dependent pathogens. In this case, by designing guide RNA, Cas-restriction enzymes are targeted towards a specific target. The aim of this study is to design guide RNA to identify two main genes of *Vibrio cholerae* bacteria O1 (ctxA and ompW). In order to design guide RNA using three online software chop chop, crispor and cas designer, the two ctxA and ompW genes that were prepared as FASTA were copied and after configuration the predictive features such as Cas protein type, PAM type, number of target region, target organism, priority trends, were optimized and selected. Sequences were priorities and compared based on efficiency, secondary structure, GC content, direction among others. In this work, the guide RNA was designed, taking into account the Cas12a protein to be used in the crispr complex. To make sure of the design, the sequence obtained from three softwares were checked together and the results were compared and interpreted using Minitab, RNA Fold, Rstudio and GC Calculator software, the best sequence was selected. Finally, for each of the gene purposes, the best sequence was selected and suggested for the diagnostic procedure. Therefore, using bioinformatics tools and guide RNA design and employment of simulated sequences, the in-silico conditions for detecting the *V. cholerae* genome can be examined and used for the lab experiment.

158. Optimizing microRNA-based Neuronal Conversion from Fibroblasts for Alzheimer's Disease Modeling

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Using microRNAs, particularly miR-9/9* and miR-124, offers significant advantages over other methods for transdifferentiating human fibroblasts into neurons. Unlike iPSCs, which are clonal and lose the age-related features of the original cells, miRNA-induced neurons (miNs) retain the biological age of the donor fibroblasts, making them ideal for studying aging and neurodegenerative diseases. This method bypasses intermediate progenitor stages, reducing the risks of using transcription factors and enhancing its clinical usage. Here, we fine-tuned the miR-9/9*-124-based neuronal reprogramming protocol for generating neurons from the dermal fibroblasts of two patients with late-onset Alzheimer's disease (LOAD). To achieve this, we used the FUW-M2rtTA and pTight-9-124-BclxL plasmids to produce viruses and transduced fibroblast cells isolated from skin biopsies of Alzheimer's patients with them. After 24 hours, plasmid expression was induced using doxycycline. Five days post-transduction, cells were replated onto poly-ornithine/laminin/fibronectin (PLF)-coated coverslips. The media was changed to a neuronal differentiation medium consisting of Neurobasal medium, conditioned media from mixed glial cell cultures (mGCM), and neural conditioned medium (NCM) supplemented with B27, N2, BDNF, NT-3, CNTF, and GDNF. VPA, db-cAMP, and RA were included as supplements to enhance the process of neuronal differentiation, while AA was given to promote the survival of neural cells. At day 35, we successfully obtained miNs that expressed neuronal markers, including Tau and MAP-2, at both the RNA and protein levels. This approach represents an advancement in

regenerative medicine, offering a more accurate and efficient platform for disease modeling, particularly for adult-onset neurodegenerative disorders.

159. FOXM1 Expression in Colon and Prostate Adenocarcinomas: Insights from Stage-Specific Analysis

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FOXM1 belongs to the Forkhead family of transcription factors, which function by binding to specific DNA sequences in the promoter of target genes. Among these target genes are essential regulators of mitosis, including CDK4/6, CDK2, RB1, and EZH2. Given the significant role of FOXM1 in cell proliferation and cell cycle progression, it is not surprising that it plays an important role in certain cancer types, such as colon and prostate cancer, which are among the most widespread and menacing malignancies. In this study, we disclosed the expression of FOXM1 in colon and prostate adenocarcinomas. TIMER 2.0 and UALCAN, which are interactive web resources for cancer transcriptome data from The Cancer Genome Atlas project, were utilized for data collection and analysis. Based on TIMER 2.0 database, in both colon and prostate adenocarcinomas, the expression level of FOXM1 was significantly ($p < 0.001$) higher compared to normal tissues. Specifically, analysis was done on 52 normal and 497 tumor cases for prostate, and 41 normal and 457 tumor cases for colon. In addition, we evaluated the expression of FOXM1 throughout different stages of cancer, which was carried out recruiting UALCAN web tool. The expression of FOXM1 differed considerably between stages in colon adenocarcinoma ($p = 8.84e-13$), but not significantly in prostate cancer ($p = 7.18e-02$). These results demonstrate that FOXM1 gene expression has elevated in prostate and colon adenocarcinomas, alluding to a possible biomarker and target for therapeutic intervention.

160. Expression of Recombinant ipaD+ stxB Protein in *E. coli* (BL21)

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Shigellosis, an infectious disease caused by Shigella bacteria, involves several key pathogenic factors, including the IpaD protein. In this study, the sequence encoding the fusion gene ipaD-stxB was cloned and inserted into the pET28^{a(+)} expression vector. This was confirmed through PCR and enzymatic digestion. The recombinant protein was expressed in *E. coli* (BL21) and its presence was confirmed using SDS-PAGE and ELISA assays. For the ELISA test, total protein extraction was performed in three biological replicates, and the test was conducted in two technical replicates using ipaD antiserum (obtained from Imam Hossein University) at a 1:200 ratio and HRP-conjugated enzyme. Additionally, for constructing the standard curve used in ELISA, pure ipaD protein was used. The recombinant protein, with a molecular weight of 24.5 kDa, constituted approximately 54.87% of the total bacterial protein. After purification through chromatography, the protein was administered to mice via gavage in four consecutive doses. Then, its immunogenicity was evaluated using the active O157 toxin from *E. coli*. The challenge results showed that immunized mice could tolerate a dose of Shiga toxin from *E. coli* O157 that was 10 times the LD50. These findings suggest that the protein derived from the fusion of the ipaD and stxB genes has potential as a candidate for developing a recombinant vaccine against various Shigella strains.

161. Expression and Characterization of VHH Antibody Against HBsAg

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Hepatitis B, an oncogenic virus belonging to the Parvoviridae family, infects liver cells and is a major cause of liver cancer. HBsAg, the surface antigen of the Hepatitis B virus, is the most important antigen of this virus. VHH, the smallest antigen-binding antibody fragment, retains its function in the absence of the light chain. In 2009, a VHH antibody against HBsAg was produced using the phage display technique. The results of this study indicated a positive effect of VHH against HBsAg in reducing the production of pathogenic virions. In this research, VHH against HBsAg was designed and expressed, and its binding to the antigen was investigated. After gene design, the corresponding nucleotide sequence was synthesized in the Pet21(a) vector between the NdeI and XhoI restriction sites. After transforming the plasmid to the E. coli Shuffle expression strain, its expression was investigated under different conditions. Finally, protein expression was performed in LB medium at 37°C with 1 mM IPTG for 4 hours. SDS-PAGE electrophoresis was used to assess expression. Expression was confirmed using Western blotting with an antibody against the His-tag. The protein was purified using a Ni-NTA affinity chromatography column, and its binding to HBsAg was finally investigated using the enzyme-linked immunosorbent assay (ELISA) technique. The designed VHH against HBsAg was successfully expressed in the soluble phase, and its binding to HBsAg was confirmed by ELISA after confirming expression and purification. This research provides efficient results for developing a kit or a purification chromatography column based on this antibody.

162. Stabilization of Laccase Enzyme by Immobilization on Magnetic Nanoparticle Coated with Polyvinyl Alcohol and Polyethylene Glycol

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Laccase is an enzyme in the oxidoreductases group that has many applications in various industries such as food, textiles, cosmetics, and so on. Using magnetic nanoparticles as a support for enzyme stabilization not only increases its stability but also simplifies the use of expensive enzymes, their management, and the process of separating the enzyme from the product. Coating magnetic nanoparticles is intended to increase stability, protect against oxidation, and improve their stabilization capacity. In this study, we coated magnetic nanoparticles with polyethylene glycol and polyvinyl alcohol, then immobilized the laccase enzyme on the nanoparticle surface. The efficacy of the immobilized enzyme was assessed using a spectrophotometric technique by measuring the absorbance of the ABTS substrate at 420 nm and then comparing it to that of the free enzyme. In line with the results of other studies, the present study also showed that stabilized laccase has more thermal stability and pH tolerance compared to the free enzyme, which indicates the protective role of magnetic nanoparticles for laccase through appropriate surface interactions. Immobilized laccase remained active at 60°C, which indicates the effect of immobilization in preventing thermal denaturation of the enzyme by limiting the movement of the enzyme and its structural changes. The immobilization effect of the enzyme on the carrier protects the laccase from denaturation, reducing the sensitivity of laccase immobilized on magnetic nanoparticles to pH variations. The findings were indicative of improved performance of the stabilized enzyme in different conditions, which may be an advantage of using these nanoparticles in industry.

163. Proteomic and Protein Analysis in Early Diagnosis of Alzheimer's Disease in Motamedi Hospital of Garmsar City

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Alzheimer's disease is one of the most common and dangerous types of dementia that gradually causes impairment in memory, thinking and behavior. Considering the economic and social burden of this disease, its early diagnosis is crucial for effective therapeutic interventions. In recent years, proteomics has gained attention as a powerful tool for identifying biomarkers and analyzing proteins in the context of chronic diseases. This study was designed to evaluate the role of proteomics in the early diagnosis of Alzheimer's disease and to identify specific proteins related to this disease. In this research, blood and cerebrospinal fluid samples were collected from 100 Alzheimer's patients in the early stages and 100 healthy control samples. Using proteomic techniques such as two-dimensional electrophoresis and mass spectrometry (MS), the proteins in each group were identified and analyzed. Also, the data obtained from the analysis were analyzed using statistical software such as R and SPSS. The findings showed that in Alzheimer's patients, there are significant changes in the level of some proteins compared to the control group. In particular, an increase in the level of inflammation-related proteins and a decrease in neuroprotective proteins were observed in the patient group. Also, two specific proteins were identified as potential biomarkers for early detection of Alzheimer's disease. This study shows that the use of proteomics can be useful as a new approach in the early diagnosis of Alzheimer's disease. It is suggested that more research be done in the field of identifying biomarkers to develop non-invasive and efficient diagnostic methods.

164. *In silico* Prediction of Peptide Based Vaccine Against Infectious Bursal Disease of Poultry

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Infectious Bursal Disease Virus (IBDV) is a significant immunosuppressive virus in chicks, causing substantial economic losses in the poultry industry. VP2 is the main protective antigen of this virus and contains antigenic epitopes responsible for inducing neutralizing antibodies. This study aimed to design a peptide vaccine by selecting potential epitopes through analyzing all VP2 protein sequences reported in the NCBI database using *in silico* methods. Initially, the VP2 protein sequences were evaluated using various bioinformatics tools to identify potential epitopes. Subsequently, the epitope ITAANDYQFS, which scored highest in terms of surface accessibility, antigenicity, non-allergenicity, non-toxicity, stimulation of MHC I and II, and docking capability with TLR2-1, was selected as the candidate epitope. This epitope possesses desirable characteristics, including the ability to stimulate the immune system and elicit an effective immune response against IBDV. Our results are based on sequence analysis and *in silico* predictions, and *in vivo* and *in vitro* studies will be required to confirm and evaluate its efficacy. These findings could provide guidance for the development of new and more effective vaccines against Infectious Bursal Disease Virus in the future.

165. Design and Fabrication of a Nanofood Containing Microalgae and Medicinal Plants

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With the rising demand for food resources, the aquaculture sector presents a viable solution for sustainable food production. Spirulina microalgae, comprising 60-70% protein by dry weight as determined by the Bradford method, is a rich source of vitamins and minerals, offering antioxidant, anti-inflammatory, and anti-tumor benefits. It supports body homeostasis and promotes the colonization of beneficial intestinal bacteria, enhancing digestion and nutrient absorption. This study utilized phytochemical compounds with therapeutic properties. This research incorporates thyme extract, identified through UV-visible spectroscopy to contain thymol and carvacrol within the 270-280 nm range. Thymol possesses notable anti-inflammatory, analgesic, and antipyretic properties, aiding in injury management and reducing immune and stress responses. Additionally, garlic extract, rich in allicin—verified by UV-visible spectroscopy at 230 nm and Fourier-transform infrared spectroscopy (FTIR) with characteristic peaks at 1049 cm^{-1} (vinyl group) and 815 cm^{-1} (C-S bonding)—has been shown to promote fish growth, increase resistance to ammonia toxicity, and enhance non-specific immune responses against infections from both Gram-positive and Gram-negative bacteria, including Bacillus, Streptococcus, Salmonella, and Aeromonas. By combining spirulina microalgae with thyme and garlic extracts, a potent and safe dietary supplement for farmed aquatic animals can be developed. This mixture is processed into a nano system using the ball mill method while retaining its beneficial properties, with FE-SEM analysis indicating a particle size of approximately 20 nm. The production and application of this nano system offer significant economic advantages, such as reduced feed consumption and enhanced nutrient availability, marking an innovative step toward more efficient and sustainable aquaculture practices.

166. The Effect of *Dunalliella salina* Exosome on Human Skin Cells

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Skin aging is a complex process, influenced by internal and external factors, especially the sun's UV, which can lead to premature aging by damaging collagen and other skin structures. Today, protecting the skin using compounds with biological sources is so important. Exosomes are naturally small membrane vesicles (30-150 nm) of endocytosis origin and have unique properties, including low immunogenicity, biodegradability, and low-level toxicity, which have been increasingly noticed. According to this issue, the microalga *Dunalliella salina* was selected for the preparation of exosomal nanovesicles and human skin fibroblast treatment in this research. Exosomes derived from *D. salina* have antioxidant and anti-inflammatory properties. The extraction process led to exosomes with dimensions of 57.58 to 76.08 nm. The size of exosomes was measured using a Dynamic light scattering device. The results obtained from the simultaneous cultivation of exosomes and skin cells in DMEM medium with high glucose and 10 to 20% FBF in a 37°C incubator for 24 hours led to a 20% increase in the proliferation and rejuvenation of skin cells. The results indicate that these exosomes have significant potential as anti-aging agents. According to these findings, microalgae-derived exosomes can lead to the design and development of new solutions in skin care.

167. The Effect of Modified Packaging Containing Zinc Nanoparticles and Temperature on Shelf-life Fresh Almond

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Nuts are very popular in the world because of their taste and high nutritional value. Nanoparticles are antimicrobial agents that are obtained by adding active substances to the packaging system and/or using active polymers and are capable of destroying or inhibiting rotten and pathogenic microorganisms. Nano technology has advantages such as higher health safety, lower price and higher quality. Metal nanoparticles include copper, zinc, gold, titanium and silver. Since zinc oxide is recognized as a safe compound by the food and agriculture organization of the united nations (FAO), its use in the food and pharmaceutical industries is approved. The purpose of this study was to use polymer films containing zinc nanoparticles as a new method to increase the shelf life and maintain the quality of fresh Almond (*Prunus amygdalus*). Fresh pistachios were packed in nanocomposite films containing copper nanoparticles (0, 3, and 5% weight) in three temperature treatments (4, 12, 25 °C) and stored for 30 days. The results showed that the amount of aflatoxin and *Aspergillus flavus* increased with the increase in storage time, and the application of nano copper particles in different concentrations could significantly reduce the growth of *Aspergillus flavus* and aflatoxin B1. Almond packed with 3% w copper nanoparticles, after 30 days of storage and temperature 4 °C, the amount of *Aspergillus flavus* was 233.33 CFU/g and aflatoxin was 0.12 (ppb). In the same time conditions and at 12 °C, the amount of *Aspergillus flavus* was 500 CFU/g and aflatoxin was 0.51(ppb). In the control treatment, after 30 days of storage at temperatures 4, 12 and 25, the amount of *Aspergillus flavus* was 300, 633.33 and 900 CFU/g, respectively. Also, the control treatment, after 30 days at temperatures 4, 12 and 25, the amount of aflatoxin was 0.56, 2.5 and 3.1 (ppb). Therefore, the application of nano zinc particles on fresh almond was able to significantly reduce the amount of *Aspergillus flavus* and aflatoxin B1.

168. The Effect of lncRNA PVT1 Knockdown on Immune Checkpoint Genes Expression in A549 Cell Line of Lung Cancer

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Lung cancer, one of the most common and deadly cancers, is caused by uncontrolled cell growth caused by genetic changes in growth-regulating genes. Despite the therapeutic advances, this cancer remains a major challenge for treatment and its improvement requires the identification of new therapeutic targets. Long non-coding RNAs (lncRNAs) are known to be critical regulators of various cellular processes, including cancer progression and immune modulation. PVT1 is one of the immune-related lncRNAs in cancer immunotherapy, which acts as an oncogene involved in the development, invasion and metastasis of non-small cell lung cancer (NSCLC). In this study, A549 cell line was cultured in RPMI-1640 medium and specific lncRNA PVT1 siRNA was transfected using polyethyleneimine (PEI). Then, RNA was extracted and cDNA was synthesized using the kit, and the expression levels of PD-L1, VISTA, and B7-H3 genes were evaluated by qRT-PCR, with GAPDH as an internal control. The results of this study showed that the suppression of PVT1 in A549 cells led to changes in the expression level of immune checkpoint genes PD-L1, VISTA and B7-H3, which indicates the regulatory role of PVT1 in the expression of these genes. The findings show that lncRNA PVT1 plays a role in modulating immune checkpoint gene expression and contributes to immune evasion in NSCLC; Therefore, the

suppression of lncRNA PVT1 can be proposed as a new therapeutic strategy to reduce the ability of cancer cells to escape from the immune system in non-small cell lung cancer (NSCLC).

169. Optimized Transgene-free Reprogramming of Human Dermal Fibroblasts into Neurons Using Small Molecules

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The transdifferentiation of dermal fibroblasts into neurons represents a significant achievement toward developing new treatments for neurological diseases and more precise modeling of these conditions. Typically, a combination of specific transcription factors is used to induce this transformation, which raises safety concerns and limits its clinical use. In this study, we address these challenges by reprogramming human dermal fibroblasts obtained from the skin biopsy of a 67-year-old Alzheimer's patient into mature neurons using an optimized transgene-free, small molecule-based method. To generate neurons, conditioned medium from mixed glial cell cultures (mGCM), neural conditioned medium (NCM), and PLO/Lam coating were employed to promote cell differentiation and boost cell survival. Neural stem cells from the postnatal cerebellum and primary microglia from mixed glial cell cultures of neonatal mouse brain tissue were used to prepare these media. Neural induction medium consists of a 1:1:1 mixture of NCM, mGCM, and Neurobasal supplemented with N-2, B-27, db-cAMP, bFGF, and a small molecule cocktail including VPA, CHIR99021, Repsox, Forskolin, SP600125, GO6983, and Y-27632. In the next step, cells were switched to a neuronal maturation medium containing the same basal components supplemented with BDNF, GDNF, NT3, AA, db-cAMP, N-2, and B-27 and cultured for an additional two weeks. Finally, after 25 days, human chemically induced neurons (hciNs) expressing neuronal markers, including DCX and Tuj1, were generated at both the RNA and protein levels. By fine-tuning the technique, we generated neurons without introducing exogenous genes. Our findings offer a safer, more efficient platform for personalized medicine and disease modeling in neurodegenerative diseases.

170. Bioinformatic Analysis of miR-21 in Atrial Fibrillation Disease: Identification of Target Genes, Pathways and Interactions

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Atrial fibrillation (AF) is a complex arrhythmia characterized by disrupted electrical activity and structural remodeling in the atria. MicroRNA-21 (miR-21) has emerged as a critical regulator in AF, influencing various molecular processes. Initially, we used the DBGAP database to confirm this claim and found that Mir-21 is one of the most important ncRNAs of the mentioned disease then we utilized several publicly available datasets and databases, including the GEO, TargetScan, and miRBase to identify miR-21 expression profiles and its predicted target genes. Differential expression analysis was performed using R/Bioconductor tools, while pathway enrichment analysis was conducted using the KEGG and Reactome databases. Network analysis was performed to visualize interactions between miR-21 targets and related pathways. miR-21 was found to be significantly upregulated in AF patients compared to healthy controls. Target prediction algorithms identified several key genes involved in fibrosis, inflammation, and hypertrophy as potential targets of miR-21, including PTEN (Phosphatase and Tensin Homolog),

TIMP3 (Tissue Inhibitor of Metalloproteinases 3), and PDCD4 (Programmed Cell Death 4). miR-21 targets and downregulates PTEN, leading to increased activity of the PI3K/AKT pathway. miR-21 targets and downregulates TIMP3, which can lead to increased activity of MMPs. This increased activity results in greater degradation of the extracellular matrix. miR-21 targets and downregulates PDCD4, leading to reduced apoptosis and increased cell survival and proliferation. Pathway enrichment analysis revealed that these targets are predominantly involved in the PI3K/AKT signaling, apoptosis, and extracellular matrix degradation signaling pathway. Bioinformatics approaches have successfully identified miR-21 target genes and their associated pathways, offering valuable insights for developing targeted therapies.

171. Bioinformatics Analysis to Identification Dysregulated Genes as Promising Biomarker in Stem Cell Niche of Ovarian Cancer

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Ovarian surface epithelial cells established more relatively than less differentiated as the malignancy developments. These cells maintain properties of moderately uncommitted pluripotent cells until undergoing neoplastic transformation. Current study aimed to identify dysregulated genes in serous ovarian cancer epithelia cells samples and their pathways they are involved. Data set GSE14407 was received from the Gene Expression Omnibus, and then the differentially expressed genes (DEGs) between serous ovarian cancer epithelia and healthy ovarian epithelia samples were identified using the R package including GEOquery, limma, BiocGenerics, affy, and oligo. Gene ontology and KEGG pathway analysis were performed to identify the biological function of DEGs by Enrichr. A PPI network was constructed to display key target genes. For hub genes validation, GEPIA databases were used and survival curve plotted by Kaplan-Meier plotter. In total 323 DEGs were selected, comprising of 176 upregulated ($\log_{2}FC > 1$, $p\text{-value} < 0.02$) and 147 downregulated genes ($\log_{2}FC < -1$, $p\text{-value} < 0.02$). The KEGG pathways were significantly enriched including RNA binding, Kinase binding, Insulin-like growth factor receptor binding, and peptide biosynthesis. Also, DEGs were enriched in biological processes associated with protein binding transcription factor activity, cellular protein metabolic process, and mitotic cell cycle. The 10 hub genes include: ACTB, RPL7, RPL6, RPS6, MRPS14, UBQLN1, MRRF, RPL22, MRPS14, and YWHA with ACTB ranking highest. Among these, ACTB, RPS6, MRRF, UBQLN1, RPL7, and PMSD14 were validated by survival analysis. These findings contribute to understanding gene regulation in ovarian cancer and identifying new therapeutic targets and biomarkers in associated stem cells.

172. Bioinformatics Analysis of Cervical Cancer by the Construction of circRNA-miRNA-mRNA Regulatory Network

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Cervical cancer ranks as one of the leading causes of cancer incidence and death among women. circRNAs have been implicated in the development of several diseases through ceRNA regulation systems. Nevertheless, the precise contribution of the regulatory network involving circRNA/miRNA/mRNA in various disorders remains uncertain and has yet to be thoroughly investigated. To achieve this objective, we gathered CircRNA expression profile data from GEO datasets. We next identified the differentially expressed circRNAs (DECs) using the R package (Limma) as the first step. Furthermore, the miRNAs that were controlled by these circRNAs were predicted using a specialized database for circRNAs associated with cancer. Then, the

identification of associated genes was achieved by intersecting targeted genes, predicted by the web tool miRWalk, with differentially expressed genes collected from TCGA datasets. Functional enrichment analyses were conducted, and a (PPI) network was built using Cytoscape software. From this network, 10 hub-genes were identified. A circRNA/miRNA/mRNA regulation network was subsequently created. Four DECs (hsa_circ_0000745, hsa_circ_0000745, hsa_circ_0002762, hsa_circ_0084904) were obtained and tree miRNAs (hsa-miR-1-3p, hsa-miR-505-5p, hsa-miR-126-5p) which are regulated by these circRNAs were also predicted. Then 1585 overlapped genes regulated by these miRNAs had been predicted, and function enrichment analysis revealed these genes are mainly linked with some regulatory pathways of cancers. Ten hub-genes (AURKB, MELK, TOP2A, ASPM, CCNA2, NCAPG, CDK1, TTK, KIF11, BUB1B) have been screened from a PPI network. This study could improve understanding of circRNA's role in cervical cancer, leading to new diagnosis and treatment options.

173. Pan-Cancer Analysis of POTEF's Prognostic Significance: From Genome to Transcriptome

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Colorectal cancer (CRC) is the most common type of newly diagnosed cancer, limited by treatment options, particularly in advanced and metastatic stages. This investigation aims to identify novel genes and genetic variants involved in (CRC), using genome-wide DNA and RNA sequencing, followed by validation in a large patient cohort and pan-cancer analysis. The researchers have revealed 3,576 differentially expressed genes (DEGs) in early-stage CRC and 2,985 DEGs in advanced CRC. Among the top dysregulated pathways, the POTE Ankyrin Domain Family Member F (POTEF) gene, associated with the tumor microenvironment, was linked to poor patient prognosis. Further analysis revealed a novel genetic variant, rs925939730, potentially regulating POTEF expression. Notably, POTEF was consistently upregulated across various cancers, including CRC. The combination of POTEF with current CRC panel genes may be diagnostic markers with sensitivity, specificity, and AUC values of 0.98, 1.00, and 0.99, respectively. The POTEF gene was further validated as a marker in additional patients with CRC by reverse transcriptase (RT)-PCR and WES. The correlations between POTEF and immune infiltration were assessed to evaluate its potential as a therapeutic target. Functional enrichment analysis highlighted the role of POTEF in tumor microenvironment-related pathways. The comprehensive analysis provides valuable insights that could guide future strategies for diagnostic and therapeutic interventions in metastatic CRC.

174. Structural Analysis of SOD1 Protein Variant in the Presence of 1-butyl 3-Methylimidazolium Thiocyanate Ionic Liquid

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An association between several mutations in the gene encoding the antioxidant enzyme Cu/Zn superoxide dismutase 1 (SOD1) and the neurodegenerative disease known as familial amyotrophic lateral sclerosis (FALS) was reported. These findings have caused a large number of new studies in experimental models to investigate the toxic function of mutant enzymes. This research aims to investigate and compare the content of the second structure of SOD1 protein containing R115G mutation in the presence and absence of an ionic liquid called 1-butyl 3-methylimidazolium

thiocyanate (BMISCN). In this study, pET28a- R115G was transformed into E.coli BL21, induced with IPTG, and purified using nickel agarose affinity chromatography. For structural studies, the protein sample was subjected to amyloidogenic conditions for 72 hours. To study the content of the second structure, FTIR spectroscopy was performed in the amide I band region (1600-1700 cm⁻¹) in the presence and absence of BMISCN. Also, the effect of BMISCN on the secondary structure tendencies of SOD1 containing the R115G mutation was evaluated with the DSSP program. FTIR results for R115G and R115G- BMISCN were 15 and 2% for cross β -sheet and 6 and 18% for α -helix. In DSSP, the percentage of β -sheet for the R115G and R115G- BMISCN was reported to be 26% and the percentage of α -helix was 12%. In general, the findings show that the ionic liquid has reduced amyloid fibrils by changing the cross β -sheet percentage.

175. Detection of Human miRNA-155 Using A Colorimetric Signal Design of G-quadruplex

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MicroRNAs are small non-coding RNAs that have garnered attention as key regulators of gene expression in the fields of biomedicine, diagnosis, and disease treatment. miRNA-155 plays a significant role in regulating inflammation and the tumorigenesis of cancer. In this study, this microRNA was examined as an input strand using an autocatalytic assembly circuit. After adding this input strand and hairpin structures, a three-way junction carrier structure containing a new trigger strand with specific domains at one end of the circuit's arm was formed, which can restart the hybridization reaction cycle. From the formed domains, a G-quadruplex structure was designed. In this structure, due to the alignment of guanine quartets, the signal is initially on. Upon adding the designed DNAzyme structure, it attaches to the target domain in the three-way junction structure, unfolds its own structure, causing the guanine quartets to separate, and thus turns off the DNAzyme signal. This experiment was validated under two conditions: positive control (with the input strand and all other hairpin structures present, showing color change and lower absorbance - white color) and negative control (without the input strand, showing no change and higher absorbance - green color) at a wavelength of 416 nm and a detection limit of 31 picomolar.

176. Breast Tumor Imaging by Peptide-bound Gold Nanoparticles to Bind to Angiogenic Receptors at the Tumor Site

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Breast cancer is a common malignancy in women. Diagnosing cancer in the early stages helps in treatment. The process of angiogenesis plays a key role in the progression of tumors. Therefore, peptide design to bind to angiogenic receptors can be a special solution in the treatment and diagnosis of cancers. In this study, a 30 amino acid peptide was designed and synthesized. Then, gold nanoparticles (GNPs) in sizes of about 20-30 nm were synthesized. TEOS/APTES was used to connect the peptide to the gold nanoparticle and the gold nanoparticle was connected to gadolinium to be labeled and used in MRI imaging. Identifying GNPs and confirming binding to gold nanoparticles was done using UV-Vis, DLS, FTIR, and TEM. ICP-MS estimated the biodistribution of substances in the body of rats. Finally, Micro CT and MRI were performed to diagnose the tumor. Imaging with Micro CT and MRI showed that the synthesized nanoparticle specifically targets tumors and accumulates more inside them than free GNPs. The functional elements used in the nanoparticle synthesis greatly help increase the accuracy of the captured images. The results show that this nanoparticle can be a suggested option for diagnostic uses.

177. Determination of Conserved Domains and Exon-intron Structure of Wox Gene Family in Sesame Plant Based on Bioinformatics Software

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Sesame (*Sesamum indicum*) is an annual herbaceous plant belonging to the Pedaliaceae family. Sesame is used for oil extraction and in the food, pharmaceutical, and industrial sectors. One of the most important ways to resist non-biotic stresses such as drought and salinity can be the resistance genes in plants. Among the resistance genes in plants, the WOX gene can be mentioned. The homeobox related to WUSCHEL (WOX) is a family of transcription factors that is specific to plants and is characterized by a homeodomain. The WOX transcription factor plays an important role in regulating plant growth and development and in responding to abiotic stress. The study of the expression profile and qRT-PCR analysis of these genes in cotton showed that most of the GmWOX genes responded to various abiotic stress treatments. The MEME software was used to identify the conserved motifs, with the parameters set to identify 20 conserved motifs with a minimum and maximum length of 6 to 50 amino acids. The results of this analysis were visualized using the TBtools software. The exon-intron structure and intron phase of the WOX genes in the sesame plant were drawn and examined using the GSDS software, the results showing the different lengths of the WOX gene family; WOX1 has the longest length, with 4 exons and 3 introns, and WOX9 has the shortest length with 1 exon. This study emphasizes the importance of the WOX gene in the resistance of sesame plants to environmental stresses and can be used to improve the tolerance of this plant to adverse environmental conditions.

178. Alteration in GSK3- β Gene Expression in Neuronal Cells Treated with Riluzole.

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Alzheimer's disease (AD) manifests as a neurodegenerative disorder and dementia, presenting symptoms such as forgetfulness, learning impairments, and memory loss. The primary neuropathological factors in Alzheimer's include the accumulation of extracellular beta-amyloid plaques (neuritic plaques) and the intracellular accumulation of phosphorylated tau (neurofibrillary tangles or NFTs). Previous studies have shown that in AD, the activity of the GSK-3 β gene increases. The heightened activity of the GSK-3 β enzyme in AD leads to tau phosphorylation and the formation of NFTs. Recent findings have highlighted the use of the drug Riluzole as a neuroprotective agent in mitigating the effects of AD, although its exact mechanism remains unknown. In this study, changes in the expression of the GSK-3 β gene were examined in human SH-SY5Y neuronal cells treated with Riluzole. The MTT assay was employed to determine the appropriate drug concentration. The MTT assay was conducted at concentrations of 10, 20, 40, and 80 μ M over 24, 48, and 72 hours. Based on the results, the optimal time and concentration for drug treatment were determined to be 24 hours at 10 μ M. RNA was then extracted, and cDNA was synthesized, followed by an analysis of the expression of genes involved in tau protein phosphorylation (GSK-3 β gene) in the neuronal cell line using qPCR. The gene expression analysis results indicate that treatment with Riluzole in neuronal cells leads to a reduction in GSK-3 β gene expression. It appears that the use of Riluzole, by reducing GSK-3 β activity, may decrease the level of tau protein phosphorylation (NFTs).

179. Preparation of Cell Line Expressing NV Gene of VHSV Virus

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Viral hemorrhagic septicemia virus (VHSV) belongs to the Rhabdoviridae family and the Novirhabdovirus genus. This virus has a spherical shape and a single-stranded negative sense RNA genom. Infection with this virus will cause symptoms such as darkening and extensive bleeding on the body surface, protruding eyes, bulging belly and eventually death in farmed and free-range fish, especially trout. There is a non-virion (NV) gene in the genome of the rhabdovirus. Removal of this gene leads to disruption of virus replication and a reduction of its pathogenicity. Therefore, its isolation in the cell culture system is a suitable method for the detection of the VHSV virus. Preparation of cell culture lines expressing subgenomic virus replicons is a desirable method for evaluation. For this reason, the recombinant lentiviral plasmid pCDH-CMV-MCS-EF1-cGFP-T2A-Puro containing the NV gene of the VHSV virus was used with the aim of creating lentiviral vectors carrying the target gene in the third generation lentiviral packaging system. Transfection in HEK-T293 cell line followed by infection of CS2-2 cell line with lentivectors was performed and CS2-2 cell line expressing VHSV virus NV gene was produced. In order to evaluate NV gene expression, it was cloned in the lentiviral transfer vector upstream of the GFP gene and by observing the bright green dots under the fluorescent microscope the expression of this gene was confirmed. These results showed the successful production of CS2-2 cell line expressing NV gene from VHSV virus.

180. Preparation of Cell Line Expressing NV Gene From IHNV Virus

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Infectious hematopoietic necrosis virus (IHNV) belongs to the rhabdoviridae family and belongs to the Novirhabdovirus genus. The virions of this family are bullet -shaped and the single-stranded RNA genome is negative sense. This virus causes symptoms such as darkening of the skin, swelling of the abdomen, bleeding eyes, accumulation of liquid in the intestine, and eventually death in many species of free fish, including salmon. Novirhabdovirus have a non-virion gene (NV) in their genome, the deletion of which leads to disruption of virus growth and reduced pathogenicity, as a result, NV plays an important role in virus multiplication and pathogenicity. IHNV diagnosis method is its isolation in cell culture system. The usual evaluation method is the preparation of cell lines that express the replicons under the virus genome. For this purpose, a cell line was produced to evaluate this virus in this study. For this reason, recombinant lentiviral plasmid pCDH-CMV-MCS-EF1-cGFP-T2A-Puro containing the NV gene of IHNV virus was used to produce lentiviral vectors containing the target gene in the third generation lentiviral packaging system. Transfection was performed in HEK293-T cell line. Then the infection of the CS2-2 cell line with these lentivectors is possible and the CS2-2 cell line expressing the NV gene of the IHNV virus is produced. The expression of NV was confirmed by its cloning in the lentivirus transfer vector upstream of the GFP gene and the observation of bright green dots by fluorescent microscope and RT-PCR test.

181. A Novel Missense Mutation in the *SLC38A8* Gene Causing Visual Impairment Foveal Hypoplasia Type 2

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Foveal Hypoplasia Type 2 is an ocular anomaly characterized by the absence of the foveal pit, persistence of the inner retinal layers, and widespread vascularization throughout the retina, leading to visual impairment and nystagmus. This autosomal recessive disorder, known as FVH2, results from mutations in the *SLC38A8* gene encoding an antiporter protein (a type of sodium transporter). Mutations in this gene cause improper signaling at the optic chiasm, leading to visual impairment and nystagmus. The aim of this study was to identify the possible genetic cause of acute visual impairment and nystagmus in three affected male individuals from two related Semnani families. First, whole exome sequencing (WES) was used to identify the gene and mutation responsible for the disorder. Subsequently, bioinformatics tools were used to assess the pathogenicity of the novel identified mutation. To confirm the identified mutation and analyze its segregation in the patients and other family members, Sanger sequencing was utilized. The WES results revealed a novel splice site mutation, c.805+1G>A, in intron 6 of the *SLC38A8* gene. Furthermore, segregation analysis and in silico studies confirmed the autosomal recessive nature of the disorder and the pathogenicity of novel mutation found. Overall, the results of this research not only expand the spectrum of mutations in the *SLC38A8* gene but also highlight the significant impact of next-generation sequencing techniques in diagnosing highly heterogeneous ocular disorders. Additionally, the findings will significantly aid in genetic counseling and prenatal diagnosis of FVH2 in at-risk families.

182. A Novel Loss-of-function Mutation in the *MME* Gene Causing Charcot-Marie-Tooth Axonal Type 2T

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Axonal Charcot-Marie-Tooth type 2T (CMT2T) is known as an autosomal recessive genetic disease with peripheral sensory motor neuropathy, with slow progression and symptoms of atrophy, slowly progressive weakness of the distal lower limb muscle, gait disturbance, distal sensory disturbances, and hyporeflexia. This abnormality is caused by a homozygous mutation in the *MME* gene encoding the Neprilysin (NEP) enzyme protein. Mutation in this protein causes the destruction of myelin sheaths of the peripheral nervous system or the destruction of nerve axons. Whole exome sequencing method was used to diagnose this disease in an affected person from Semnan. Moreover, bioinformatics software was used to investigate the pathogenicity of the novel mutation found. Sanger sequencing and segregation analysis were used to confirm the identified gene mutation in the patient and his parents. The results showed the existence of a loss of function mutation in the form of c.1400dupA:p.Arg468fs in exon 41 of the *MME* gene of the affected patient in the family. Also, segregation analysis and in silico studies confirmed the autosomal recessive pattern of the disease and the pathogenicity of the novel discovered mutation. In addition to expanding the spectrum of *MME* gene mutations, the obtained results emphasize the important impact of next generation sequencing techniques in the diagnosis of heterogeneous hereditary disorders such as CMT. In addition, these results will significantly contribute to genetic counseling and prenatal diagnosis of CMT2T in at-risk families.

183. Instructions for Facile Synthesis and Characterization of Citrate-mediated Fe₃O₄@Au core-shell Magnetic Nanoparticles

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Unique magnetic and optical properties are exhibited by Fe₃O₄@Au core/shell nanoparticles. Magnetic resonance imaging, photothermal therapy, controlled drug delivery, protein separation, biosensors, DNA detection, and immunosensors are among the biomedical applications of these nanoparticles. This article's objective is to stabilize magnetic iron nanoparticles in order to achieve the Fe₃O₄@Au structure. Initially, magnetic nanoparticles were synthesized through the co-precipitation procedure. Following that, we treated them with citrate to ensure their complete dispersion in an aqueous environment. The next step involved coating the modified magnetic nanoparticles with gold chloride, either in the absence of citrate or in the presence of additional citrate, to provide the magnetic properties and the SPR surface plasma resonance. We used UV-Vis spectroscopy and high-resolution transmission electron microscopy (HRTEM) to analyze the characterization of the intended hybrid nanoparticle. Spectroscopic analysis verified the presence of gold on the surface of magnetic iron nanoparticles. Additionally, the high-resolution transmission electron microscope effectively demonstrated the gold shell's formation on the magnetic iron nanoparticles. The remarkable dispersibility of magnetic nanoparticles is due to the significant reduction of high surface energy and dipole attraction, which occurs as a result of surface modification by citrate. Gold chloride was reduced on the surface of magnetic iron nanoparticles using citrate ions to generate the core-shell structure. The citrate ion functions as both a reducing agent and a capping agent to ensure the stability of the synthesized gold-coated iron oxide hybrid nanoparticle.

184. An Immunoinformatics Approach for Developing a Multi-Epitope Vaccine Providing Cross Protection Against H5N1 Avian Influenza Viruses

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H5N1, also known as avian flu, predominantly affects birds and is enzootic in many bird populations. It can also infect humans, causing severe respiratory illness. Recent outbreaks in dairy cows and poultry workers highlight the importance of monitoring and prevention. This study focuses on bioinformatics analysis to investigate and identify highly immunogenic and conserved epitopes derived from the hemagglutinin (HA) and neuraminidase (NA) proteins. These proteins play crucial roles in both the pathogenesis of the virus and the host immune response. By targeting these epitopes, we aim to develop a strategy that could provide broad coverage against various H5N1 avian influenza viruses. Initially, we extracted protein sequences from databases and aligned them to identify conserved regions using Clustal Omega software. Next, we employed immunoinformatics servers to identify B and T cell epitopes within the HA and NA proteins. From these proteins, we selected the most promising epitopes. These selected epitopes were linked using appropriate linkers to create a designed construct. Finally, we analyzed this construct's physicochemical and structural properties using relevant computational tools. We identified three TCD4+ and three B cell epitopes to construct the final product from two commonly found proteins. Our immunoinformatics analysis demonstrated that the designed polyepitopic peptide possesses favorable characteristics: it is safe, soluble, hydrophilic, and thermostable. These features make it

a promising candidate for a potential vaccine. The polyepitopic construct holds promise as a potential vaccine candidate against H5N1 avian influenza viruses.

185. Fabrication and Evaluation of a Core-shell Magnetic Chitosan Drug Nanocarrier for the Treatment of Breast Cancer

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Breast cancer is the second leading malignancy after lung and colorectal cancer worldwide, and it is predicted that more than 3 million new cases will emerge annually, with a mortality rate of 1 million people by 2040. Nanotechnology has introduced a new approach to cancer treatment, such as targeted drug delivery, effectively reducing drug resistance and the side effects of chemotherapy. In this project, to find an effective and controlled method for breast cancer treatment, the core-shell nanoparticles composed of magnetic nanoparticles/chitosan nanoparticles was synthesized by co-precipitation and chemical methods respectively, and the doxorubicin drug was loaded in the core of this nanocarrier. The nanoparticles were characterized using DLS, zeta potential, FTIR, and FESEM/EDX techniques, and their effectiveness in killing cancer cells was evaluated on breast cancer cell lines. Results from DLS and FESEM showed that nanocarrier with an approximate size of 80 nanometers were synthesized. FTIR and EDX results confirmed the correct synthesis of the drug-containing core-shell nanoparticles. The synthesized nanoparticle, with a zeta potential of -20 mV, showed 60% cell toxicity on the MCF-7 cell line. The results confirmed that this nanocarrier can be a more suitable option for breast cancer treatment due to its continuous and sustained release compared to the doxorubicin.

186. Synthesis of HSV-2 Positive Control Using Overlap Extension PCR for Real-time PCR

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Overlap extension PCR, a novel template-independent version of PCR, is used to synthesis arbitrary sequences, introduce targeted mutations for genetic editing at specific points within a sequence, and assemble larger fragments (up to 5kbp) with complex structures from smaller genomic DNA fragments. In this study we aimed to determine the efficiency of OEP for positive control synthesis applications. To set up OEP, Herpes simplex Virus type 2 was selected as the gene synthesis model. First, the US6 region in the herpes genome was selected based on a literature review. Then, a unique area within this region was identified using Clustal ω to compare HSV-1 and HSV-2. Different primers were designed for the identified region using SnapGene software. In silico PCR products were also assessed. All primers were checked for thermodynamic parameters and secondary structures using AlleleID software. All validation-related characteristics were designated in accordance with MIQE guidelines. After synthesizing the positive control using OEP, the synthetic fragment was amplified and then cloned into the pUC18 plasmid using TA cloning. The cloned fragment was then assessed using sequencing. Efficiency, interassay and intraassay variation, sensitivity, specificity and precision parameters were all tested for both the synthetic fragment and the natural herpes genome. In conclusion, our study demonstrates that overlap extension PCR (OEP) is a robust and reliable method for synthetic biology applications, particularly in the context of molecular diagnostics.

187. Papillary Thyroid Cancer and its Relationship with GJB3 Gene

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Papillary thyroid carcinoma (PTC) is characterized by its ability to metastasize to adjacent tissues, with approximately 10% of patients exhibiting metastatic manifestations. Despite the association of GJB3 with various cancers and diseases, its role in PTC development remains unclear. To investigate this relationship, we extracted microarray data from the NCBI-GEO database and applied the Limma algorithm to identify genes with differential expression between tumor tissue and adjacent healthy tissue. We analyzed samples from 25 patients with PTC at Sina Hospital, Isfahan. RNA extraction, cDNA production, and real-time PCR were performed using cybergreen for quantitative analysis. We designed exon crossing primers to evaluate the expression level of GJB3 and examined its relationship with patient age, sex, and invasion rate. Additionally, we investigated the degree of malignancy, promoter methylation levels, and disease progression rates in different subgroups. Finally, we assessed the correlation between GJB3 expression and patient survival. Our results show a significant increase in GJB3 gene expression in PTC tissue compared to adjacent healthy tissue. Furthermore, we found a direct correlation between GJB3 expression and tumor malignancy. Notably, we observed a relationship between GJB3 expression and disease subtypes.

188. Suppression Cell Proliferation Through Down-regulation of Cyclin B1 Expression and Induction of Apoptosis in PC3 Prostate Cancer by Green Tea Extract

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Prostate cancer is a significant global health concern. It is the fifth leading cause of cancer-related deaths in men. While its prevalence varies geographically, prostate cancer is the most common cancer diagnosed in men in over half of the world's countries, therefore exploring treatments with higher efficiency and less side effects is important. Green tea, a beloved beverage worldwide, contains polyphenols (catechins) with potential anti-cancer properties. This study investigated the effects of green tea extracts on prostate cancer cell proliferation by focusing on the expression of cycling B1 levels (a key mitosis cyclin for regulation of cell cycle) and apoptosis. To do so, PC3 cells were cultured and treated with green tea extract for 48 hours. By using western blot and DAPI staining, we analyzed the expression of cyclin B1 and viability of cells. Our results revealed a significant downregulation of cyclin B1. Moreover, DAPI staining showed the induction of apoptosis of cancer cells. These findings suggest that green tea extract may inhibit prostate cancer cell proliferation through modulation of cyclin B1 suppression and induction of apoptosis. While these results are encouraging, further research is needed to fully understand the anti-cancer mechanisms of green tea in prostate cancer and explore its potential as a natural based therapeutic agent.

189. Synthesis and Investigation of Magnetite/Schiff Base Nanocomposite Carrying 5-fluorouracil Drug

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The 5-fluorouracil is an anti-metabolite and anti-cancer drug, which is placed in the structure of DNA and RNA due to its structural similarity with pyrimidine and leads to the prevention of replication, toxicity, and colon or rectal cancer that has spread to other parts of the body. Drug delivery nanostructures are designed to deliver lower and more effective concentrations of

chemotherapy drugs. In the meantime, magnetic nanoparticles, as a group of nanoscale materials, have created a revolution in diagnosis and treatment methods through the possibility of targeted transfer of genes, drugs, stem cells, etc. to the target tissue or cell in medicine. In this study, magnetite nanoparticles were synthesized by co-precipitation method of Fe^{2+} and Fe^{3+} salts in alkaline environment. Magnetite nanoparticles coated with 3-aminopropyltrimethoxysilane were prepared by silanization reaction. Then, benzenedicarboxaldehyde 1 and 4 was covalently fixed on these modified nanoparticles to synthesize a new Schiff base ligand ($\text{Fe}_3\text{O}_4@\text{COF}$) and finally the anticancer drug 5-fluorouracil was loaded on the modified nanoparticles. FT-IR technique was used to ensure COF binding to nanoparticles and drug loading on nanoparticles. Comparison of average size and crystal structure of nanoparticles was investigated by transmission electron microscope, scanning and X-ray diffraction pattern. Their cytotoxic effect on MCF-7 and T47D cancer cells was evaluated by MTT assay. According to the FT-IR results, the presence of C-O and C-C bands in the peaks of 1203 cm^{-1} and 1385 cm^{-1} confirmed the formation of the Cof layer on the surface of the nanoparticles by the Schiff base reaction. The XRD pattern shows the cubic spinel structure of pegylated magnetite nanoparticles with an average of 21.22 nm . The magnetic properties were shown using VSM results which is the nanocomposite resulting from superparamagnetism. The results of the MTT tests showed that drug-carrying nanoparticles have a faster and stronger effect on inhibiting the growth of breast cancer cells (MCF-7) compared to the free form of the drug. These cell culture tests show the potential of these nanocarriers as revealed a suitable targeted nanopattern for anticancer drug delivery.

190. Synthesis and Identification of Modified Magnetite Nanoparticles with Organic-covalent Frameworks, Carrying the Drug Fluorouracil

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Iron oxide magnetic nanoparticles are one of the nanocarriers that are considered a suitable option in modern drug delivery due to their features such as low toxicity, biocompatibility, ability to load and control the transfer of drugs to cancer cells. Covalent organic frameworks (COFs) are also an emerging and new group of porous polymers with low density, large specific surface area, and good thermal stability, which have received the special attention of researchers in recent years. Fast, high thermal stability, large specific surface area, so they can be used in a wide range of applications. In this study, magnetite nanoparticles were synthesized by co-precipitation method of Fe^{2+} and Fe^{3+} salts in alkaline environment. Then, by controlled precipitation polymerization reaction, magnetite nanoparticles were coated with layers of COF to synthesize a new open Schiff ligand ($\text{Fe}_3\text{O}_4@\text{COF}$), and finally, the anticancer drug 5-fluorouracil was loaded onto the modified nanoparticles. FT-IR technique was used to ensure COF binding to nanoparticles and drug loading on nanoparticles. Comparison of average size and crystal structure of nanoparticles was investigated by transmission electron microscope, scanning and X-ray diffraction pattern. Their cytotoxic effect on MCF-7 and T47D cancer cells was evaluated by MTT assay. According to the FT-IR results, the presence of C-O and C-C bands in the peaks of 1203 cm^{-1} and 1385 cm^{-1} confirmed the formation of Cof layer on the surface of nanoparticles by Schiff base reaction. The XRD pattern showed the cubic spinel structure of pegylated magnetite nanoparticles with an average of 12.13 nm . Magnetic properties using VSM results showed that the resulting nanocarrier is superparamagnetic. The results of MTT tests showed that drug-carrying nanoparticles have a faster and stronger effect on inhibiting the growth of breast cancer cells (MCF-7) compared to the

free form of the drug. These cell culture tests show the potential of these nanocarriers as a targeted nanopattern. Suitable for the delivery of anti-cancer drugs revealed.

191. Synthesis of Copper Oxide Nanoparticles Using Plant Extract of *Eucalyptus globoulus* and its Antioxidant, Anticancer and Antibacterial Activity

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Numerous investigations on targeted medication delivery systems employing nanotechnology have been carried out recently. The particular significance of studies is on the green synthesis of nanoparticles that combat antibiotic-resistant bacteria and suppress cancer cells. In the current investigation, the physicochemical properties of copper oxide (CuO) nanoparticles were evaluated. They are intermediate metal oxides with good electrochemical activity and stability. The extract derived from *Eucalyptus globulus* leaves was employed as a stabilizer during the synthesis of the metal oxide nanoparticles. In addition, their physicochemical properties were evaluated. The Fourier-transform infrared spectroscopy (FT-IR) spectrum analysis demonstrated the accuracy of the nanoparticle production. These nanoparticles had a spherical shape and a size of 50 nm, according to FE-SEM images. Evaluating these nanoparticles' capacity revealed their capacity to improve the environment's pH. Following the measurement of these nanoparticles' biological impact on the MCF-7 cell line, the IC₅₀ concentrations for chemical and green synthesis CuO nanoparticles were determined to be 88 and 79 micrograms per milliliter, respectively chemical nanoparticles, Green synthesis nanoparticles did not significantly affect the normal cells of HEK-293. Also, a scratch test demonstrated Green synthesis nanoparticles 5% were found to prevent migration more than chemical nanoparticles after 72 hours. Moreover, *S. aureus* bacteria were used to test the antibacterial activity of the substances. For chemical CuO and green-manufactured CuO nanoparticles, the MIC and MBC values were determined to be 10 and 50 micrograms per milliliter, respectively. Molecular and animal investigations will be valuable to conduct a more thorough examination of these nanoparticles' capabilities.

192. Docking Simulation of Asenapine as a Potential Lead Inhibitor Against Central Nervous System Glutamate receptor 2 (GluR-2)

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The aim of this potential repurposing study is to investigate the potential inhibitory activity of Asenapine against central nervous system (CNS) Glutamate receptor 2 (GluR-2) using docking experiments. The Glutamate receptor 2 is an ionotropic transmembrane receptor for glutamate that mediates fast synaptic transmission in the central nervous system. It plays an important role in excitatory synaptic transmission. L-glutamate acts as an excitatory neurotransmitter at many synapses in the central nervous system. The possible attractive interactions of Asenapine within the binding sites of three subunits of the Glutamate receptor 2 were studied. Docking experiments of Asenapine were performed using Molegro Virtual Docker analysis. Docking and scoring experiments of Asenapine showed several binding interactions anchoring Asenapine within Glutamate receptor 2 catalytic sites and a cavity in chain B had the highest MoleDock score (-103.722) and Rerank score (-77.36). Our study provides evidence that Asenapine can serve as a promising lead for the development of new Glutamate receptor 2 inhibitors.

193. Identification of the Most Important Involved Genes in Presbycusis by 12 Hub Gene-Recognizing Methods

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Presbycusis, a Greek word meaning "senile hearing", refers to age-related hearing loss. This complication is caused by several factors, including physiological and anatomical changes due to aging, genetic predispositions, hormonal effects, etc. In this research, a systematic review was conducted using advanced search in PubMed to identify genes related to Presbycusis. Articles were selected for analysis based on statistically significant relationship (p -value < 0.05) between the genes and Presbycusis. The purpose of this study is to better understand genetic factors and genes affecting hearing loss associated with Presbycusis. Based on the findings of our systematic review, 78 genes related to Presbycusis were identified and the gene network was drawn. The analysis of 12 different methods of identifying key genes (hub gene) by the GeneMANIA algorithm showed that among 78 genes, PTK2, GRM7, CTH, DCLK1 and TLR4 genes were identified 10, 10, 9, 8 and 8 times by different methods, respectively as hub genes. The frequent presence of these genes as hub gene shows that they are the most important genetic factors affecting Presbycusis. These findings have contributed to the better understanding of the most important genetic factors affecting Presbycusis and inspiring for research in the treatment of Presbycusis and targeting these key genes to treat this disease.

194. Identification of TFPI-2 as a Tumor Suppressor Gene and Potential Biomarker in Anaplastic Thyroid Carcinoma

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Anaplastic thyroid carcinoma (ATC) is among the most aggressive and lethal forms of thyroid cancer, characterized by rapid progression and resistance to conventional therapies. Given its high malignancy and poor prognosis, understanding the molecular mechanisms of ATC is essential for identifying novel therapeutic targets. This study seeks to identify differentially expressed genes (DEGs) in ATC by analyzing microarray and RNA-seq data from The Cancer Genome Atlas (TCGA) and Gene Expression Omnibus (GEO) databases. RNA-seq and microarray datasets from TCGA and GEO were analyzed to compare gene expression profiles between 30 ATC tissues and 30 adjacent normal thyroid tissues. Log2 transformations and quantile normalization were applied to standardize the data and reduce variability. Principal Component Analysis (PCA) was conducted to assess data clustering. DEGs were identified using the limma package, with a threshold of $\log_2FC > 1.5$ and p -value < 0.05 . Overlapping DEGs between datasets were identified, and TFPI-2, a gene of interest, was selected. RT-q PCR will also be used to validate TFPI-2 expression level. Nineteen DEGs were consistently dysregulated in ATC compared to normal tissues. TFPI-2 was significantly downregulated in ATC samples, suggesting its role as a potential tumor suppressor. The downregulation of TFPI-2 in ATC offers new insights into the molecular basis of this aggressive cancer. These findings highlight TFPI-2's potential as a biomarker for ATC, making it a promising candidate for future diagnostic and therapeutic strategies. The integration of bioinformatics and experimental validation strengthens the robustness of these results.

195. Identification of *Moraxella Catarrhalis* Bacteria by Selecting an Appropriate Genomic Region and Designing Specific Oligonucleotides

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Moraxella catarrhalis is a pathogen of the human respiratory system, accurate diagnosis of which is essential for effective treatment; however, genetic diversity among strains is challenging. This study aims to select the appropriate gene region among the important common gene regions between the main strains of *M. catarrhalis* to design specific oligonucleotides for fast and reliable identification of this pathogen. Nucleic acid sequences of genes were checked with the NCBI megaBLAST tool. Gene Runner software was used to design oligonucleotides. NCBI primer BLAST was used to check the properties of oligonucleotides and the BlastN. NCBI tool was also used for their specificity. By studying the bacterial genome, 20 genes were selected from vaccine-candidate genes and virulence factors. 13 genes were excluded from the target species due to the detection of non-target species exhibiting less than 70% similarity or the presence of 20 or fewer strains in their BLAST results. BLAST results of oligonucleotides of the other 6 genes were non-specific, so the *ompCD* gene was selected by identifying 34 strains with a similarity of 95% or more and query coverage of 91% or higher. Oligonucleotides were designed with specific characteristics, including a minimum of 4 suitable secondary structures, a length of more than 30 nucleotides, $65^{\circ}\text{C} \leq T_m \leq 70^{\circ}\text{C}$, $50 \leq \%GC \leq 60$, and an amplicon size of 203 nucleotides. BLAST results of oligonucleotides confirmed 100% specificity of different *M. catarrhalis* strains. These oligonucleotides offer a valuable resource for the precise identification of *M. catarrhalis*. Future studies could focus on their validation within clinical environments and their integration into quick diagnostic assays.

196. Whole Exome Sequence Recognized Polyalanine-expansion Mutation in a Patient Affected with Synpolydactyly

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Synpolydactyly (SPD) is the combination of two inborn limb deformities *i.e.*, syndactyly and polydactyly. This congenital disorder, is an autosomal dominant limb malformation with incomplete penetrance and variable expressivity, and is clinically and genetically one of the most heterogeneous deformity. It was reported that the incidence of SPD is 3–10 in 10 000 births, though higher estimates ranging from 10–40/10 000 have been reported. The phenotype of SPD has been divided into three categories: typical SPD features, minor variants and unusual phenotypes. Three genetically distinct SPD loci have been mapped to 2q31, 22q13.31 and 14q11.2eq12, and have been classified into SPD1, SPD2 and SPD3, respectively. Typically, patients with SPD have syndactyly of the third finger (F3), fourth finger (F4) and/or fourth toe (T4), and fifth toe (T5). Polyalanine-expansion mutations in *HOXD13* lead to synpolydactyly. The *HOXD13* gene is part of the *HOX* gene family and locates on 2q31.1 of chromosome 2. The *HOX* genes encode a highly conserved family of transcription factors that are fundamentally important for morphogenesis in all multicellular organisms. In humans, there are 39 *HOX* genes arranged in four separate clusters: *HOXA*, *HOXB*, *HOXC*, and *HOXD*. We performed Whole Exome Sequence (WES) in a patient affected with SPD and found a mutation in the *HOXD13* gene (NM_000523.4: c.212_213ins) which change the protein (p.Ala61_Ala71dup) in the proband. Polyalanine-expansion has already reported in this disease. Therefore co-segregation analysis need to confirm the pathogenicity of this mutation.

197. Identifying Common Mutations and Investigating the Frequency of Mutations in *METTL5*, *METTL7A*, and *METTL7B* Genes in Gastrointestinal Cancers Based on *in silico* Data

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Gastrointestinal cancers play a crucial role in cancer-related deaths. Key genes in the development of these cancers include the METTL family members, which have various biological functions and play an important role in tumorigenesis. Our aim was to investigate mutations and their frequency in three selected genes from this family, namely METTL5, METTL7A, and METTL7B, in gastrointestinal cancers. Identifying mutations in these genes and evaluating their frequency could provide insight into the role of these genes in cancer progression. Initial gene identification relied on relevant articles and analysis of the TCGA database. RNA-seq data for colon, stomach, pancreas, esophageal, and liver cancers were collected, preprocessed, and normalized. The analysis of differential expression using R software revealed significant expression changes in the genes METTL5, METTL7A, and METTL7B. Available DNA-Seq data for each sample in the TCGA database were utilized to identify common mutations and their frequencies. To achieve this, MAF data for all candidate cancer samples were downloaded, and then assessed for mutation frequencies and types using the Maftools package. Based on the results, METTL5, METTL7A, and METTL7B genes were mutated in the gastrointestinal cancers. Findings indicated that various types of mutations occur in these genes, with a higher prevalence of SNP and missense mutations. The significance of identifying genetic variants associated with cancers lies in their potential to serve as biological markers for diagnosis or therapeutic targets. SNP and missense mutations have the highest frequency in selected genes. Although detecting gene mutations using computational models is useful, it requires empirical validation. Nonetheless, *in silico* screening is a valuable initial step in identifying mutated genes in cancer.

198. Identification of Hub Genes in Gastric Cancer: A Bioinformatics Approach

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Gastric cancer (GC) is a significant malignancy, being the fourth most common tumor in terms of incidence and the second leading cause of cancer-related deaths globally. Its pathogenesis is highly complex, contributing to the challenges in understanding and treating the disease effectively. In the present study, we aimed to identify new diagnostic and prognostic biomarkers in GC patient. Differentially expressed genes (DEGs) between GC tissues and normal stomach tissues were identified using GEO2R, and overlapping DEGs were determined through Venn diagrams. Enrichment analyses, including Gene Ontology (GO) and Kyoto Encyclopedia of Genes and Genomes (KEGG), were performed. The protein-protein interaction (PPI) networks of these DEGs were visualized in Cytoscape. To validate the expression differences of hub genes in gastric adenocarcinoma versus normal tissues, Gene Expression Profiling Interactive Analysis (GEPIA) was utilized, and the overall survival (OS) of hub genes was assessed using the Kaplan-Meier plotter. A total of 268 shared DEGs were identified, comprising 76 upregulated and 192 downregulated genes. An integrated analysis highlighted the top twenty hub genes, including FN1, CXCL8, SOX2, MUC5AC, NCAM1, TTR, ATP4A, CHGA, SPP1, GKN1, MUC6, SST, COL1A1, TFF2, CDX2, GHRL, KRT20, GAD1, PLA2G2A and CLDN18. These hub genes

showed significant overexpression in GC samples and exhibited positive correlations with each other. The identified hub genes and associated pathways offer promising targets for clinical research aimed at developing new treatments for gastric cancer. By focusing on these specific genes and their roles in disease mechanisms, researchers may uncover novel therapeutic strategies and improve patient outcomes.

199. Exome Sequencing Revealed the Genetic Cause of non-syndromic Hearing Loss in Four Iranian Consanguineous Families

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Hearing impairment is the second most prevalent clinical and genetically heterogeneous neurosensory disorder, affecting 1 in 166 Iranian individuals due to the high rate of consanguineous marriage. Hereditary Hearing loss (HHL) is classified as syndromic and non-syndromic forms. Non-syndromic autosomal recessive hearing loss (ARNSHL) is associated with over 70% of genes related to HL. In this study, exome sequencing (ES) was performed on eleven affected individuals to identify the disease-causing genes in six consanguineous families with hereditary non-syndromic hearing loss, The families had negative results on the otoscope panel screening. Finally, results were confirmed using Sanger sequencing. We identified two novel candidate HHL genes, DBX2: c.28G>A (p.Ala10Thr) and ARHGAP22: c.1873G>A (p.Glu625Lys), along with two novel variants in known HHL genes: OTOA: c.55G>A (p.Gly19Arg), and TBC1D24: c.484A>G (p.Asn162Asp). DBX2 interacts with ISL1, LMX1A, and LMX1B in auditory pathways. An essential component of the superior olivary complex, which is responsible for sound localization, is encoded by DBX2. The protein expressed by ARHGAP22 is found in the Rho GTPase protein cluster. It interacts with proteins that can lead to hearing loss, such as CDC42, JAG1, ROCK2, and DIAPH3. The likely pathogenic variant, OTOA (NM_144672):c.55G>A (p.Gly19Arg), is associated with two key effects. First, it impairs the recognition of signal peptides. Secondly, it reduces the flexibility of otoancorin, which appears to affect its normal function. The TBC1D24 gene encodes specialized GTPase-activating proteins associated with syndromic (DOORS) and non-syndromic HL (DFNB86). The c.484 A>G variant is located in the Rab-GAP-TBC Domain which is crucial for phosphatidylinositol linkages, and can modify the protein's normal function. We discovered the cause of HL in approximately 60% (4/6) of the studied group through exome sequencing, demonstrating that ES is a suitable technique to determine the genetic etiology of heterogeneous conditions such as HL.

200. Identification of Effective Flavonoids for Inhibition the Fibrillation of Amyloidogenic Peptides via *In silico* and *In vitro* Studies

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The accumulation of amyloidogenic proteins is a key factor in the development of neurodegenerative diseases. In recent times, there has been a growing interest in herbal remedies due to their cost-effectiveness and minimal side effects. Flavonoids, a group of compounds, have shown potential in reducing the aggregation of amyloidogenic proteins. This research seeks to identify the most effective flavonoids in inhibiting alpha-synuclein aggregation, a type of amyloidogenic protein. Initially, 98 flavonoids known for their inhibitory effects on various amyloidogenic protein aggregations were selected as potential candidates based on previous

studies. These compounds were subjected to initial screening to assess their absorption, distribution, metabolism, excretion, and pharmacokinetic properties using the OSIRIS and Swiss ADME web tools. The three-dimensional structure of the target protein was determined through homology modeling, and the interaction between the protein and selected flavonoids was studied in potential binding sites identified using the DoGSiteScorer and CASTp web servers, with the help of PyRx software. Subsequently, two flavonoids with the lowest binding energy to alpha-synuclein and showing interactions with amino acids in the amyloidogenic regions of the protein-identified by FoldAmyloid, TANGO, and Waltz web servers-were chosen for further investigation in laboratory experiments. In the in vitro phase, alpha-synuclein was subjected to conditions that promote fibrillation both with and without the selected flavonoids. ThT fluorescence assays, FTIR spectroscopy, and AFM images confirmed the ability of these two flavonoids to inhibit the aggregation of alpha-synuclein effectively.

201. Identification Alternative Splicing Events in Hypothalamus Tissue of Layer and Broiler Chickens

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In the poultry industry, two meat and egg-laying breeds are raised, which are different in terms of morphological, physiological and genetic characteristics. The reason for this difference can play an important role in regulating physiological behaviors. In this research, alternative splicing events and its role in transcriptome diversity and proteome diversity were investigated using hypothalamus tissue transcriptomic data related to two egg-laying (Hy-Line Brown) and meat (Arbor Acres Plus) breeds. The main goal of this research was to determine the role of text editing events in the difference in gene expression in meat and egg-laying breeds. The obtained results show that 30,504 occurrences are intermittent, among which 244 occurrences were at the level of $FDR < 0.05$. Multiple exon occurrence (SE) had one contribution with 137 significant events, intron retention (RI) with 37, mutually exclusive exon (MXE) with 31, splicing site'3 (A3SS) with 24 and splicing site'5 (A5SS) with 15. Significant events are identified events

202. Design of Guide RNA for CRISPR-Cas12-based Detection of *Salmonella typhimurium*

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CRISPR-based detection methods are used as a revolutionary approach to detect pathogen genes. In this regard, the first step is the design of guide RNA (gRNA) using bioinformatics tools. gRNA is a component in CRISPR systems that leads to the recognition of the target, the establishment of the CRISPR complex on it and the activation of Cas cleavage activities. The aim of the current research is designing gRNA to identify *invA*, *fimA* and *fimY* genes from *Salmonella Typhimurium* to be used in its detection kit. In this research, Chop Chop and Cas Designer software were used for design, and the secondary structure of the designed sequences was analyzed by RNA Fold software. According to the planning of the primary amplification by the isothermal LAMP method, the relevant primers were designed by NEB LAMP Primer Designer online tool. Also, the design of the guide RNA was carried out considering the Cas12a protein for use in the CRISPR complex. To be more sure of the design, the sequences obtained from two software were compared with each other and the results were interpreted using the RNA Fold database and GC Calculator to select the best sequence. Finally, for each of the gene targets, the best sequence was selected and suggested for the next diagnostic path based LAMP and CRISPR-Cas12. By using simulation

studies in the design of guide RNA and by using the resulting sequences, it is possible to detect the genome of the pathogen in contaminated food accurately and without false positive results.

203. Designing and Analysis of Point Mutations on Chondroitinase ABC I Using Bioinformatics Tools

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Tissue flexibility in Central Nervous System (CNS) is an important parameter allowing the axons to regenerate upon spinal cord injuries (SCI). In other words, various types of Glycosaminoglycans are secreted at the site of damage by the activated astrocytes, leading to inhibition of axon regrowth after SCI. Chondroitinase ABC I from *Proteus Vulgaris* with the ability to degrade the main types of Glycosaminoglycans has introduced as a novel candidate for restoring the tissue flexibility and recovery of damaged CNS. To overcome the challenges such as protein aggregation in new environmental conditions, a combination of protein engineering and drug delivery strategies should be developed. In this work, we used *in silico* and Bioinformatics tools, and targeted a surfaced exposed helix at the central domain of Chondroitinase ABC I toward designing of two-point mutations. A polar residue at position 606 was replaced with the positive and negatively charged residues. The structure of mutants was constructed by the MODELLER program V. 10.4 and compared with that of wild-type (WT) enzyme using the Chimera program. According to the sequence and structure analysis, it is predicted that changing the net charge of protein affect the solubility of protein, and T606K mutant is prone to aggregation, while T606D is more soluble due to the increasing the repulsive electrostatic interaction between enzyme molecules. Therefore, is predicted that T606D may enhanced the catalytic efficiency at 37 oC comparted with the WT enzyme due to having more soluble enzymes as effective concentration in solution

204. In-silico Designing and Optimization of Loa22 Protein in Pathogenic *Leptospira* Serovars for Use in Recombinant Vaccine

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Leptospirosis, caused by pathogenic *Leptospira* species, is a globally prevalent zoonotic disease with significant public health implications. Developing an effective vaccine against leptospirosis remains a challenge due to the complex nature of the pathogen and its outer membrane proteins (OMPs). The outer membrane protein Loa22 has been proposed as a potential vaccine due to its immunogenic properties. The study aims to explore the application of bioinformatics and immunoinformatics in studying the Loa22 protein, elucidating its structural and functional characteristics, and assessing its potential as a vaccine candidate for leptospirosis. Based on the findings of multiple sequence alignment, Loa22 protein showed more than 99% convergence in different strains of local pathogenic *Leptospira*. The evaluation of different features of this protein showed it to be an immunogenic, non-toxic, and non-allergenic antigen that can induce immune responses against *Leptospira* infection. Also, based on the predictions, it was shown that Loa22 protein is a stable structure, soluble, and has antigenic areas of T and B cell epitopes, which are conserved in all pathogenic serovars and can be used in the design of the recombinant vaccine or

the use of its immunogenic epitopes in the combination with the immunogen epitopes of other conserved proteins of *Leptospira* outer membrane should be used in the design of multi-epitope vaccine.

205. Design and Synthesis of Peptide AJ63 to Prevent Self-Aggregation in Alpha-synucleins

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Abstract: Alpha-synuclein is a small protein found in neurons of the brain, playing a role in regulating the movement of synaptic vesicles toward the cell membrane and the release of neurotransmitters into the synaptic space. Abnormal aggregation of alpha-synuclein in the brain is linked to Parkinson's disease, multiple system atrophy, and Lewy body dementia. Aggregation often occurs in the NAC domain. In this study, the 60-70 region of the alpha-synuclein protein was considered, and by introducing point mutations in the mentioned sequence, peptides with higher hydrophilicity and polarity were designed. To select the best peptide, evaluations were conducted for allergenicity, cell penetration ability (CPP), blood-brain barrier (BBB) permeability, toxicity, self-aggregation potential, and binding energy. After further analysis using molecular dynamics (MD) and parameter assessments, the most effective peptide was selected. This peptide, named AJ63, prevents self-aggregation by binding to the alpha-synuclein protein, thereby preventing the binding of other alpha-synucleins. Then, the AJ63 peptide was synthesized using the solid phase method and was evaluated by HPLC and gas chromatography. Finally, in the in vitro environment, by binding the peptide to the alpha-synuclein protein fibril, a decrease in fibrillation was observed in the peptide-protein complex.

206. Efficient Development and Validation of a Versatile TA Cloning Vector for PCR Product Cloning

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Genetic engineering has greatly changed the field of molecular biology by providing manipulation of DNA to construct vectors such as the TA vector that is used to facilitate cloning of PCR products. This process begins with the selection of a suitable vector backbone that includes a high-copy origin of replication, a multiple cloning site (MCS) and an antibiotic resistance gene. To perform the TA cloning procedure, it is necessary to ensure that the linearized plasmid has an additional thymine nucleotide at the 3' end, the addition of an adenine nucleotide to the end of the PCR products is carried out by using of the Taq polymerase enzyme. The designed linker contains KpnI and BamHI enzyme digestion sites and a unique enzyme cleavage site that provides a single nucleotide T at the 3' end. The linker was cloned into the pUC57 plasmid, which serves as a stable backbone for the vector. The developed construct was subsequently transferred to *E. coli* bacteria. Colonies have been evaluated to verify the existence of the inserted fragment by colony-PCR and restriction enzyme analyses. In addition, the presence of MCS sequence in the lacZ locus serves as another quality control tool. To evaluate the effectiveness and versatility of the designed vector, constructs of different sizes including 600 bp, 3200 bp, and 8100 bp were cloned into the TA vector. The designed TA vector improves the cloning process and the efficiency of transformation, as well as reduces time and cost and increases the accuracy of the results in the genetic engineering process.

207. Investigating and Comparing the Expression Changes of Histone Deacetylase 1 and 2 genes in Cumulus Cells After *In Vivo* Aging and *In Vitro* Aging in Ovulated Mice

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Infertility is a major health issue impacting many individuals, highlighting the importance of reproductive health. Assisted reproductive technology (ART) offers a promising solution for those struggling to conceive. However, aging of oocyte and cumulus cells remains a significant challenge, affecting egg quality and ART success rates. This study is dedicated to investigating the differences in the expression of histone deacetylase (HDAC) genes in cumulus cells under two aging conditions. To conduct this research, thirty female Balb/C mice were randomly divided into three groups for comparison: a control, an *in vivo* aging and an *in vitro* aging. Then, ovarian stimulation was carried out to facilitate the extraction of cumulus-oocyte complexes (COCs). In the *in vitro* group, COCs underwent an aging process after being extracted from the fallopian tube in the culture medium in the incubator. RNA was isolated from the cumulus cells, and complementary DNA (cDNA) was synthesized. To quantify the expression levels of the HDAC1 and HDAC2 genes, quantitative real-time PCR (qRT-PCR) was employed, providing a detailed understanding of gene expression dynamics. Statistical analysis was performed using GraphPad Prism, and enrichment analysis was conducted using EnrichR. The results revealed that the expression levels of HDAC1 and HDAC2 were significantly elevated in the *in vivo* aging group when compared to the other groups. This suggests that the aging conditions experienced *in vivo* may trigger an activation of these epigenetic regulators. The enrichment analysis revealed key transcription factors and pathways in gene expression, aiding our understanding of oocyte aging. These results suggest that targeting epigenetic regulators may enhance oocyte quality and improve ART outcomes for those seeking fertility assistance.

208. Antioxidant Activity of Silver Nanoparticles Coated with Curcumin

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Antioxidants not only cause cell death in cancer cells but also protect healthy cells from free radicals. In this research, silver nanoparticles coated with curcumin (AgNPs-Cu) were synthesized and characterized by the green method with the aim of increasing the solubility of curcumin. Then its antioxidant activity was evaluated using the DPPH inhibition assay, briefly, 50 μ L of AgNPs-Cu with concentration of 10 to 100 μ g/mL was mixed with 250 μ L of DPPH and the absorbance of the samples was read at a wavelength of 517 nm. For the ABTS antioxidant assay, 50 μ L of AgNPs-Cu with a concentration of 10 to 100 μ g/mL was mixed with 250 microliters of ABTS+ solution and its absorbance was measured at 730 nm wavelength. Free radical inhibition percentage was calculated with the following formula. Free radical inhibition percentage = [(A sample-A control)/A control] \times 100 The results indicated that the shape of these nanoparticles was spherical with an average size of 39 nm. The results of FTIR spectroscopy showed that pure curcumin surrounds the nanoparticles. The results of the ABTS and DPPH antioxidant assay showed that AgNPs-Cu inhibits the production and activity of free radicals in a concentration-dependent manner. A concentration of AgNPs-Cu that leads to the inhibition of 50% of free radicals in the ABTS test is 78 μ g/ml and in the DPPH test, it was equal to 95 μ g/ml. These inhibitory activities are due to the presence of curcumin on the surface of silver nanoparticles.

209. The CD147 Transmembrane Helix as a Regulator of Lactate Propensity to Membrane Monocarboxylate Transporter Type 1 (MCT1)

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Transporting lactate outside and inside the cell is one of the most critical elements in the metabolic reprogramming process of various cancer types. The proton-coupled monocarboxylate transporters (MCT1/4) transport this oncometabolite across the membrane, therefore considered drug targets candidates. Proper folding and membrane localization of these transporters require a glycosylated chaperone called CD147, which remains tightly associated with them, even after being transferred to the membrane. It is notable that, despite the experimental confirmation of such a physical connection, the effect of CD147 on the structural-functional properties of MCT1/4 and the lactate transport process, in particular, has never been studied. Therefore, considering the recently reported crystallographic structure of the MCT1-CD147 complex and utilizing molecular dynamics simulation techniques, we investigated the influence of CD147 on the structural features, stability, and dynamics of MCT1 in the plasma membrane. The results of this research show that the physical interaction of MCT1 and CD147 in the plasma membrane significantly effect on the tendency of this transporter to bind to lactate. On the other hand, creating a full mutant of CD147 helix to alanine, showed that the interaction and not the structure of this helix with MCT1 determines the binding tendency of this transporter to lactate. These findings show that the destruction of this binding method can be proposed as a therapeutic point of view in targeting cancers related to lactate metabolism.

210. Characterization of Oxaliplatin/PLGA/Vitamin E Succinate Conjugate Micelles through Reverse Emulsification

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Chemotherapeutic drugs are a primary treatment modality for metastatic breast cancer. Oxaliplatin (OXA), a third-generation platinum-based anticancer compound, features a 1,2-diamino cyclohexane ligand carrier and an oxalate leaving group. However, oxaliplatin faces limitations due to the need for more excellent selectivity, better tumor accumulation, and dose-dependent drug resistance. PLGA, or poly (lactic-co-glycolic acid), is a synthetic polymer with high potential in drug delivery systems. It is used for various drugs, including oxaliplatin, due to its biodegradability, biocompatibility, stability, and non-immunogenic properties. Vitamin E succinate (VES), an ester of succinic acid, is one of the most effective anticancer compounds, capable of inhibiting tumor growth through various pathways, including induction of apoptosis. VES also exhibits synergy with chemotherapeutic drugs, overcomes multidrug resistance, and due to its biocompatibility, and lipophilic properties, can be used as an emulsifier for poorly water-soluble drugs. Based on the aqueous solubility of oxaliplatin, single oil-in-water emulsions was employed. This study investigates the characteristics of PLGA/VES conjugated micelles using the reverse emulsion method and distinct nanoparticles to enhance the efficacy of oxaliplatin. The nanoparticles were characterized by UV/Vis spectroscopy, DLS, FTIR and XRD. The result were shown PLGA contain oxaliplatin and VES. The research investigates that the development of micelles through reverse emulsification may improve drug efficacy, prevent dose-dependent drug resistance, and reduce the side effects of oxaliplatin in treatment.

211. *In Silico* Drug Delivery Investigation; the Interaction Between Cellulose Nanocrystals and Membrane Protein of Cancer Cells

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In modern medicine, drug delivery systems are crucial. These systems provide significant advantages, including targeted delivery to specific cells, reduced toxicity, and dose frequency. Nanoparticles are integral to them. Polysaccharide nanoparticles, particularly Cellulose NanoCrystals (CNCs), show considerable potential as improved drug carriers because of their inexpensiveness, high biodegradability, and compatibility with living organisms. This investigation focused on docking hyaluronic acid (HA), a CD44 receptor ligand, with CNCs to target cancer cells and deliver medicine. The CD44 is a multifunctional cell surface receptor that expresses at a high rate in cancer cells, indicating the role of this protein in cancer cells. The CNC structure was obtained from the Polysac3DB database, while the 3D structures of HA and CD44 receptor were selected from PubChem (CID: 155618327) and the Protein Data Bank (ID: 4PZ4), respectively. AutoDock 4.2 was used to dock CNC and HA. Subsequently, HEX 8.0.0 was employed to dock the CNC-HA complex with the CD44 receptor. The most favorable binding energy between CNC and HA is -3.69 kcal/mol, and the E-total for docking CNC-HA with CD44 is -672 kJ/mol. The docking results of the CNC-HA complex with the CD44 receptor illustrate a stable connection, characterized by numerous hydrogen bond interactions in the central region of the two protein chains. The CNC-HA complex shows potential for delivering drugs to cancer tissues with high CD44 expression. Therefore, CNCs can play a role as a mediator between HA and CD44 receptors. This technology can be utilized specifically for delivering drugs to cancer cells.

212. Study the Effect of Curcumin on β -catenin Gene Expression in Gastric Cancer Cells (AGS)

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Gastric cancer is the third leading cause of mortality and also being one of the most common cancer types in Iran. The β -Catenin gene is a multifunctional protein that plays a role in physiological homeostasis, and its overexpression has been linked to various diseases, including cancer. Curcumin, has both culinary and medicinal uses. Studies have shown that curcumin, possesses antioxidant and anticancer properties, making it a potential therapeutic agent for various types of cancer. This study aims to investigate the effect of turmeric extract on β -catenin gene expression in gastric cancer cells (AGS). Additionally, it aims to determine the optimal dosage and treatment duration of turmeric extract and compare its effects on β -catenin AGS cell cultured in a medium containing 10% FBS at 37°C in a 5% CO₂ incubator. Turmeric extract was added to AGS cells at concentrations of 800, 1200, and 2000 μ g/ml, and treatments were applied at 48 and 72-hour intervals. Real Time PCR analysis have done to measure the expression rate of β -catenin. In both time intervals and all concentrations of the extract, the expression of the β -catenin has decreased. The most significant effect of the extract was observed after 72 hours of treatment with a concentration of 2000 μ g/ml, resulting in an 84% reduction in β -catenin gene expression. Based on the reduced expression of the β -catenin gene with turmeric extract treatment, it can potentially have a positive impact on the improvement of gastric cancer cells.

213. Studying the Effect of Transantol on NF_KB Gene Expression in The Liver of Male Rats with Inflammation

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NF-KB transcription factor plays an important role in the expression of cytokine genes and immune response regulator. Incorrect expression of this transcription factor leads to autoimmune diseases, cancer and inflammation. Transanthol is the main compound of medicinal plants such as cinnamon, thyme, and cloves and plays an important role in inhibiting inflammation. The purpose of this study is to investigate the effect of transanthol on the level of NF_KB gene expression in the liver of rats with Acrylamide inflammation. 16 male Wistar rats have been placed in 4 groups. Trans-anthole Treatment have been done for two groups and 28 days. Then the rats were anesthetized and the liver tissue was removed. RNA extraction and cDNA synthesis were performed according to the kit protocol, and NF-KB gene expression was performed by real time PCR. β -actin gene was used as internal control. The results have shown 50% redaction of IL-6 gene express compared to the control group. According to the results of this study, transantol as an effective and strong drug can play a role in reducing inflammation.

214. Study the Effect of Ziziphora Extract on Claudin-1 and Claudin-6 Gene Expression in Gastric Cancer Cells (AGS)

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Claudin genes have essential roles in gastric cancer. Studies have shown that over-expression of claudin -1 and 6 is related with malignancy and metastasis of gastric cancer in which claudin-1 is up-regulated 22 fold in gastric cancer. The purpose of this study has been evaluating claudin 1 and claudin 6 expressions in adenogastric cancer cells (AGS) which have treated with ziziphora extract. Ziziphora possesses anticancer properties, making it a potential therapeutic agent for various types of cancer. AGS cell cultured in a medium containing 10% FBS at 37°C in a 5% CO₂ incubator. Ziziphora extract was added to AGS cells at concentrations of 800, 1200, and 2000 μ g/ml, and treatments were applied at 48 and 72-hour intervals. Real Time PCR analyses have done to measure the expression rate of caudin 1 and claudin 6 genes. In both time intervals and all concentrations of the extract, the expression of the caudin 1 and claudin 6 genes have decreased. The most significant effect of the extract was observed after 48 hours of treatment with a concentration of 800 μ g/ml, resulting in an 48% and 57% reduction in claudin 1 and claudin 6 gene expression, respectively. This study showed that ziziphora extract was effective on claudin 1 and claudin 6 expression rate. treatment, it can potentially have a positive impact on the improvement of gastric cancer cells. It seems that the lower concentration and treatment duration have the best effect on claudin gene expression in cancerous cells.

215. Molecular Docking Study of *Origanum vulgare* L. Compounds as Potential Inhibitors of Fructose-1,6-Bisphosphate Aldolase Class II in Giardia Lamblia

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Infection with Giardia lamblia is one of the most common causes of diarrhea worldwide. Fructose-1,6-bisphosphate aldolase class II, a key enzyme in the glycolytic pathway of this parasite, plays a crucial role in its energy production. Given the enzyme's importance for parasite survival, its inhibition could offer a novel approach to treating giardiasis. In the present study, we employed molecular docking methods to evaluate the potential of compounds from Origanum vulgare L. to

inhibit the Giardia lamblia fructose-1,6-bisphosphate aldolase class II enzyme. Compounds from the plant were extracted from the Lotus and NPASS databases, and their three-dimensional structures were stored in sdf format using the PubChem database. The three-dimensional structure of the enzyme was retrieved from the PDB database (PDB ID: 3GAY) and saved in pdb format. Molecular docking was performed using PyRx software. The results indicated that two compounds, Apigetrin and Taxifolin, demonstrated the highest binding energies (-9.2 and -8.8 kcal/mol, respectively) compared to the control compound Phosphoglycolohydroxamic Acid, which had a binding energy of -6.1 kcal/mol. These compounds showed significant potential to inhibit enzyme activity, thereby halting parasite growth. Preliminary pharmacokinetic and toxicity assessments suggested that these compounds exhibit minimal side effects and toxicity. Therefore, while the findings of this study are promising, further in vitro and in vivo research is required to confirm these results.

216. Meta-analysis of N-Acetylcysteine-related Gene Expression and Signaling Pathways on Human Mesenchymal Stem Cells aging, using Bioinformatics and Network Pharmacology

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Aging is almost the inevitable fate of all organisms; however, it is possible to delay it. Several genetic and environmental factors can affect the aging process. N-Acetylcysteine (NAC), as an antioxidant and glutathione inducer, can possibly have the opposite effect on aging. The purpose of this study is to investigate the anti-aging effect of NAC on aged mesenchymal stem cells. In this study, the GSE35959 dataset of the GEO database was used. Differentially expressed genes (DEGs), were obtained by GEO2R with screening criteria adj P value < 0.05 and $|\log FC| > 2$ and NAC target genes were also obtained from Swiss Target Prediction and Pharm Mapper databases. Finally, the number of 38 shared genes was obtained from the sharing of target genes of NAC and DEGs. The biological functions and signaling pathways of these 38 genes were investigated and their protein-protein interaction (PPI) network was drawn by Cytoscape. In addition, 10 genes KIF11, DHFR, GART, CA2, APC5, SRC, CTSK, MMP8, ARG1 and CHEK1 were also identified as hub genes. The results showed that NAC target genes can play a role in aging signaling pathways. Based on these findings, NAC can be a suitable solution to prevent aging by affecting the expression of genes effective in aging by affecting the biological pathways involved in it.

217. Network Pharmacology-based Identification of Pharmacology of Signaling Pathways and Target Genes of Resveratrol on the Aging of Granulosa Cells Using Bioinformatics Analysis

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Granulosa cells (GCs) play a pivotal role in oocyte development within the female reproductive system, with their aging affecting ovarian reserve and fertility. Resveratrol is a natural polyphenol compound with known anti-inflammatory, anti-cancer, and anti-aging properties. This study aims to investigate the target genes and pathways through which affects GC aging using network pharmacology analysis. Gene expression microarray data (GSE129919) from the Gene Expression Omnibus (GEO) was analyzed to identify differentially expressed genes (DEGs) in senescent GCs using GEO2R, with adj-Pvalue ≤ 0.05 and $|\log FC| \leq 1$ as criteria. Resveratrol-related target genes from the PharmMapper database were intersected with the DEGs via a Venn diagram. A Protein-Protein Interaction (PPI) network of 39 common genes was constructed using Cytoscape software and the String database, identifying ten hub genes based on the MCC score: EGFR, IGF1R, MMP9, ANXA5, PGR, MAPK14, CHEK1, FGFR1, AURKA, and SOD2. This study also suggests

the involvement of common genes in cancer signaling pathways, breast cancer, and FoxO signaling pathways. This research offers insights into pathways related to GC aging and the potential effects of resveratrol, highlighting pathways that could be targeted to address GC aging. Further experimental validation are necessary to clarify the mechanisms through which resveratrol influences GC aging and its implications for reproductive health.

218. Studying the Functional Mechanisms of Cationic Antimicrobial Peptides Using Molecular Dynamics Simulation

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In recent years, the rise in antibiotic resistance has necessitated the exploration of new methods to control the pathogenic effects of infectious agents. One promising alternative to antibiotics is cationic antimicrobial peptides (AMPs), which offer several advantages, including biological origin, structural design capabilities, and low immunogenicity. The primary functional strategy of AMPs is membrane disruption. In this study, we investigated the functional mechanisms of cationic AMPs within membrane environments. The spinigerin antimicrobial peptide was incorporated into two zwitterionic membrane models: palmitoyl-oleoyl-phosphatidylcholine (POPC) and anionic palmitoyl-oleoyl-phosphatidylglycerol (POPG), each containing 128 lipids. Molecular dynamics (MD) simulations were conducted for 500 nanoseconds using GROMACS software. Our MD analyses revealed an increase in the helical percentage of the peptide within the zwitterionic membrane, while little change was observed in the anionic membrane. Examination of the order of the sn1 and sn2 chains of the membrane lipids indicated that the terminal carbons of both chains experienced less variation in the POPG model. Furthermore, at the end of the simulation, the peptide in the POPC membrane exhibited a lower slope compared to the POPG membrane, attributed to the interaction between the cationic residues of the peptide and the negatively charged membrane surface. The insights and data derived from this research can contribute to modeling peptide functions and developing a non-toxic antimicrobial peptide compatible with mammalian physiology.

219. Correlation Study of Increased Gene Expression Between Long Non-coding RNA and Circular RNA in Colorectal Cancer

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One of the most common gastrointestinal cancers is colorectal cancer, which is the third most common malignancy and the third leading cause of cancer-related death worldwide. For this study, a gene expression data group according to microarray was found from the public database (GEO NCBI Omnibus Expression Gene), which is from the accession numbers of the gene for the obtained data set containing GSE184093 with GPL20115 from a total of 18 samples, 9 colorectal cancer tumor samples and 9 The non-tumor sample is the margin for which the data was obtained from the file. Affymetrix CEL was downloaded as a robust multi-array RNA interface for 2Logfc conversion, normalization and background correction that were preprocessed for analysis by qualitymetrics arrays were realized in R. Based on the analyzes done in colorectal cancer and different signaling pathways, we investigated the genes and pathways that cause increased expression, which is the same as the previous research. According to the investigations, it was

observed that in the tumor tissue compared to the tumor margin, taking into account $5 > \text{LOGFC} > -5$ and $p\text{-Value} < 0.05$, there is a significant increase.

220. Studying the Effect of a Fibrate Small-molecule on the Differentiation of Stem Cells to Bone

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To overcome the limitations of organ transplantation, cell therapy approaches using mesenchymal stem cells have been proposed. Mesenchymal stem cells (MSCs) can be obtained from different tissues of the body. Tissue engineers consider adipose tissue to be a rich source of MSCs. Bone tissue consists of four different types of cells, which are; Osteoblasts, osteocytes, osteoclasts and bone lining cells. Fibrates, which are a group of anti-lipid drugs, work by affecting the expression of genes involved in cell metabolism. Studies have shown that lipid metabolism is related to bone homeostasis. We measured the effect of clofibrate on the differentiation of adipose-derived mesenchymal stem cells into bone. In this study, using the MTT technique and morphological examination of adipose-derived mesenchymal stem cells exposed to variable concentrations of clofibrate through acridan orange photography, the concentration of 1 Micro Muller was considered as the optimal concentration. Alizarin red photography was used to qualitatively detect the differentiation of cells into bone, which reveals calcium deposits in the extracellular matrix, and alkaline phosphatase activity and calcium level tests were used to quantitatively investigate the differentiation. The results showed that clofibrate can be considered as a suitable differentiation candidate for differentiation of stem cells into bone lineage.

221. Comparison of the Effect of Two Edible Dyes on the Pepsin Structure and Activity

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In the current study, the interaction between Acid yellow1 (AY1), and Acid yellow3 (AY3) as edible synthetic dyes with pepsin were compared under simulated physiological conditions using multi-spectroscopic methods. Based on the UV-Vis absorption results, pepsin had a maximum absorbance peak at 280 nm due to Trp residues. After the addition of AY1 to the reaction mixture, pepsin absorbance intensity was increased step by step with increasing AY1 concentrations. In contrast by rising concentrations of AY3, the enzyme absorbance intensity was decreased. The induced changes in the amount of pepsin absorption indicated the enzyme micro environment around the aromatic residues was altered after dye injection. Fluorescence spectroscopy results revealed the binding of both synthetic dyes to the protein caused a reduction in the fluorescence intensity. The reduced emission induced by the binding of the mentioned dyes was due to the Trp's alteration to a less hydrophilic micro environment. This arose from a change in the tertiary structure and conformation of pepsin. Therefore, we characterized the binding affinity between AY1 and AY3 with pepsin. The spectroscopic information disclosed both edible dyes could bind to the pepsin and affect its structure and activity.

222. Comparing Images of Gastric Lesions Caused by *Helicobacter Pylori* with Fuzzy Logic

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Helicobacter pylori infections are very common and almost half of the world's population is affected by this infection. This bacterium reduces the ability of the stomach to produce mucus and makes the stomach prone to damage caused by gastric acid and stomach ulcers and can cause gastric adenocarcinoma. Changes in the shape of *Helicobacter pylori* during division and acquisition of the curved form cause complexity and errors in diagnosis. Nowadays, the combination of artificial intelligence with medical knowledge enables faster and more accurate diagnosis of Stomach ulcers. Method: In this research, Fuzzy Edge Detection (FED) was used to identify edges of images. The vertical, horizontal and oblique derivatives and threshold are done with the above logic and the obtained images are considered as the input of the algorithm and after removing the extra points and lines, the proposed model was presented. The results of the present study showed that with Fuzzy Edge Detection (FED), the images of *Helicobacter pylori* in non-hemorrhagic lesions can be recognized and the improvement of the edge can be suggested with this method, but it was not possible to identify and improve the edge of *Helicobacter pylori* in hemorrhagic gastric ulcers images. The results of this study showed that in disturbed images with many color and surface changes did not provide suitable prediction model.

223. Comparison of Combined and Chemical Methods in the Quality of Sheep Achilles Tendon Tissue Decellularization

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There are different physical, mechanical, chemical and enzymatic methods for tendon tissue decellularization. The purpose of decellularization of tendon tissue is to completely remove cells and cellular debris so that the three-dimensional ultrastructure and natural composition of ECM is preserved to a large extent and used as a biological scaffold. The results of previous researches have shown that many variables such as the type and quality of tissue used for decellularization, cell density and histological characteristics are effective on decellularization efficiency. decellularization methods are usually associated with adverse effects on ECM quality, so methods should be chosen that, while maximally removing cells and cellular debris, cause minimal changes in biological structure in the natural ECM matrix, decellularization of ship achilles tendon tissue once by chemical mwthods and using triton X100, EDTA_{Na2} and SDS was done again by adding a repeated freeze-thaw step and combining physical and chemical methods. in the integrated method, an increase in the efficiency of decellularization and beter ECM quality maintenance was observed compared to the chemical method alone. Analyzing the results of histological tests, dyeing and measuring the total protein and DNA of the decellularized tendon showed that the combination of physical and chemical decellularization methods led to the certain of biological scaffold. It is more suitable for the purpose of regenerative biology and tissue engineering.

224. Comparison of 36B4 and HBG Single-copy Genes Function for Investigation in Telomere Length Studies

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To better understand the aging process and related diseases, the study of telomere length as a biomarker is of particular importance. To measure telomere length, single-copy genes are used as a normalization factor in qPCR results. In this experimental study, DNA extraction using lysis buffer with a combination of 155 mM NH₄Cl, 10 mM KHCO₃, 5 mM EDTA_{Na2} and CTAB extraction buffer was used for frozen blood samples. The quantity and purity of the extracted DNA was checked by absorption at a wavelength of 260 nm using absorbance ratios of A₂₆₀/A₂₈₀ and A₂₆₀/A₂₃₀; Its integrity was also evaluated using gel electrophoresis. Reproducibility of the data was evaluated using the coefficient of variation (CV%). The qPCR efficiency was reported by examining the standard curve using the linear regression equation and coefficient of determination (R²) in GraphPad Prism v10 software for single-copy genes 36B4 and HBG. The average amount of extracted DNA was reported as 251.83 ng/μL (CV= 6.7%). Purity and integrity of DNA according to the mentioned proportions and gel results were favorable. The efficiency of qPCR for single-copy gene 36B4 was 103% and R²= 99.7% and HBG single-copy gene was 126% and R²= 97% for telomere. According to the results, single-copy gene 36B4 has provided better yield than HBG. The aim of this study was to compare single copy genes 36B4 and HBG in studies of telomere length from frozen blood samples using qPCR data. It is suggested to use different types of buffers and other extraction methods to calculate the efficiency of these two genes.

225. Comparing a Classical and a Descriptor-Free Deep Learning Method for Enhanced QSAR Predictions of mTOR Inhibitors

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Suppressing the mammalian Target of Rapamycin (mTOR) is a highly promising approach for treating cancer, because of its essential involvement in cell growth, proliferation, and survival. This study discusses the creation and assessment of Quantitative Structure-Activity Relationship (QSAR) models to predict the biological activity of mTOR inhibitors. The models were developed using a dataset of 5868 compounds. We utilized a classic descriptor-based machine learning and a sophisticated descriptor-free deep learning method to develop resilient predictive models. The construction of the classic QSAR model involved the utilization of Ridge classifier, which employs L2 regularization to mitigate overfitting in datasets exhibiting multicollinearity among features, minimizing a penalized least squares loss function. This model utilized molecular descriptors generated by the "DRAGON" software. For the deep learning QSAR model we employed Long Short-Term Memory networks (LSTMs), to analyze Morgan fingerprint which generated from SMILES strings via "RDKit" package in order to detect intricate molecular patterns. The findings from our study revealed that the deep learning model achieved superior performance compared to traditional method, demonstrating impressive levels of accuracy. The Ridge Classifier scored an accuracy of 0.80 and an AUC of 0.87, while LSTM model, earned an accuracy of 0.91 and an AUC of 0.95. By comparing classic and deep learning techniques, we provided useful tools for identifying and optimizing mTOR inhibitors. This work emphasizes the potential of sophisticated Quantitative Structure-Activity Relationship (QSAR) modeling in the field of drug discovery. It

also identifies important molecular characteristics that can provide guidance for future advancements in therapy.

226. The Molecular Mechanisms of Endosulphan Interaction with HSA: A Multispectral and Computational Exploration

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The environmental impact of pesticides has raised concerns due to their usage. Prolonged application of pesticides can damage the soil and lower its quality. These chemicals, utilized in agriculture, households, and industries, can infiltrate the human body through various means and interfere with its natural functions. Our investigation focused on the interaction between human serum albumin, a vital blood protein, and the pesticide endosulfan. Our study demonstrated that this interaction could have adverse effects on the human body. This discovery is important for comprehending the potential consequences of pesticide exposure. This research aimed to investigate the interaction between endosulfan and human serum albumin (HSA) in neutral pH conditions. This study used various techniques including UV-visible spectroscopy (UV/Vis), fast-transformation infrared measurement (FTIR), and molecular dynamics simulation. During UV-VIS analysis, it was observed that the spectrum of different concentrations of endosulfan shows a hypochromic change, which indicates a change in the local environment of protein residues and expresses the formation of a complex between endosulfan and protein. Molecular dynamics simulations showed the important role of hydrogen and van der Waals bonds in the interaction between toxin and protein. In addition, FTIR results showed that endosulfan affects the secondary structure of HSA, potentially leading to toxicity and structural damage due to changes in hydrogen bonds and secondary structure. The results of spectroscopic experiments and molecular dynamics analysis supported these findings. These findings provide valuable insights into the potential toxic effects of endosulfan on human health.

227. Interaction Between Magnetic Nano-bead and Phenylalanine Dehydrogenase

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The interaction of nanoparticles and proteins has always been of interest from various aspects, such as regulation of activity, changes in structure, conformation, and protein separation. Designed and newly synthesized magnetic nano-bead showed significant changes in the second structure of the enzyme phenylalanine dehydrogenase (PheDH), activity and also the amount of binding capacity to the enzyme. Structural and conformational changes by CD and fluorescence and determination of enzyme activity in the presence of the nano-bead was investigated by spectroscopic method at 340 nm. The physical and chemical properties of nano-bead were analyzed by XRD, EDX, FTIR, SEM and DLS techniques. The results of the study showed that the mentioned nano-bead can change the activity of the enzyme in a concentration-dependent manner. Also, this work showed that the percentage of alpha helix decreased significantly and the percentage of beta strands increased in the second structure due to the presence of nano-bead. On the other hand, the results showed that the binding capacity of the nano-bead to the enzyme can change by changing the conditions, including the duration of incubation. The total results of the

study showed that the mentioned nanoparticles have a good capacity to interact with proteins and can be further investigated for use in various bio-medical field

228. Biomarkers Related to the Biological Process of Skeletal Muscle Development in Chicken

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The development of skeletal muscle is closely related to the efficiency of meat production and quality. Chicken skeletal muscle development depends on myogenesis and adipogenesis. Li et al. (2020), identified APOA1 and COL1A1 genes as biomarkers for chicken intramuscular fat cells. Today, it is possible to use bioinformatics methods from the data obtained from various studies and platforms to identify biomarkers. In this study, a list of 43 genes, which are significantly involved in the biological process related to the development of skeletal muscles in chicken, was extracted from different studies. The purpose of this study was to investigate protein-protein interactions, identify sub-clusters with high density in order to investigate signaling pathways and gene ontology. For this purpose, gene network was illustrated by String 1.5.1 program and Cytoscape 3.7.1 software. In the next step, MCODE 1.6.1 plugin was used to identify high density regions in sub-clusters. These regions may contain proteins that function as a complex within the cell. This calculation led to the creation of two sub-clusters. From the sub-cluster with the highest score, 23 nodes, 62 edges and a hub protein called ACTC1 were identified. ClueGO 2.5.10 plugin was used to depict the gene ontology network. After analysis, significant gene ontology terms) P-value<0.05) including muscle organ growth, skeletal muscle myosin thick filament complex, upregulation of skeletal muscle fiber growth, and regulation of muscle contraction along with cytoskeletal signaling pathways in muscle cells, motor proteins and tight junctions were identified

229. The Role of C8ORF33 in Cancer

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The aim of this study is to explore the potential role of the C8ORF33 gene in the incidence or malignancy of tumors. So far, no specific function has been reported for this gene; however, the Genecards database provides information regarding its role in protein binding. To investigate the function of this gene we first analyzed data from public databases confirming its overexpression in various cancers including breast, cervical, CNS, large intestine, esophagus, liver, lung, Lymphoid, nasopharynx, oral cavity, pancreas, pituitary, prostate and salivary glands. In the reviewed studies, amplification of this gene was observed in 11.7% of tumors (317 tumors), and patients with overexpression of this gene have experienced a decrease in average life expectancy by 27 months. Next, we conducted an enrichment analysis of genes with positive and negative correlations to this gene. The results, based on the significant Spearman correlation coefficient, revealed that genes with positive correlations generally play a role in the localization of telomerase RNA in Cajal bodies and exhibit RNA-binding functions. Besides, genes with negative correlations are primarily involved in cell death pathways and immune system functions. Using the AlphaFold method, we concluded that the protein encoded by this gene binds to telomerase RNA through specific domains, and the resulting error plot indicates minimal error. These findings may inform future clinical studies and provide strategies for preventing cells from becoming cancerous.

230. The Role of miR-217 Gene on the Aging of Endothelial Cells and the Therapeutic Potential of Vascular Atherosclerosis

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In mammals, aging occurs heterogeneously in several organs and gradually leads to tissue dysfunction. (1) The rate of population aging is increasing dramatically worldwide. (2) In particular, age-related changes Cardiology includes cardiac hypertrophy, diastolic dysfunction, myocardial fibrosis, arterial stiffness, and endothelial dysfunction. (3) Endothelial cell is a vital regulator for maintaining vascular balance, and its dysfunction plays an important role in the development of atherosclerosis. (4) And aging is an important risk factor for the formation of atherosclerotic lesions. (5) According to the review of 27 different articles, we found 432 genes effective in the aging of the cardiovascular system, among these markers, the increase in the expression of the miR-217 gene is associated with cardiovascular aging. Laboratory studies show increased expression of the miR-217 gene in aging human endothelial cells. (6) Also, increased expression of the endothelial miR-217 gene causes a lack of NO (nitric oxide) production and endothelial dysfunction and aggravation of atherogenesis in mice. As a result, it plays a role in the production of larger atherosclerotic plaques in the aorta and coronary arteries. Also, miR-217 plasma levels are increased in people with coronary atherosclerosis. The expression of miR-217 gene disrupts the expression of different signaling pathways that are important for endothelial and causes the simultaneous reduction of different signaling pathways, including apelin and VEGF pathways, which lead to the activation of eNOS (endothelial nitric oxide synthase). (7) Therefore, inhibition of miR-217 gene expression in senescent vascular endothelial cells can be an effective therapeutic strategy for age-related vascular atherosclerosis.

231. New Developments in a Recombinant Affibody for Identification of Cancer Cells

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Abstract: In this study, we developed and evaluated a bioluminescent affiprobe, EGFP-Z08699, integrating an enhanced green fluorescent protein domain with a HER3-binding affibody domain. Expressed in bacteria and purified via affinity chromatography, EGFP-Z08699 effectively detects HER3-positive breast cancer cells, positioning it as a potential molecular biosensor for in vitro use. Breast cancer is the most common cancer among women worldwide. HER3, part of the epidermal growth factor receptor family, plays a critical role in cancer cell biology. Its overexpression, particularly in breast cancer, contributes to the HER2-HER3 complex essential for cancer cell survival. Thus, detecting HER3 is vital for both clinical and research applications. At the beginning, the HER3-binding affibody Z08699 was cloned into a pCold I vector containing the EGFP sequence. Then, we expressed EGFP-Z08699 in E. coli BL21 and purified it using Ni Sepharose High Performance. Its binding affinity to HER3 was evaluated through fluorescence microscopy and flow cytometry on HER3-positive MCF-7 and HER3-negative Hs578T cells. According to the results, SDS-PAGE and Bradford assays confirmed the successful expression and purification of EGFP-Z08699. Spectroscopic analysis indicated that the fluorescence properties of EGFP remained unchanged. Fluorescence microscopy and flow cytometry demonstrated that EGFP-Z08699 specifically binds to HER3-positive MCF-7 cells while showing

no binding to HER3-negative Hs578T cells. As a conclusion, EGFP-Z08699 serves as an efficient and cost-effective probe for detecting HER3-expressing cells in vitro, offering potential clinical applications for breast cancer diagnosis and monitoring.

232. Positive Correlation Between the Expression Level of MIAT lncRNA and the Age of People with ASD

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Autism spectrum disorder (ASD) is a complex neurodevelopmental disorder with a strong genetic basis. Several studies have shown the role of long non-coding RNAs (lncRNAs) in the pathogenesis of ASD. lncRNAs are a group of non-coding RNAs with a length of more than 200 nucleotides that are not translated into protein. Miat is a lncRNA with a length of 30,051 bp located at 22q12.1. lncRNA MIAT is considered a high-risk gene for paranoid schizophrenia, and its expression is significantly reduced in the cortical and gray matter regions of the brain of patients with schizophrenia after death. lncRNA miat is upregulated in the substantia nigra and striatum of Parkinson's disease (PD) mice and is involved in the progression of PD by exerting a neuroprotective effect through sponging miR-34-5p, upregulating SYT1 and increasing the survival of SH-SY5Y cells. In this study, we investigated the expression of lncRNA miat between people with ASD and healthy controls using real-time PCR technique, and statistical analysis showed that the expression level of this lncRNA is different between diseased and healthy people, but this the expression difference was not statistically significant. However, the examination of the expression level of this lncRNA in people with ASD showed a significant positive correlation with $P\text{-value} = 0.0004***$ between the expression level of this lncRNA and the age of people with ASD. In summary, lncRNA-MIAT may play an important part in the pathogenesis of ASD. However, the role of lncRNA in the neurobiology of autism needs to be investigated further.

233. Perovskites Applications in Biological and Medical Sciences

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Perovskites are a group of nanoparticles that, although widely used in physics and solar cells, have shown a positive effect in some biological and therapeutic aspects. One of the most commonly used perovskites in solar cells is $\text{CH}_3\text{NH}_3\text{PbCl}_3$, which is used in solar cells to convert inexhaustible and clean solar energy into electrical energy due to their high electrical conversion power. In this study, by substituting iron instead of lead and using methylamine (MA) as an organic material, biocompatible organic-inorganic hybrid perovskite $\text{CH}_3\text{NH}_3\text{FeCl}_3$ with a three-dimensional structure was obtained. The effect of MAFeCl_3 on the ability to induce the production of reactive nitrogen species in AGS gastric cancer cells treated with this perovskite and in the presence of X-rays was investigated using the NO assay kit. The results indicated the radiation-sensitizing properties of this perovskite due to the increase of the reactive nitrogen species NO compared to the radiation group without perovskite. To prove this more precisely, more studies are recommended, including investigating the effect of perovskite without radiation treatment on the production of reactive nitrogen species, investigating the mechanism of the effect of this perovskite on AGS cells and normal cells, and integrating this treatment with other treatments besides radiation.

234. Application of Hairpin-based Nanostructures Utilizing Toehold Mediated Strand Displacement Reactions in Automated Molecular Assays

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In dynamic nanotechnology, toehold mediated strand displacement (TMSD) reactions involve three hybridization processes: toehold binding, branch migration, and strand dissociation. Initially, the invading strand binds to the toehold domain of the incumbent strand. Then, the invading strand initiates branch migration. Finally, the original strand is displaced from the incumbent strand. Autocatalytic assembly circuits (AAC) consist of a catalytic DNA assembly reaction that, once triggered, can generate multiple new triggers to accelerate the overall amplification reaction. In this study, the autocatalytic assembly circuit, the location of the toeholds, and the mechanism of the TMSD reaction were designed using the NUPACK software. Three hairpin structures (H1, H2, H3), one auxiliary hairpin structure (Hp), and an oligonucleotide strand as the input were used to perform the reaction. The input strand initially hybridized with the auxiliary hairpin structure (Hp), containing trigger domains, to form the Input-Hp structure. Subsequently, hairpin structures H1 and H2 were added sequentially, forming the Input-Hp-H1 and Input-Hp-H2-H1 structures, respectively. Finally, with the addition of hairpin structure H3, the input strand and the auxiliary hairpin structure (Hp) were separated and re-entered the cycle; simultaneously, a Y-shaped H3-H2-H1 structure was formed, containing trigger domains that could re-enter the AAC system to continue the TMSD reaction for automated molecular assays. The formation of the autocatalytic assembly circuit was confirmed by electrophoresis and band pattern analysis.

235. Application of Zein-polyvinylpyrrolidone (PVP) Nanocomposite Containing Extract of *Salvia officinalis* L. Against HepG2 Cancer Cells

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Medicinal plants are of special importance in treatment and health due to having a wide range of secondary metabolites, and promising efforts have been made in the direction of identifying secondary metabolites and their applications in the fields of investigating antimicrobial, antioxidant and anticancer effects. Due to the high mortality rate associated with cancer and the side effects of chemotherapy and radiation therapy, many cancer patients seek alternative or complementary treatment methods. In this study, HepG2 cancer cell line was used to investigate the anticancer effects of Zein-PVP nanocomposites. After the synthesis of nanocomposites, the properties of the synthesized nanocomposites were evaluated by spectrophotometry and electron microscopy. After confirming the synthesis, the MTT test was used to investigate the lethal effect of nanocomposites against cancer cells. Based on the obtained results, it was found that 246 micrograms of essential oil was loaded per milligram of nanocomposite. Based on the electron microscope results, the size of the synthesized nanocomposites was estimated between 250 and 500 nm. Zein-PVP nanocomposites without essential oil have smaller dimensions and a smooth and uniform surface structure, and with the addition of essential oil to the structure of nanocomposites, their surfaces were seen as uneven ridges and the size of nanocomposites was doubled. The anticancer properties of Zein-PVP nanocomposites containing sage essential oil against HepG2 cell line showed that the effect of nanocomposites along with essential oil was to inhibit the growth of HepG2 cells in the concentration range of 100 to 300 µg/ml.

236. CORTBP1 Downregulation in Thyroid Cancer and Its Relationship with Tumor Invasion

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Thyroid cancer (TC) is the most common endocrine tumor, and its incidence is on the rise. Among the many factors that contribute to this disease, changes in gene expression can be cited. Cortactin binding protein (CORTBP1), which is related to the proto-oncogene SRC, may play a role in malignancies. It is known that the CORTBP1 gene is involved in the formation of brain synapses and autism, but its function in TC is unknown. NCBI-GEO was used to extract microarray and RNAseq data. The Limma method was used to identify genes whose expression was different between TC tumor tissue and healthy tissue adjacent to TC tumor tissue after data quality control. The relationship of CORTBP1 with age, sex, degree of tumor malignancy and survival was evaluated. A total of 18 patients with TC at Sina Hospital in Isfahan provided tumor tissue and adjacent healthy tissue. Using exon junction primers and Cybergreen dye, Real Time PCR reactions were performed following RNA extraction and cDNA production. A significant decrease in the expression of the CORTBP1 gene was observed in TC tissue when compared with normal tissue adjacent to the tumor. Tumor malignancy and gender were associated with lower expression levels. Additionally, the expression of this gene is reduced in patients between the ages of 21 and 40 when compared to individuals of normal age. As CORTBP1 gene expression decreases in tumors with extensive metastasis, it suggests that this gene may be a marker of TC tumor invasion.

237. ITPA Gene Downregulation in SH-SY5Y Neuronal Cell Line

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Epilepsy is a chronic neurological disorder characterized by recurrent seizures throughout an individual's life, affecting a significant portion of the global population. Epilepsy is multifactorial, involving complex molecular interactions. Recent studies have shown that mutations in the ITPA gene are associated with epilepsy. It is hypothesized that in the absence of the ITPA gene, the accumulation of non-conventional purines such as ITP and XTP leads to impaired function of ATP- and GTP-dependent receptors, causing electrical potential disruption in neuronal membranes and resulting in seizures. However, the molecular mechanisms by which ITPA dysfunction can contribute to the onset or progression of epilepsy remain unclear. Furthermore, previous studies have indicated that defects in the GRIN1 gene, which encodes the GluN1 subunit of NMDARs, are associated with epilepsy and seizure disorders. In this study, we aimed to investigate the role of the ITPA gene in epilepsy and its impact on GRIN1 gene expression in human neuronal cells. The expression of the ITPA gene was downregulated using specific shRNA in the SH-SY5Y neuronal cell line, and real-time PCR analysis confirmed that the shRNA sequences effectively suppressed ITPA expression at the transcriptional level. Our results also demonstrated that reduced ITPA expression significantly increased GRIN1 gene expression. Future investigations should involve treating the ITPA knockdown cell line with deaminating agents and comparing the resulting changes to those observed under normal conditions. This approach could reveal new pathways and mechanisms, offering insights into the potential therapeutic implications for epilepsy management.

238. FIDAS-5 Treatment Reduces HIF-1 α Levels and Increases RIPK3 Activity in a Rat Model of Glioblastoma

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Glioblastoma multiforme (GBM) is the most common type of primary malignant brain tumor. The average survival time of patients with this disease is about 13 to 14 months. Methionine deprivation inhibits the growth of cancer cells. The enzyme methionine S-adenosylmethyltransferase (MAT) catalyzes the synthesis of SAM from methionine and ATP. SAM is the primary donor in biochemical transmethylation reactions that plays an important role in epigenetic regulation, especially DNA methylation and immune disorders. Activation of RIPK3 can lead to changes in gene transcription in addition to necroptosis cell death. HIF-1 α acts as a main regulator of the cellular and systemic homeostatic response to hypoxia by activating the transcription of many genes, including those involved in energy metabolism, angiogenesis, apoptosis, etc. In this study, glioblastoma c6 cell line (1x10⁶) were surgically injected into the parietal cortex of the used rats. Rats were treated with FIDAS-5 drug (20 mg/kg) for 14 days in three groups: control, sham and treatment. At the end of the treatment period, the brains of the rats were removed and the level of RIPK3 and HIF-1 α was evaluated by ELISA method in the brain tissue extract. In addition, the amount of brain tissue necrosis was evaluated after staining with Hematoxylin-Eosin method. The results showed that after treatment with FIDAS-5, the tissue level of HIF-1 α decreased, but RIPK3 and necrosis rate increased. These results showed that FIDAS-5 drug can reduce the invasion and increase the death of glioblastoma tumor cells.

239. Cloning and Expression of Xylonate Dehydratase from *Caulobacter Vibrioides*

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Lignocellulosic biomass is a widely abundant source for the production of biofuels and chemicals. D-xylose, is the second most abundant sugar in lignocellulosic hydrolysates. D-1,2,4-butanetriol (BT) is an extremely important chemical, is widely used in many fields, such as pharmaceuticals, polymer materials, and military applications. A synthetic pathway consisting four steps has been proposed and applied to produce BT from D-xylose. And because in most studies, the xylonate dehydratase was used in the case of *Caulobacter crescentus*, and given the very high genetic similarity between *Caulobacter crescentus* and *Caulobacter vibrioides*, the aim of this study is to clone and express xylonate dehydratase gene of *C.vibrioides* in the *E.coli*. The sequence of xylonate dehydratase gene was obtained from the NCBI database, and the gene was multiplied by xylD-RBS-F, xylD-HindIII-R primers with the help of PCR. The gene was cloned in the pET28 expression vector and then transferred to the *E.coli* prepared cells. By using NdeI and HindIII as restriction enzymes, Colony PCR and sequencing, the cloning process and the entry of the gene into the pET28 expression vector was confirmed. The presence of the recombinant protein was tested by SDS-PAGE with a molecular weight of approximately 68 KDa and the expression rate of the recombinant protein, estimated by Image J software, was 54 percent. The high-speed and high-volume bioproduction of butanetriol requires *E.coli* as the target strain and the use of cheap substrate such as xylose and the existence of the enzyme xylonate dehydratase.

240. Cloning and Cell Surface Expression of Aldehyde Reductase Enzyme in *E. coli* Strain

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In recent years, biomass has become an important source for the production of value-added chemicals such as 1,2,4-butanetriol, which has applications in medicine. Butanetriol bioproduction pathway consists of 4 enzymes. Aldehyde reductase, the last enzyme of this pathway, is an oxidoreductase that catalyzes the reversible oxidation of alcohols to aldehydes or ketones with the corresponding reduction of NAD or NAD phosphate. The aim of this research is cloning and cell surface expression of aldehyde reductase. For this purpose, after designing the cloning pathway, the gene encoding aldehyde reductase (adhP) was amplified with specific primers aldehyde reductase-SalI-R, aldehyde reductase-NcoI-F. Then pBAD-adhP vector was digested with SalI and NcoI enzymes and adhP was removed from it and cloned into pET-26-b-YiaT vector. YiaT protein acts as an anchor for cell surface expression. Correction of the vector's frame was done by primers adhP-F.ct-ctc and R-YiaT-NcoI. The recombinant vector was cloned into *E. coli* DH5 α strain. Obtaining the vector was confirmed by colony PCR, enzymatic digestion with HindIII and BglII and sequencing. Recombinant vector cloned into the expression strain *E. coli* Rosetta (DE3) and after induction with IPTG, the desired protein band with a size of 61.4KD (35.4KD adhP/26KD yiat) was observed on SDS-PAGE gel compared to the control strain. Evaluation of enzyme activity with ethanol substrate and based on the amount of absorption of NADH produced from NAD at 340 nm during the aldehyde reductase activity of the enzyme compared to the control and at different time intervals and showed an increase of more than two times the amount of absorption. Culture optimization can affect the protein expression.

241. Cloning and Fusion of ASC and CASP1 to Split-Luciferase and Their Bacterial Expression

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The NLRP3 inflammasome is a macromolecular complex of the innate immune system which activates inflammatory signaling in response to various stimuli. Upon activation, NLRP3s oligomerize and recruit ASC and procaspase-1 proteins, leading to the activation of caspase-1. Activated caspase-1 processes the pro-inflammatory cytokines, pro-interleukin-1 β and pro-interleukin-18, into their mature forms, promoting inflammation. Additionally, caspase-1 cleaves the Gasdermin-D protein, resulting in the pore formation in the cell membrane and subsequent pyroptotic cell death. Interactions between the components of the complex occur through PYD-PYD and CARD-CARD interactions. Investigating these interactions is crucial for designing biosensors and screening potential drug candidates. In this study, ASC and caspase-1 genes were cloned into the pET28a plasmid containing split-luciferase fragments and subsequently expressed in bacteria. The fragments were amplified using PCR with specific primers and inserted into the plasmids containing the split-luciferase fragments. The ligation products were then transformed into *E. coli* BL21 (DE3) cells, and colonies were screened by PCR. After sequencing, the expression of two gene constructs was carried out under different temperature, time, and induction conditions, and the results were evaluated by SDS-PAGE. Although both luciferase-fused proteins were expressed in the bacteria, they were found to be insoluble and formed aggregates in the pellet under all tested conditions. Therefore, using urea to solubilize the proteins and further optimizing the purification process are recommended.

242. Cloning and Expression of Vitreoscilla Hemoglobin Gene in Deferoxamine-B Producing Streptomyces Pilosus Bacteria

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Desferrioxamine B (DFB) removes excess iron from the blood of patients with thalassemia major who receive blood. Streptomyces Pilosus is the most common DFB producing, whose morphology and ability to grow and produce is strongly influenced by the amount of dissolved oxygen in the culture medium. Vitreoscilla bacterial hemoglobin (VHb) is an oxygen-binding protein with a molecular weight of 15775 Da that can facilitate intracellular oxygen transport, improve oxygen utilization efficiency, and ultimately increase the production of the target metabolite. This research aimed to increase DFB production by designing a suitable vector for cloning and expressing the VHb gene in Streptomyces pilosus. Therefore, the first shuttle vector pGM1192 was selected, the VHb gene target was designed with the SnapGene software, and then synthesized. The recombinant vector pGM1192-vgb was transferred to E. coli TOP10, by heat shock method. The construct extracted with the plasmid extraction kit was checked for the correctness of the transformation by PCR and enzymatic digestion with NdeI and BamHI enzymes. Then, the plasmid containing the VHb gene was transferred to Streptomyces pilosus by electroporation, and the transformation accuracy was evaluated and confirmed by colony PCR method and 1% agarose gel. The growth of Streptomyces pilosus containing the VHB gene and DFB production increased more than 2 times compared to the wild strain. Access to such a recombinant microorganism will greatly help future research projects in using the VHb gene to increase the production of biopharmaceuticals.

243. Metabolomics-based Diagnosis of Medullary Thyroid Cancer: A Plasma 1H NMR Approach

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Medullary thyroid cancer (MTC) is a rare neuroendocrine malignancy that comprises 5-10% of all types of thyroid cancer. Surgical intervention, including total thyroidectomy and bilateral cervical lymph node dissection, is the primary treatment modality recommended for most patients. Our objective was to conduct a pilot study to analyze plasma metabolic profiles of MTC patients, aiming to uncover disruptions in metabolic pathway that play a role in MTC tumorigenesis. This case-control study was conducted among patients referred to the Cellular and Molecular Endocrine Research Center at the Research Institute for Endocrine Sciences, Shahid Beheshti University of Medical Sciences in Tehran, Iran. Peripheral blood samples were obtained from 16 MTC patients (11 females and 5 males), with an average age of 43 ± 18.40 years. And the screen metabolic changes in plasma samples from MTC patients and healthy subjects was done by proton nuclear magnetic resonance (1H-NMR). A total of 30 compounds were identified; among them, three metabolites, including glycerol, isobutyric acid, and valine, were substantially changed between MTC and the control group ($p < 0.05$). The global incidence of thyroid cancer is rising, primarily due to increased utilization and improvement of diagnostic imaging and monitoring practices. Despite this trend, the precise causes behind the incidence and mortality rates of TC remain partially unknown. Thus, non-invasive diagnostic biomarkers are essential in this context. So, the NMR-based metabolomics approach can provide a metabolic pattern of MTC to improve diagnostic procedures.

244. Design and Synthesis of Peptide AJ63 to Prevent Self-Aggregation in Alpha-Synucleins

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Alpha-synuclein is a small protein found in neurons of the brain, playing a role in regulating the movement of synaptic vesicles toward the cell membrane and the release of neurotransmitters into the synaptic space. Abnormal aggregation of alpha-synuclein in the brain is linked to Parkinson's disease, multiple system atrophy, and Lewy body dementia. Aggregation often occurs in the NAC domain. In this study, the 60-70 region of the alpha-synuclein protein was considered, and by introducing point mutations in the mentioned sequence, peptides with higher hydrophilicity and polarity were designed. To select the best peptide, evaluations were conducted for allergenicity, cell penetration ability (CPP), blood-brain barrier (BBB) permeability, toxicity, self-aggregation potential, and binding energy. After further analysis using molecular dynamics (MD) and parameter assessments, the most effective peptide was selected. This peptide, named AJ63, prevents self-aggregation by binding to the alpha-synuclein protein, thereby preventing the binding of other alpha-synucleins. Then, the AJ63 peptide was synthesized using the solid phase method and was evaluated by HPLC and gas chromatography. Finally, in the in vitro environment, by binding the peptide to the alpha-synuclein protein fibril, a decrease in fibrillation was observed in the peptide-protein complex.

245. The Control of Programmed Cell Death by Honey in Human Lung Cancer Cell Lines

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Lung cancer ranks among the top causes of mortality on a global scale. Investigating novel anti-cancer medications derived from natural sources stands out as a key focus in cancer therapy research. Honey finds a vital role in various applications using its anti-inflammatory, antioxidant, antibacterial and antitumor properties. To assess the parameters of quality control, including hydroxymethylfurfuraldehyde [HMF], reducing sugars, fructose/glucose, sucrose, proline content, distaste activity, and free acidity, the selected crude honey sample was analyzed. tenth potential of honey was investigated to induce cytotoxic and antiproliferative effects in cultured human Lung cancer cell line (A549) in comparison to non-malignant (MRC-5) cells. Both cells were cultured in RPMI medium and treated with the selected crude honey sample at various concentrations (1% - 20%) for 3, 6, 12, 24, 48 and 72 hours. Morphological characteristics were examined utilizing both light and fluorescent microscopy. The viability of cells was determined through MTT assay, with absorbance values measured at 570 nm using an ELISA reader for each trial. The identification of cellular apoptosis was conducted with the Annexin V-FITC Apoptosis Detection Kit. The findings indicated that the honey sample under investigation met the required quality standards. The morphological analysis displayed characteristics of cellular apoptosis, such as cell rounding, decreased cell count, membrane blebbing, as well as nuclear changes including nuclear shrinkage, chromatin condensation, and fragmented nucleus in A549 cell lines. Cell viability assay showed a time and dose-dependent inhibitory effect of honey on A549 cell lines. Honey showed antiproliferative activity with the 50% inhibitory concentration (IC₅₀) value, 5% and the $\geq 80\%$ inhibitory concentration 17% in A549 cell line. Flow cytometry analysis revealed a noticeable increase in the percentage of early apoptotic cells, indicating the presence of early apoptosis in a manner that was dependent on both the dosage and duration of exposure. It can be concluded that higher concentrations of honey is safe for MRC-5, but it exerts antitumor cytotoxicity and anti-

proliferative effects in a Lung cancer-derived cell line. Thus, it is considered as a potential chemotherapeutic agent against Lung cancer.

246. Meta-analysis of Long non-coding RNA-mRNA in tumor tissue and tumor margin of breast cancer patients

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Breast cancer (BC) is a malignant tumor with high morbidity and mortality among women worldwide. The prognosis of patients with breast cancer is almost usually related to the expression of Long non-coding RNAs (LncRNAs) and the infiltration of immune cells. Recent studies have shown that LncRNAs are abnormally expressed in breast cancer and are closely related to the progression and prevalence of breast cancer. The purpose of our study is to investigate the meta-analysis of non-coding RNAs and mRNA in the tumor and the tumor margin of breast cancer patients. For this research, a gene expression data set based on microarray from NCBI Gene (GEO Expression Omnibus). (<http://www.ncbi.nlm.nih.gov/geo>) found that from the accession numbers of the gene for the data set obtained on the GSE134359 holder with GPL17586, out of a total of 86 samples, 74 cancer tumor samples Breast and 12 non-tumor samples are the margins that the data obtained from the file. Raw Affymetrix CEL Downloaded RMA robust multi-array interface for log transformation normalization and background correction post-processed for monitoring by array quality metrics in R were met according to data we obtained from gene databases. According to analyzes what we did in breast cancer, we studied the genes and pathways of genes that increase or decrease expression in different signaling pathways, which is consistent with previous studies. The increase in expression in tumor tissue compared to the tumor border tissue, considering $0.2 > \text{LogFC} > -0.2$ and $P\text{-values} < 0.05$ significant relationship and increase in expression.

**The Fourth International
Conference on Environmental
Biology and Conservation**

Oral Presentation

1. Application of genetic data in biodiversity management and conservation

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Life on the planet includes millions of plant, animal and microorganism species, whose protection is the guarantee of human survival and one of the Goals of Sustainable Development. Biodiversity protection is considered at three levels: ecosystem, species and gene. Recognizing each of these conservation levels with conventional techniques of biodiversity measurement is very complicated, time-consuming and expensive. The development of new genetic techniques in recent decades has greatly contributed to our understanding of biodiversity at all levels. On the other hand, the fast analysis process, non-invasive sampling methods, data collection and their accuracy, and the genetic data banks have provided the new approach for the protection of biodiversity at different levels. Identification of species using DNA barcoding and genetic fingerprinting, classification and phylogeny of species, relationships between and within populations, gene flow, Kinship relationships of species, diet determination, criminology and hunting violations are among the benefits of genetics studies. Observation and sampling of the rare and endangered species are rather difficult. Genetic techniques are very efficient in identifying the rare, endangered and threatened species helping in their conservation and population management.

2. Bioremediation of toluene from groundwater in a laboratory pilot

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Groundwater is one of the most important sources which can easily contaminated by oil pollutants and cause health problems for people and the environment. Using biological methods in hydrocarbon pollutant removal is important due to their affordability and eco-friendliness. The most important issue in bioremediation of groundwater pollution is providing oxygen and nutrients for aerobic bacteria. Ligninolytic enzymes usage has superiority due to its control capability, no need for oxygen supply, and providing nutrients for growth, reducing treatment costs. In this research, a two-dimensional sand tank model was made after preparing the required conditions and materials, and based on the results obtained from the enzyme activity. Hydrogeological characteristics of the real aquifer environment, boundary conditions and horizontal groundwater circulation system were simulated. By confirming the precision of the initial design with a fluorescent dye and making the necessary amendments, the physical model system with all control and monitoring tools was set up using 1 U/ml of active enzymes. At first, synthetic toluene contamination with a concentration of 1000 ppm was created. Afterward, biodegradation conditions were investigated in the presence and absence of enzymes over 24 hours. The removal level was determined by analyzing the gas chromatography of samples taken from the wells of the laboratory pilot model. The results showed that the purification ratio increased by 76% in the presence of the enzymes. The results of this study promise the improvement of groundwater treatment methods with enzyme consortia.

3. In vitro evaluation of DMBA as a potential Carcinogenic Polycyclic aromatic hydrocarbon (PAH) in Wistar rats

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Polycyclic aromatic hydrocarbons (PAHs) are organic compounds that form through biological processes or as byproducts of incomplete combustion from natural or artificial sources. Research has confirmed that PAHs can possess carcinogenic and mutagenic effects and act as potent immunosuppressants. These compounds readily dissolve in fat and are easily absorbed from

mammals' digestive system. One specific PAH, dimethylbenz (a)anthracene (DMBA), is used to induce cancer. In this study, 12 male Wistar rats were divided into two groups: Control and DMBA. The control group was administered 1 mL distilled water twice a week, while the DMBA group was given only a single dose of DMBA at a dose of 25 mg/kg for 8 weeks. After 8 weeks, all rats survived and were completely anesthetized intraperitoneally with ketamine and xylazine. Their gastrointestinal tract tissue samples were obtained and placed in formalin for histopathological examination by optical microscopy. The results of the histopathological assessment indicated that the DMBA group showed various stages of necrosis, hyperemia, and infiltration of inflammatory cells, along with the presence of Aberrant crypt foci (ACF) in the small intestine tissues. The findings of this study indicated that DMBA can effectively serve as a substance to induce gastrointestinal cancer models. Future studies are anticipated to explore the effects of this carcinogenic substance on other body systems to gain a better understanding of its multifaceted effects.

4. Utilizing DNA Barcoding to Identify Unknown Specimens at the Natural History Museum of Iran's Environmental Protection Organization

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Natural history museums not only display a nation's biodiversity but also serve as genetic repositories for various species. However, some specimens within these collections remain unidentified. Accurately identifying these specimens enhances the genetic repository and supports scientific research into the genetic changes that species undergo over time. This study applies DNA barcoding to identify specimens housed in the Natural History Museum of Iran's Environmental Protection Organization, a key representation of the country's biodiversity. Due to the lack of reference sequences for certain native Iranian species in specific mitochondrial genome regions, three regions COI, D-loop and Cytb were used for comprehensive species identification. DNA was extracted and PCR performed on 90 specimens, all of which were successfully sequenced with high quality. Subsequent sequence editing, alignment and comparison with the GenBank database led to the identification of 48 distinct species. The sequences of the target genes were also submitted to GenBank, enriching the genetic repository and facilitating future genetic identification of Iranian species. Consequently, DNA barcoding is demonstrated as an effective method for identifying museum specimens and assessing species diversity in various habitats.

5. Green synthesis of Zinc oxide nanoparticles (ZnO-NPs) from *Sargassum ilicifolium* extract and their impacts on growth and biochemical properties in tomato plants

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The green synthesis of ZnO-NPs represents a cutting-edge environmentally friendly method that can promote sustainable agriculture by reducing the need for chemical fertilizers. The effects of ZnO-NPs derived from *Sargassum ilicifolium* extract and bulk ZnO on tomato plants were studied at different concentrations, focusing on germination rate, photosynthetic profile and associated biochemical changes. The identification of the average size and stability of the ZnO-NPs was analyzed by Dynamic Light Scattering (DLS), X-Ray diffraction analysis (XRD) and field emission- scanning electron microscopes (FE-SEM). Nano-priming of tomato seeds with 100 and 25 ppm ZnO-NPs led to improved seed germination rates in the initial seven days versus control. Higher concentrations of ZnO-NPs, specifically 100 and 50 ppm, significantly enhance the total content of carotenoids and anthocyanins of tomato leaves to control. Additionally, leaves treated

with 50 ppm ZnO-NPs exhibited a notably higher total phenolic content than those treated with 5 ppm. Interestingly, a substantial increase in total flavonoid content was observed alongside a significant reduction in malondialdehyde levels in response to 100 ppm ZnO-NPs than control. The activities of superoxide dismutase, peroxidase, and catalase were higher in control than at various ZnO-NPs concentrations. As ZnO-NPs concentrations decreased, the activities of ascorbate peroxidase and polyphenol oxidase enzymes increased, leading to a remarkable rise in H₂O₂ levels in response to control and 5 ppm versus other treatments. At 50 and 100 ppm ZnO-NPs, higher levels of insoluble sugars were found than at 10 ppm. In summary, foliar spraying with 100 and 50 ppm is recommended for both quantitative and qualitative improvement of tomatoes in greenhouse conditions.

6. Study on the removal of tetracycline antibiotics from aqueous solutions using iron and aluminum modified Nano zeolite by using hydrogen peroxide

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In this research work, iron and aluminum modified Nano zeolite was used as an effective adsorbent for the removal of tetracycline antibiotics. Hydrogen peroxide was used as a catalyst to break the bonds between tetracycline molecules, which accelerated and facilitated the adsorption of tetracycline by the zeolite Nano adsorbent. Due to concerns about pharmaceutical pollutants caused by the presence of antibiotics like tetracycline in water resources and wastewater, which lead to the proliferation of resistant microbes and increased drug resistance in humans, the efficiency of the modified Nano zeolite for tetracycline removal was studied by varying parameters such as pH (2, 3, 5, 7, 10, 11, 12), time (2, 5, 10, 20, 30, 60, 75, 90 minutes), temperature (25, 35, 50, 60°C), adsorbent dosage (50, 100, 150, 200, 250, 300, 350 mg/L), tetracycline concentration (10, 40, 60 mg/L), and hydrogen peroxide concentration (0.25, 0.37, 0.5, 0.66, 1 mg/L). The results showed that the maximum tetracycline removal efficiency of around 99% was achieved using hydrogen peroxide (0.66 mg/L), pH 10, contact time of 30 minutes, temperature of 25°C, Nano adsorbent dosage of 200 mg/L, and tetracycline concentration of 10 mg/L. Therefore, it can be concluded that hydrogen peroxide, by breaking the tetracycline bonds, can act as an effective catalyst in the adsorption of this antibiotic by the iron and aluminum modified Nano zeolite adsorbent.

Posters

7. Improving environmental stabilization of the laccase with immobilization on chitosan-alginate matrix for petroleum compounds biodegradation

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Oil, as the most important economic resource oil producing countries, inevitably causes environmental pollution throughout the extraction, refining, distribution, and storage stages. The activity of related industries causes many environmental problems, including water, soil and air resources pollution and leads to irreversible damage to the environment and jeopardizing the health of society. The enzyme laccase can successfully act in order to degradation of petroleum compounds due to its wide range of substrate specificity. Preserving environmental stability, temperature and pH range is crucial in biological purification conditions. In this study, calcium

alginate 3%, chitosan 2%, acetic acid 1%, and calcium chloride 5.1% were used. To activate the surface agent groups of the beads, glutaraldehyde 1% was used and beads were exposed to it for 24 hours. Furthermore, an enzyme solution with a concentration of 150U/ml was utilized. The enzyme laccase was immobilized utilizing a surface absorption method. Stabilized enzyme performance was investigated under temperature conditions of 20 to 60 °C and pH values of 3 to 9. In the beginning of the investigation, the enzymatic activity of the immobilized enzyme decreased by 19% compared to the free enzyme, but functional stability increased at a temperature of 60 degrees and under acidic and alkaline conditions. Continuing persistency of immobilized enzyme activity against free enzyme increased by 68 percent. Considering the severe and harsh environmental conditions in oil-contaminated areas in the south of Iran, this research promises the possibility of using stabilized enzymes in contaminated areas to degrade petroleum compounds.

8. Investigating the environmental challenges of climate change in Mazandaran province

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Climate change is one of the main and most important environmental challenges of the world and our country. This phenomenon has many negative consequences for the environment, which will eventually destroy the environment and change the natural and human ecosystem. In this regard, the aim of the present study is to examine the challenges of climate change on the environment of Mazandaran province. The research method is descriptive-analytical. In this research, 20-year rainfall and climate change statistics and environmental change statistics during this period have been used to show the trend of climate change and its environmental effects in Mazandaran province. The results obtained from the process of climate change in the last few decades in Mazandaran province show that the most important challenge is the water crisis and drought that has affected a large part of the province. If this crisis continues, the agricultural economy, underground water resources, Wetlands and streams, Hyrcanian forest cover, plant and animal species, land use and human health will face major environmental challenges. Since the findings show the impact of human actions on climate change, controlling and reducing the effects of human actions can reduce the effects of climate change on the environment to some extent.

9. The effect of heavy metal cadmium pollution on mineral nutrition of pistachio plant (*Pistacia vera*) around the Qhatran factory in Zaran city

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Zarand city, as an industrial city, has been associated with extensive environmental challenges due to the release of toxic gases and dangerous pollutants from the chimneys of factories, including Qhatran, and the existence of these factories causes numerous pollutions, including heavy metal pollution. brought in the soil of these areas. On the other hand, the existence of pistachio processing areas in these areas also causes many concerns for consumers due to the entry of these types of pollutants into the human food chain. For this purpose, in order to evaluate the accumulation of heavy metal cadmium in this plant, a factorial experiment was conducted based on a completely random design. And in addition to measuring this element in soil and plant samples (including leaves, cores and green skins of fruits) by atomic absorption device, the effect of this metal on plant mineral nutrition (in the case of elements such as potassium, calcium and sodium) was evaluated. Based on the obtained results, the amount of this element was lower than the standard and permissible limit in all samples of both pistachio cultivars, except for the green skin of Akbari

pistachio variety, especially in pistachio fruit core. Regarding the three food elements, as the factories were approached in terms of distance, the amount of these three elements in both the leaves and the core of the pistachio fruit showed a significant decrease compared to the control area.

10. Floristic analysis on 50 local floras in Central Zagros Region

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2850 species in 50 local floras form part of Flora in the Central Zagros region, in the provinces of Isfahan, Kohgiluyeh-Boyer-Ahmad, and Chaharmahal-Bakhtiari. Due to variation in their area, the study time and revisions in nomenclature and classification of some taxa, it is not possible to compare these floras directly. In this study, the floristic data was corrected based on APG and the validity of names based on the current nomenclature of taxa according to the WFO international database, and their floristic lists was reproduced. The comparison of the local floras studied, is summarized in a table including the number of families, genera, species, number and percentage of endemics, medicinal and rare species, species in each IUCN classes EN, VU and LR, and the number and percentage of life forms (Ph, Ch, He, Cr and Th) and the number and percentage of species in each chorotype (IT, shared species between IT and other phytochoria, the cosmopolitan species and penetrated species into IT region). Pie charts for their abundance are presented. Beta diversity values between each pair of local flora are calculated and presented in a table. Results showed that the flora of Ardakan, Golestankoh and Venk are the richest floras of the region, and the flora of Moute and Ardakan show the highest amount of beta diversity (960). The lowest beta diversity (76) was obtained between flora Sawers, and Pahn-Eshgar.

11. The effect of different concentrations of cadmium on germination factors and early growth of safflower (*Carthamus tinctorius* L.)

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Safflower (*Carthamus tinctorius* L.) is an annual herbaceous plant belonging to the family of Astraceae, which grown in poor soils with environmental stresses such as salinity, water deficiency and heat stress. Cadmium (Cd) is the toxic non-essential heavy metals that amount is increasing in the soils around urban areas. Seed germination is the first physiological that can be affected by cadmium in the soil, because we evaluated different concentrations of cadmium (0, 25, 50, 100, 200 and 250 ppm) on germination factors, root and hypocotyl length in *Carthamus tinctorius* seedlings. The results showed that the germination percentage of *Carthamus tinctorius* seeds was not affected by different concentrations of Cd. But, the mean germination time (MGT) significantly increased in 200 and 250 ppm compared to the control. Hypocotyl length was not affected by Cd, but hypocotyl length significantly decreased by Cd independent of its concentration. The Cd-restricted root elongation is almost certainly caused by Cd accumulation in the root itself, which eventually causes inhibition of cell division and cell elongation. Seedling growth is much more sensitive to Cd than seed germination which it may be due to the increased permeability of the seed coat to Cd in during seed germination.

12. Effect of climate change on habitat suitability and distribution model of the Levantine viper *Macrovipera lebetinus* (Linnaeus, 1758) in the future

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The large Palearctic viper, *Macrovipera* Reuss, 1927 with two species *M. lebetinus* and *M. razii* is distributed from Morocco and Anatolia to Southwest Asia and Central Asia. The Levantine viper *Macrovipera lebetinus* (Linnaeus, 1758) with wide distribution in diverse habitats has six known subspecies. In the study, used the maximum entropy approach based on climatic variables, modeled the potential distribution areas and determined the suitable habitats in the contemporary and predicated distribution in the future (2080) under the representative concentration pathway scenarios (RCP 2.6 and RCP 8.5) of greenhouse gas concentration levels for the Levantine viper *M. lebetinus*. Evaluating the results of the distribution patterns showed that the variables of slope (31.5%), mean of precipitation seasonality (16.5%), annual precipitation (16.4%) were effective in identifying the distribution of suitable habitats in the contemporary period, as well as the amount precipitation of the warmest quarter of the year (41%), and the precipitation of the coldest quarter (29.5%), temperature seasonality (17.9%) in the RCP 2.6 scenario, and the variables of seasonal temperature (36.9%), isothermality (34%) and coldest precipitation Season of the year (20%) in the RCP 8.5 scenario was the most important factor shaping the distribution of *M. lebetinus* for the future. It seems that climate change until 2080 will cause the relative increase of some habitats and the destruction of other habitats. However, human activities in the fragmentation and change of habitats cannot be ignored.

13. Allelopathic effect of rosemary on purslane weed

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One of the agriculture problems is the excessive growth of weeds. Today, herbicides are used to kill weeds that cause environmental pollution and damage to human health. Researches show that the use of allelochemicals compounds can be a suitable solution to control weeds. The purpose of this study was to investigate the effect of different concentrations of rosemary leaf extract (0, 5, 10 and 15 percent) in a completely randomized design with three replicates on purslane. The length of the plant was measured with a ruler and the fresh and dry weight of the plant was measured with a precise scale. Wet samples were weighed after 48 hours exposure at 60 centigrade. The content of chlorophylls and carotenoids, proline and proteins was measured by spectrophotometry method. The results showed that the fresh and dry weight of the plants, the content of chlorophyll b and total and carotenoids at all levels, while the length and content of chlorophyll a in the treatments of 10% and 15% rosemary leaf extract were significantly reduced compared to the control. By increasing the concentration of rosemary leaf extract, the proline and protein contents increased significantly compared to the control. Based on this research, it seems that the monoterpenes in rosemary leaf extract causes a change in the synthesis of photosynthetic pigments, proteins and proline content, disrupt photosynthesis, change the permeability of the cell membrane and prevent cell division and growth in purslane weed. Therefore, rosemary leaf extract can be used to eliminate purslane.

14. Providing an integrated management framework for optimal water hyacinth control in Guilan province

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Water hyacinth, *Eichhornia crassipes* (Martius) Solms-Laubach, is one of the most important aquatic invasive plants in the world, likely introduced to Guilan province as an ornamental plant. This weed was first identified in 2011 in the Eynak Wetland located in Rasht County. Due to its rapid growth and reproduction, it quickly covered the entire area of Eynak Wetland and began to infiltrate other aquatic ecosystems. Studies indicate that while water hyacinth has the ability to absorb and filter heavy metals, its prolific reproduction and adaptability can have adverse effects on the biodiversity of aquatic and wetland environments, directly impacting aquatic life and plants, and disrupting the food chain of birds and other organisms. Controlling its spread is essential for the health of invertebrates in the depth of water, amphibians, reptiles, fish, and birds. Thus, appropriate methods to prevent its distribution and control are crucial. To manage water hyacinth, this research proposes an integrated management framework. Key successful steps in this program include identifying the weed source, mapping the extent of water hyacinth pollution, recognizing the sources of nutrient pollution, collaborating with relevant NGOs, and creating a calendar for various control methods such as mechanical removal, use of herbicides, and biological control. Implementing this integrated management program could serve as a suitable model for managing water hyacinth both in the country and globally.

15. Assessing the health of ecosystems in the south of the Caspian Sea using the AMBI ecological index

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The presence of stress and changes in marine ecosystems can have significant effects on organisms and the ecological and economic potential of these valuable areas. Therefore, continuous monitoring of ecological health is important to assess the health of these habitats. In this research, the Azti Marine Biotic Index (AMBI) was used to evaluate the health of the coastal area of the Caspian Sea (specifically the southern part, including the Tamishan and Glandroud rivers), which are areas exposed to human pollution and stress. Two linear transects perpendicular to the coast, including three stations near the coast, in the middle, and far from the coast at distances of 500 meters, 1000 meters, and 1500 meters, were selected for sampling benthic invertebrates in the southern part of the Caspian Sea. Sampling of benthic invertebrates was conducted with the assistance of Grab van Veen. The results of the ecological assessment of the sampling areas showed that, based on the AMBI index, the Glandroud River is slightly disturbed, while the Tamishan River is slightly to moderately disturbed. Furthermore, the results of the AMBI index indicated that the Tamishan River has higher pollution levels compared to the Glandroud River. Factors affecting the Tamishan and Glandroud rivers include pollution from human sewage in the surrounding areas, agricultural fertilizers from land cultivation, and sewage from the fishmongers' market near the Glandroud River. The AMBI index, which is derived from the ratio of resistant to sensitive species in relation to stress and increasing pollution, indicates a good ecological condition. The results demonstrate that the AMBI index is a suitable tool for distinguishing areas with minimal human impact and can be used effectively in monitoring programs.

16. Assessment of the ability of *Salsola nitraria* plants in soil remediation of contaminated lands

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Mining activities and metal extraction are significant contributors to soil pollution, with surface soils around mines often exhibiting high levels of these metals. This study aimed to investigate the saltwort plant (*Salsola nitraria*) for its potential in the phytoremediation of zinc. After identifying the collected plant samples, they were prepared for relevant analyses. The concentrations of zinc, electrical conductivity, and pH were measured, and the samples' ability to absorb and accumulate zinc was evaluated by calculating the Bio-concentration Factor (BCF) and the Translocation Factor (TF). The results indicated that the total zinc concentration in the soil ranged from 1232 to 2075 mg/kg dry weight, while the exchangeable zinc concentration varied between 147 and 224 mg/kg dry weight. The average pH of the soil samples was found to be between 7.1 and 7.5. The findings also showed that the maximum average zinc concentration in the saltwort plant was 225 mg/kg in the roots, 573 mg/kg in the aboveground parts, and 1145 mg/kg in the soil. The results suggest that the Bio-concentration Factor for the saltwort plant was 0.3, and the Translocation Factor was 2.9. Regarding zinc, saltwort can absorb substantial amounts of this metal from the soil and accumulate it in its tissues. Therefore, saltwort can serve as an effective biological solution for environmental remediation and enhancing the quality of contaminated soils.

17. Assessing the Efficacy of Commercial Activated Carbon in Removing Biochemical Oxygen Demand from Urban Wastewater

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Wastewater is often contaminated with different hazardous materials such as organic and inorganic compound. The treatment of such wastewater is very important from environmental and economic views. Adsorption techniques are most widely used among the treatment processes. Commercial activated carbon has been regarded as a good adsorbent for the treatment of wastewater and for removal of biochemical oxygen demand (BOD) content with high efficacy. In this study concentration of BOD was measured in urban wastewater and its removal process was studied by using commercial activated carbon, under laboratory conditions. Results showed that BOD concentration of studied wastewater was measured as 1000 mg/l which is more than permitted limit. Also based on obtained results commercial activated carbon reached high removal percentage (99%) for BOD. So according to obtained results, commercial activated carbon is a good adsorbent for the removal of BOD from wastewater.

18. Using the waste of button mushroom salons for the production of industrial worm meat

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Extreme weather events have direct consequences on our food systems. The effects of such environmental factors on food security are well known. "Novel" food sources refer to food sources that have not been widely used in the past. The nutritional value of earthworms is due to its high protein content, which usually constitutes 45-70% of the weight of the dry matter of worms. Earthworm has a lot of absorbable protein compared to white and red meat. It also has a high ability to maintain nutritional value compared to other types of meat. Some agricultural products such as (bagasse, oat pulp, tomato pulp, potato waste, soil, sawdust and animal manure) and some urban waste such as garden waste etc. are used for breeding worms. Of course, the type and amount of desired waste is very important. For the first time, the waste from the button mushroom

production halls (*Agaricus bisporus*) was used to feed earthworms (*Eisenia foetida*). Young worms were purchased from Karaj Vermi Composting Company. 6 different fungal treatments were used. After 50 days, the treatments were evaluated. In alcoholic fermentation and fresh mushroom treatments, the worm population decreased at the end of the experiment. In the treatment of dried mushroom waste, the population of worms increased by 15%. In the treatment of 20% acid fermentation of mushroom waste, the worm population increased by 50%. The best answer was observed in the treatment of 10% acidic fermentation of mushroom waste, which increased the population of worms by 100%.

19. Utilizing the Internet of Things (IoT) and Artificial Intelligence (AI) Technologies for Promoting Environmental Monitoring and Conservation: Advanced Applications in Air Quality, Water Management, Sustainable Agriculture and Food Security

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Environmental management has always focused on environmental performance. In recent years, due to the escalating gravity of environmental problems, all nations have redirected their attention towards effectively protecting the environment and attaining sustainable economic and social development. As the new generation of technological revolution advances, the question of whether enterprise digitalization can enhance enterprise environmental performance has emerged as a new area of interest for research. Applying the Internet of Things (IoT) approach in this field and the synergy between artificial intelligence (AI) and humans could help us learn more about how these changes affect all living things and natural systems by using technology to solve problems. IoT generates large volumes of data that require swift processing, which AI algorithms can handle with enhanced efficiency and superior decision-making quality. These two are crucial elements of a unified network that enhances efficiency and precision in automating environmental management and protection. Artificial neural networks (ANN) are among the new techniques applied in several environmental science fields. We want to hasten the acceptance of these techniques among environmental scientists. As a result, this study focuses on integrating IoT and AI, specifically artificial neural networks, to effectively handle environmental sustainability challenges related to water and soil problems, as well as the causes of climate change.

20. Man and ecosystem changes in the forest areas of western Iran

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Drought is a weather phenomenon that is likely to occur in all parts of the world and with any climate conditions. Drought crisis is one of the climate anomalies that has adverse effects on plants, animals and ultimately humans and ecological environments. Based on this, monitoring systems are very important in developing plans to deal with drought and its management. On the other hand, this phenomenon can have a significant effect on the occurrence and escalation of other disasters, such as fires, especially in the forest areas of western Iran (semi-arid oak forests), which are one of the main dangers in the Zagros forests. And every year it causes irreparable damage to the environment and ecosystems. Therefore, investigating accident-causing behaviors and institutionalizing the culture of environmental protection, determining high-risk fire areas and predicting them using risk models, examining drought and annual rainfall data in the provinces of the Zagros region, such as Lorestan and Kermanshah; It plays a significant role in minimizing damages caused by human errors to natural resources. In the above article, which is a scientific-promotional article with an analytical approach, relying on educational issues and improving

society's awareness, an attempt is made to investigate the crisis of drought and fire and the mutual effects of these two phenomena on each other and to try to reduce the adverse effects of these events on We will have biological communities and ecosystems.

21. Conservation importance and ethnobotany of (*Descurainia sophia* L.) Webb ex Prantl in Iran

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Nowadays, medicinal plants are considerably face threats due to factors such as drought and the expansion of farmlands. As a result, it is important to study and document information about the therapeutic uses of different plant species. One of these plants that has captured people's attention for years and is employed in treating various diseases in Iran is *Descurainia Sophia* (L.) Webb ex Prantl (Khakshir or Khakshi) belonging to the family Brassicaceae. Based on available reports, this annual or biennial plant is distributed across most regions of Iran and is sensitive to pests such as insects, fungi, and viruses. Therefore, to uncover its medicinal properties and conservation importance, we conducted electronic and face-to-face interviews in both rural and urban areas within Iran. More than a hundred people participated in this research. The age group of 18 to 24 years provided interesting information about the medicinal properties of khakshir, demonstrating the successful relationship of this group with traditional medicine and middle-aged people. According to the participants, this plant is used to treat constipation, control asthma symptoms, skin smoothing, fatty liver treatment, skin inflammation, bad breath elimination, weight loss, and as refrigerant. Some informants reported using this plant in combination with cichory, plantain, fumitory, fleawort and purslane to treat diseases. The seeds, flowers and leaves are the most commonly used parts of the plant, typically in the form of syrup, decoction, powder, and poultice. It should be noted that excessive consumption of this plant can reduce intestinal activity and cause diarrhea. Regarding distribution, most participants believed that the number of these herb has decreased over time. Considering this reduction, its medicinal properties, and the fact that its status is "Not Evaluated" in International Union for Conservation of Nature (IUCN), it is recommended to preserve biodiversity through the propagation of pest-resistant plants.

22. Investigation of microplastic pollution in Oriental river prawn *Macrobrachium nipponense* eggs of Anzali wetland

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The production and extensive application of plastic in various industries has led to the pollution of ecosystems, including aquatic environments. After entering aquatic environments, these plastic materials are transformed into very small particles in microplastic form and even smaller as a result of photolytic and mechanical degradation. Some *Macrobrachium nipponense* shrimps were caught from Anzali wetland and 13 female shrimps with eggs were detected and eggs were isolated. The eggs were digested with 10% KOH and after filtration the resulting solution, filters were investigated by stereomicroscope. The results show that all the examined samples are contaminated. A total of 42 microplastic particles were observed in shrimp egg subsamples. The highest frequency of particles is related to filament particles (81%), irregular fragments (14%) and microbeads (5%). These particles were very diverse in color and most of them were black (16 particles) and white/transparent (14 particles). The smallest particle size found was 10.96x100 micrometers and the largest one was 706.56x4120.9 micrometers. In the study of Rasta et al. (2018), the microplastic contamination of Anzali wetland sediments was investigated and an average of 78.36±78.08 particles per 100g of dry wetland sediment was observed. In the research of Amini et al. (1402), the amount of microplastic was measured in the gills, skin, muscle and

digestive tract of 7 aquatic species of Anzali wetland, and the amount of particles in all samples ranged from 5.2 ± 4.2 to 7.20 ± 8.6 . The findings of the present study are consistent with the results of previous studies and indicate the contamination of Anzali wetland and its aquatic life with microplastics.

23. Investigating the effect of antimony on some physiological parameters of oats (*Avena Sativa* L.)

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The problem of heavy metal pollution is enhanced more and more; even low concentrations of these metals, immediately absorbed into plant systems, have the potential to disrupt metabolic processes. Antimony is an unnecessary element for plants and animals and human. While most of the antimony is stored in root tissues, a small amount of this heavy metal, can be transported to aerial parts, causing several harmful effects and it depends on plant species. The present study aims at investigating the effect of antimony on some of the physiological parameters of oat plant, (*Avena sativa* L.), where the seeds were grown in perlite, and after reaching the stage of four-leave in Hoagland's environment, they were subjected to an antimony effects every 3 days for a period of 14 days and this is notable that the antimony treatments were conducted with a concentration of 0, 2.5, 5, and 10 millimolar. After harvesting, some growth and physiological parameters were investigated in these plants. The results indicated that the length of the aerial part and root decreased with increasing antimony concentration in both sorts. The maximum decrease was observed in the concentration of 2.5 millimolar in both. Total protein content, hydrogen peroxide amount, catalase, peroxidase, and ascorbate peroxidase enzymes activity, and the content of chlorophyll a, b, and carotenoid increased under augmented antimony concentrations. Generally, it can be concluded that oat grains have little resistance against the stress caused by accumulation of antimony heavy metal by augmenting in the activities of antioxidant enzymes and soluble proteins but not high ability in preventing entry of a high amount of antimony to the roots and aerial parts, which causes toxicity and damage in plant tissue.

24. Investigating the accumulation of heavy metals in different parts of vetiver plant

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The industrial revolution has always been associated with creating problems for the environment. One of the environmental pollutants is leachate produced from municipal waste. The most important pollutants of this leachate include organic compounds and heavy metals that cause great damage to the environment. The use of plants to remediation environmental pollutants is called phytoremediation. Vetiver plant (*Vetiver Zizanioides*) has been noted for its unique properties, especially for its phytoremediation ability. In this study, which used complete random block design, vetiver plants were equalized and irrigated with concentrations of zero, 25, 50, 75 and 100% of municipal wastewater. The amount of heavy metals in different root and aerial parts was measured by ICP device. The results showed that in urban waste leachate, copper metal has the highest amount among the mentioned heavy metals. In the aerial part, more nickel and lead were observed in the tips of the leaves, and more zinc and copper were observed in the last two pieces of the stem. In the root part, the highest accumulation of these metals was seen in the root hairs. Cadmium metal was not observed in the leachate and also in the plant. The survival of vetiver plant in different concentrations of leachate showed that this plant is a very suitable option for urban waste plant treatment projects. Considering the various uses of vetiver, it is suggested that this plant be used simultaneously with plant remediation for multilateral projects.

25. Autoecology of cypress trees (*Cupressus sempervirens* var. *horizontalis*), case study: Seidan's forest reservoir, Roudbar, North of Iran

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This research was conducted to investigate the autoecology of Mediterranean cypress (*Cupressus sempervirens* var. *horizontalis*), in Seidan forest reserve, Roudbar, in north of Iran. Three replications of sample plot with an area of 0.1 ha in each aspect, and in total, 36 circular plots were selectively taken. In each sample plot, all trees ($DBH \geq 7.5$ cm) were measured and identified. The types of shrubs were identified and enumerated. Moreover, herbaceous species was estimated using Domin criterion, and also topographical factors (i.e., altitude, slope and aspect) were recorded by GPS. The soil samples were taken in order to study physicochemical properties in center of each sample plot. Principal Component Analysis (PCA) were used to study of the relationships among soil, plant species, and environmental factors. One-way analysis of variance (ANOVA), and Tukey HSD test were applied to compare the mean of quantitative values of trees in various classes of topographic factors. ANOVA test indicated that among the topographical factors (slop, aspect and altitude) is a significant difference. The highest number of individual trees were found in north aspects with 50-75% slop, and 401-500 m a.s.l., conversely, southern and western aspects with 25-50% slop, and 501-600 m a.s.l had the best conditions for other quantitative parameters. Soil samples analysis indicated that sand, and clay percentage, porosity, soil organic carbon stock (SOCs), soil organic matter (SOM), and lime had the greatest effect and the percentage of moisture, acidity, silt, bulk and particle density, had the least effect on the distribution of the sample plots.

26. Examination of substrate changes and geomorphological of west Guilan rivers.

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This study examines the changes in the substrate and geomorphological characteristics of the West Guilan rivers and analyzes the diverse climate, geological and human impacts on these changes. The West Guilan region is one of the most sensitive and important areas in northern Iran due to its special geographical location, humid and mountainous weather conditions, and abundant rainfall. Changes in river substrates, such as changes in substrate width and depth, route displacement and sedimentation, not only affect local ecosystems and biodiversity, but also have significant effects on human activities such as agriculture, irrigation and habitation. To do this research, various methods such as satellite image analysis, field studies, and hydrological modeling have been used. The results show that changes in river substrates are mainly affected by natural factors such as floods and heavy rains, and human factors such as construction and agricultural activities. These changes have led to problems such as erosion of the sides, increased risk of flooding, and reduced water quality. According to the findings, proposals have been made to better manage water resources and reduce the negative impact of these changes, including strengthening flood management programs, controlling human activities in sensitive areas, and using new technologies to continuously monitor rivers. The study could be used as a basis for further research and development of more efficient strategies in water resource management in the West Guilan region.

27. Biodiversity survey of plant elements in Zaz and Mahro districts, Lorestan province, Iran

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Identifying plant elements in an area is very important for biodiversity studies, protection and management of vegetation. In this study, the collection and identification of plants in Zaz and

Mahro districts located in Aligudarz County (Lorestan) was done using topographical maps. Information related to any including family name, scientific name, Persian name, local name, flowering time, biological form, vegetative type, geographical distribution, part used and medicinal use, native and local, were collected and recorded. 200 plant species belonging to 58 plant families and 162 genera were identified and the species related to each family were arranged in Latin alphabet. In this region, Asteraceae with 24 species, Fabaceae with 19 species, Poaceae with 17 species, Lamiaceae with 14 species, and Rosaceae with 11 species have the highest number of species. Among the largest plant genera in Zaz and Mahro region, we can mention *Allium* and *Astragalus* with 5 species, *Ranunculus* and *Vicia* with 3 species. Biological forms of plants in the studied area include trophites (38%) with 76 plant species, hemicryptophytes (29.5%) with 59 plant species, phanrophytes (15%) with 30 plant species, geophytes (12%) with 24 plant species, cameophytes (3.5%) with 7 plant species, cryptophytes and helophytes with abundance (1%). 34% (68 species) of the plants of Zaz and Mahro regions grow in Iranian-Turanian vegetation areas.

28. Exploring the algae diversity and abundance in Aras River, Northwestern Iran

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Aras River is one of the most important and water-rich northern rivers of Iran in the Azerbaijan region, and it is also the border strip between Iran and the Republic of Azerbaijan and Armenia, and the Republic of Nakhchivan. The length of this river is 1072 km. Aras River originates from the Anatolian Mountains of Turkey and after passing through the borders of Turkey, Nakhchivan, Jolfa and Armenia, it enters the soil of Iran and after crossing the border of Iran, it flows into the Caspian Sea. In this research, the algal periphyton communities of Ares River were investigated and identified. Sampling of algal periphyton communities was conducted in 16 stations throughout all four seasons with three replications. According to the results obtained in this study, 281 species of diatoms (57 genera), 13 species of green algae (9 genera), 10 species of cyanobacteria (9 genera) and 11 other algae species (9 genera) were identified. The most abundant diatom species in the Ares River include *Diatoma vulgare*, *Amphora ovalis*, *Cocconeis placentula*, *Rhoicosphenia abbreviata*, *Cymbella helvetica*, *Brevisira arentii*, *Navicula tripunctata*, and *Nitzschia linearis*. The most dominant species are Diatoms, which has 57 genera, while Chlorophyta has 9 genera and Cyanophyta has 8 genera. The highest amount of phytoplankton is in the summer season, while the lowest amount is in the winter season. It is suggested to investigate the flora and algae diversity of Ares River in the neighboring countries, considering the influencing factors in it and in different months of the year. To confirm the identified algae species, it is recommended to use genetic and molecular markers.

29. Investigating the Relationship between Soil Macrofauna and Soil Physicochemical Properties in Different Land Uses (Rangeland and Urban Parks of Chitgar, Lavizan and Darkeh)

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Soil is the primary source of biodiversity and reflects the vital processes of ecosystems. Many changes observed in soil, including chemical, biochemical, and physical alterations, are not possible without the presence and activity of soil organisms. Understanding the relationship between soil and soil macrofauna, as essential soil components, is crucial for better and sustainable land management. This study examines the relationship between seven soil parameters, including acidity (pH), total calcium (Ca), total magnesium (Mg), organic carbon (OC), total nitrogen (N), total phosphorus (P), and soil texture with the presence of soil macrofauna. Canonical

Correspondence Analysis (CCA) was employed to investigate the relationship between soil physicochemical factors and the richness and abundance of soil macrofauna. Principal Component Analysis indicated that the factors Ca, Mg, and silt in the pasture, and Ca, sand, and silt in urban parks have a greater impact on soil macrofauna. The results showed a strong correlation between soil physicochemical properties and macrofauna diversity. Generally, the type of vegetation cover has a direct impact on the relationship between macrofauna and physicochemical factors. Land use change alters environmental conditions and soil characteristics, significantly affecting soil communities. Maintaining soil health is essential for ensuring biodiversity, ecosystem functioning, food security, and environmental sustainability.

30. Investigation of life form and chorotype of plants species in two protected and protected compartments in western beech forest of Guilan. a case study of district 2 Nav Asalem.

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This study was conducted to investigate the life form and chorotype of plant species in two protected and unprotected compartments, with areas of 36 and 69 hectares respectively, in a beech forest from series 2 Nav Asalem in western Guilan. In each compartment, 25 sample plots of 400 square meters were taken using a random-systematic method with a grid size of 100×150 meters. In each sample plot, tree and shrub species were recorded. Additionally, for the study of regeneration and herbaceous layer, two sub-sample plots of 25 and 4 square meters were used respectively. The life form of the species was determined using the Raunkiaer method, and the vegetation regions were obtained using the Zohary method. In the protected parcel, 21 plant species from 19 genera and 17 families were identified. Hemicryptophytes represented the highest life form at 70%. Regarding geographical distribution, the highest frequency, at 69%, was attributed to European-Siberian elements. In the unprotected parcel, 24 plant species belonging to 24 genera and 23 families were observed. Hemicryptophytes accounted for the highest life form with 80%. In terms of geographical distribution, the highest frequency, calculated at 74%, was related to European-Siberian elements. Based on the results, with the opening of the canopy, the richness of understory species increases. The presence of hemicryptophytes indicates the existence of suitable climatic conditions for growth in the temperate region. The European-Siberian chorotype reflects the affiliation of the entire northern forests to this climate and the remnants of primary forests.

31. Investigating the flora of diatoms in the Aras River, northwest Iran, and conducting ecological analysis of the river

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Quantitative and qualitative assessment of water resources is one of the important and fundamental elements of sustainable development. The level of pollution in water sources can be identified using biological indicators, particularly diatoms, which can provide appropriate information for evaluating water ecosystems. Bacillariophyta is a group of unicellular algae known for their siliceous cell wall and bivalve structure. This study was carried out in Aras River, which is one of the most important rivers in northwest Iran. Sampling was done in the fall of 1400 in 16 stations. Physicochemical factors of water such as pH, EC and TDS were measured at the sampling site after sampling and transferring the samples to the laboratory, all the raw samples were treated using hot 35% hydrogen peroxide and 32% hydrochloric acid to remove the internal compounds of diatoms as well as organic and mineral substances present in the solution. Removed and only

the cleaned siliceous cell walls were fixed for studies. In this study, it was determined that the algal flora of Aras River consists of alkaline species. According to the collected information, the diversity of diatoms in the upstream and downstream of the river is different. This study identified 281 species of diatoms (57 genera). The genera Gomphonema, Nitzschia, Navicula, Amphora, Cymbella, Pinnularia, Surirella, Fragilaria, and Cymatopleura were the most abundant genera. According to these results, in the Jolfa region towards Pars-Abad, high amounts of various pollutants and heavy metals from copper and molybdenum mines in Armenia enter the river, water quality (in terms of species diversity of diatoms) has been strongly influenced. The presence of pollutants and heavy metals in the middle and downstream of Aras River has caused the growth and deformation of different species of diatoms, the decrease in the growth of diatoms adapted to favorable conditions and the increase in the growth of pollution-resistant diatoms in the downstream stations. It is recommended that pollution entering the water environment can be reduced by using better agricultural methods and more effective wastewater treatment, and also, the problem of pollution in the Aras River from neighboring countries should be resolved as soon as possible.

32. Investigating tourism and importance, rohe of the wetland ecosystem (Case study: Miankale Wetland)

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Tourism can help the local economy and sustainable wetland management. The development of tourism in the Miankala wetland does not conflict with the protection goals of this ecosystem, although conservation decisions in the wetland are prioritized over tourism planning. In this way, by examining the positive and negative effects of tourism in the wetland, we were able to achieve a balance between the economy and society, so that in addition to the economic growth, the existence of the wetland is guaranteed in the range of human activities, because the Miankala wetland is one of the most important ecosystems in the world. The working method in this article is library and research. The purpose of this study is to show that in addition to natural factors, human factors have also caused the destruction of this wetland. In order to prevent the destruction of the wetland ecosystem and preserve the values of the wetland, we must consider appropriate management solutions. These management goals include conservation, native biological approach, assessment of the environmental effects of strategic management. The findings indicate that Miankale Wetland has many weaknesses and threats. By examining these factors, we can protect the ecosystem of Miankale Wetland and remove it from instability and return it to its previous state. It cannot be implemented because there is a scattered and multiple management plan in it. As a result, by creating a sustainable management plan, the problems of the ecosystem of this wetland can be understood to some extent, and it should be in such a way that both human society and the wetland ecosystem can progress and develop. It should be preserved because if the wetland is destroyed, it will ruin the relationship between man and society.

33. Seasonal Dynamics and Correlations of Cocconeis Diatoms and Macrophyte Biomass in Chabahar Bay, Northern Gulf of Oman

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The Chabahar Bay coastal ecosystem in the northern Gulf of Oman features a variety of macrophytes and epiphytic microalgae, with Cocconeis diatoms being the most dominant. This study investigates the spatio-temporal patterns of macrophyte biomass and Cocconeis abundance

to better understand the ecosystem dynamics. In Chabahar Bay, ten *Cocconeis* species have been identified. Their abundance ranged from 8.9 ± 0.8 to 14.7 ± 1.2 cells/ml in spring and increased to 9.4 ± 0.8 to 15.4 ± 1.3 cells/ml in summer. Dominant species included *C. costata* var. *costata*, *C. fasciolata*, and *C. imperatrix*. *Cocconeis* sp. also showed a seasonal rise, from 5.6 ± 0.6 cells/ml in spring to 8.3 ± 0.8 cells/ml in summer. The key macrophytes identified in the bay include *Ulva*, *Padina*, and *Sargassum*. Macrophyte biomass ranged from 8.3 ± 0.7 to 17.2 ± 1.4 g dry weight/m² in spring and increased to 14.2 ± 1.2 to 19.8 ± 1.6 g dry weight/m² in summer. Pearson correlation analysis showed strong positive correlations between *Cocconeis* species and macrophyte biomass. *C. costata* var. *costata* correlated highly with *Ulva* ($r = 0.92$), *Padina* ($r = 0.88$), and *Sargassum* ($r = 0.95$). *C. fasciolata* had similar high correlations with *Ulva* ($r = 0.90$), *Padina* ($r = 0.86$), and *Sargassum* ($r = 0.92$), while *C. imperatrix* also showed strong correlations with *Ulva* ($r = 0.87$), *Padina* ($r = 0.83$), and *Sargassum* ($r = 0.90$). These results highlight a significant relationship between *Cocconeis* abundance and the biomass of key macrophytes in the Chabahar Bay ecosystem.

34. Predicting the climatic factors limiting of the growth period of macadamia (*Macadamia tetraphylla*) in Kerman, Iran

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Investigating patterns of occurrence of thermal stresses based on plant phenological periods is one of the fastest tools for evaluating the climatic adaptability of new plant species at a regional scale. This research was carried out with the aim of temporal analysis of phenology and pattern of thermal stresses of the macadamia (*Macadamia tetraphylla*) plant in Kerman province, Iran. For this purpose, at first, the agricultural climatic characteristics of the studied fruit are determined and specified, and based on climatic data, thermal and photoperiod indices, the phenological parameters of macadamia in different climatic conditions of the province are determined, and in the next stage, the risk of thermal stress periods for Each of the growth stages of the plant was calculated. The results showed the length of the growth period based on the minimum threshold temperature in Baft, Shahr Babak, Lalehzar, Anar, Rafsanjan and Kerman stations is 80, 90, 100, 65, 70, and 75 days, respectively. Therefore, the mentioned stations cannot adapt to the climate for macadamia planting and production. In Bam, Jiroft, and Kohnuj stations, the average restriction is less than 15, 10, and 5 days, respectively, and they do not have a severe restriction period. , no limitation was observed for the risk of heat stress in the vegetative and flowering stages in any of the stations but in the fruit formation until ripening, the heat stress in Kohnuj station is somewhat limiting. In general, the lowest climatic factors limiting the macadamia growth period were predicted in the Bam, Jiroft, and Kohnuj stations.

35. The Impact of Historical Climates on Shaping Current Biodiversity Distribution Patterns

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Species Distribution Models (SDMs) are widely used to describe the ecological niches of species. However, SDMs often make simplified assumptions, such as the constancy of a niche throughout its lifespan and the equilibrium of species distributions with long-term climatic means (typically 30 years). In reality, such equilibrium is rarely observed. This study aims to determine which temporal window better explains current species distributions and whether a species' lifespan

affects the delay and length of these temporal windows. We developed a multi-temporal SDM that incorporates temporal dynamics into SDMs, considering the effects of historical climate and species longevity. We compared the performance of this multi-temporal approach with conventional methods. Twenty-one plant species with short (~10years), medium (~50years), and long (~100years) lifespans were tested across the western Holarctic region using GBIF data and long-term CHELSA time series. Biodiversity data from the past five years and climate windows of 1, 5, 10, 20, and 50 years were selected. Annually moving time windows from 1900 to the present were used to fit a model each time. We utilized 12 machine-learning algorithms along with ensemble approaches. Results indicated that historical climate conditions explained current biodiversity patterns better than contemporary climate conditions in 65% of cases. Optimal time lags and windows varied depending on species longevity, with longer-lived species benefiting more from long-term windows. Performance comparisons of multi-temporal models with conventional models (AUC,TSS) highlighted the enhanced capabilities of multi-temporal SDMs. This study demonstrates the potential of multi-temporal SDMs to better explain niches under varying environmental conditions.

36. The impact of human and livestock grazing on physiognomic and diversity of plant species and some physicochemical properties of soil in Tanian, Western Guilan.

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Forest is a dynamic ecosystem which can restore after natural degradation; unless human accelerates the process of natural destruction. The plant community which impacts on natural production might be under effect of immediate degradation. Plant regeneration cannot be established in a forest ecosystem. Livestock grazing is one of the human factors which effects on degradation. Hence, this study was conducted to investigate the effects of livestock, and ranchers on the floristic characteristics of plants, vegetation diversity and some physiochemical properties of soil in 100 ha of Tanian forests in Sowme'eh Sara, Guilan province, northern Iran (50 ha protected, and 50 ha unprotected). Forest inventory was carried out utilizing a random-systematic with grid dimensions of 100×200 m, 60 circular sampling plots (0.1 ha). The results revealed that the density in tree, and regeneration layers increased, however, in shrubs layer decreased significantly in the protected area ($P \leq 0.05$). The mean of vegetation cover was also lower in the protected area. Diversity indices have decreased in tree and shrub layers, conversely, increased in herbaceous, and regeneration layers in the protected area. The life forms were the same in all trees, shrub, and herb layers. There was a significant difference between both areas in terms of height class of trees, and coverage percentage according to Kochler's criterion. Soil analysis demonstrated that bulk and particle density, soil moisture and carbon between two regions had significant differences. The reason for these results in the protected area can be attributed to the lack of livestock and logging.

37. The Impact of Land Use Change on Soil Insects in the Vicinity of Tehran (Rangeland and Urban Parks of Chitgar, Lavizan and Darkeh)

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Rangelands surrounding cities are being destroyed due to land use change, particularly urban development. This trend not only destroys habitats but also leads to the extinction of various species and disrupts the natural balance. Despite its benefits, the conversion of rangelands into urban parks can negatively impact soil insects. These insects play a vital role in maintaining soil health and natural ecosystems. In this study, insects were collected from three regions: Loyzan,

Chitgar, and Darkeh, encompassing both rangeland and urban park areas during the spring season. In each region, two sites were selected, and six quadrats were examined at each site. A total of 72 quadrats were surveyed, yielding 825 individuals identified, comprising 132 MorphOTUs. The results of statistical analyses revealed significant differences in abundance, diversity, and community composition between the rangeland and urban park areas in each region. Beta diversity analysis also indicated turnover between the two areas in each region. Despite relative stability in the overall insect population between the two land use types, it can be inferred that areas where more than 20 years have passed since the land use change have achieved a degree of stability and balance, allowing sufficient time for recovery, despite observed changes in species diversity. Given the significant increase in land use change, particularly in recent decades, collecting comprehensive information on the apparent effects of such human disturbances on soil organisms is essential for adopting appropriate and effective conservation measures.

38. The impact of time on the stability of environmental DNA (eDNA) of the Persian sturgeon (*Acipenser persicus*) in earthen ponds and its detection in river

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The use of innovative methods for the identification and tracking of sturgeon species is essential. Environmental DNA (eDNA) detection serves as a powerful tool for species monitoring in aquatic environments. In this study, two methods including sediment sampling and water filtration using a vacuum pump and cellulose nitrate filters were employed for eDNA sampling. To investigate the persistence of eDNA from the Persian sturgeon, 1,000 liters of eDNA-laden water were transferred from a breeding tank to a 2-hectare earthen pond, with sampling conducted at three different points over four-day intervals. For the analysis of eDNA dynamics in the Khomam River, sampling was carried out at six locations along a 5-kilometer stretch, examining factors such as water discharge and distance from the source. eDNA extraction was performed with high precision, and a suitable protocol for tracking eDNA of sturgeon was developed and implemented. The quality of the DNA samples was verified using gel electrophoresis, and DNA concentrations were measured with a NanoDrop spectrophotometer, ranging from 130 to 650 ng/μL with a ratio of 1.8 to 2.0. Sample amplification and standard curve construction were performed using Mini-Barcoding quantitative real-time PCR, establishing a highly accurate linear relationship between cycle threshold (Ct) values and DNA concentration of the Persian sturgeon. In the earthen ponds, the highest concentration of eDNA was observed on the first day, while no positive detection of eDNA was found on the twelfth day. In the riverine environment, significant differences in positive samples were observed across all stations. This research demonstrates that eDNA could be effectively utilized as a tool for assessing the presence and distribution of sturgeon species in the estuaries and rivers connected to the Caspian Sea

39. Bifurcation Analysis of a Delayed Competitive-Predatory System with Two Predators and One Prey

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Limit cycle occurrence in interacting populations' dynamics is fundamental. One of the mechanisms after which such limit cycles are reproduced is the delay in predators' response to the prey's performance or population density. Suppose a system in which two predators compete for

one common prey. With the assumption of different phenological asynchronies between the prey and predator 1 and 2, the result of competition changes in favor of the faster species (with less delay in reaching the appropriate biological stage of the host). Stabilizing the effect of temporal heterogeneity, as a promoting factor in competitive coexistence in population biology of insect parasitoids and insect predators, is a well-known phenomenon. In the current study, phenological asynchrony between competitors in reaching the appropriate biological stage of the prey was introduced as a delay τ in their functional response in relevant differential equations. Considering τ as the bifurcation parameter, conditions of Hopf branching and limit cycles were derived, and the relevant dynamics were simulated. It was assumed that the functional response of both competing predators is of Holling type II. The delay value at the bifurcation point, τ_c considering other parameters' values based on the results of biological studies in literature, was calculated. For $\tau < \tau_c$, the equilibrium is a stable node, while for $\tau > \tau_c$, limit cycles were depicted around the equilibrium. This means that two competing predators could coexist with a delay less than τ_c , but by increasing delay beyond τ_c , the system undergoes oscillation. In case of unstable limit cycle, a competitive exclusion is expected.

40. Thermal adaptation analysis of Jujube (*Ziziphus jujuba*) in Fars province, Iran

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Researching new cultivation patterns is one of the most important strategies for sustainable production, increasing ecological efficiency, and preserving soil and water resources in the critical conditions of long-term droughts caused by climate change. This research was carried out to evaluate and analyze the time and place pattern of the jujube growth period in Fars province. In this research, firstly, the agricultural climatic characteristics of the studied fruit were determined and standardized, and based on that, the pattern of jujube growth period pattern was determined in each region. Based on the results of this research, 8 types of growth period patterns were distinguished for jujube in the study area. A semi-arid climate with mild winters and very hot summers in Lamard station with a severe limitation of heat stress and the ability to accumulate more than 6000 degrees, a semi-arid climate with cool winters and very hot summers such as Lar and Hajiabad with a moderate limitation of heat stress and accumulation ability Less than 6000° growth days, semi-arid climate, very hot summer and cool winter like Darab station with moderate heat stress limitation, dry climate, hot summer, cool winter like Fasa, Niriz, Shiraz stations with accumulation capacity less than 5000 Growth degree, with a small limitation of thermal stress, semi-arid climate, hot summer, cold winter like Doodzen with the ability to accumulate nearly 4000 growth degree, with very favorable conditions to complete the growth period and crop production in wet and dry conditions. , dry climate, hot summer, cold winter like Zarghan station with the ability to accumulate nearly 4000 degree-days of growth and jujube production in water conditions. Semi-arid climate, hot summer and very cold winter like Euclid station with less than 150 days and the ability to accumulate less than 3000 degree-days-growth with the ability to plant and produce rain juniper, in general, the presented method is the average thermal limitations during the period Jujube growth shows.

41. Biodiversity survey of plant elements in Zaz and Mahro of the Genus *Prorocentrum* in Chabahar Bay, Northern Gulf of Oman

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The coastal ecosystems of Chabahar Bay in the northern Gulf of Oman support diverse and productive macrophyte and epiphytic microalgae communities. Macrophytes and their epiphytes, such as the dinoflagellates of the genus *Prorocentrum*, play a crucial role in the coastal food web and ecosystem health and functions. This study quantified the spatiotemporal patterns of macrophyte biomass and *Prorocentrum* species abundance to assess the ecological status of the Chabahar Bay ecosystem and design management strategies. Samples were collected in spring and summer at three sites in Chabahar Bay. Epiphytes were scraped from macrophytes and counted using an inverted microscope. The macrophyte biomass was estimated by collecting quadrat samples, drying and weighing the material. The *Prorocentrum* species abundances were generally higher in summer; However, *P. cordatum* and *P. elegans* had the highest abundances (12-14 cells/ml) in spring. In spring, the dry biomass of *Ulva* was 15.7-16.4 g/m², *Padina* 8.3-8.8 g/m² and *Sargassum* 16.9-17.2 g/m². In summer, the biomass of *Ulva* slightly decreased, while that of *Padina* and *Sargassum* increased. The study found strong negative correlations between the *Ulva* biomass and the abundances of ten *Prorocentrum* species, but showed strong positive correlations between the *Padina* biomass and the same species. The correlations between the *Sargassum* biomass and the *Prorocentrum* species abundances were positive, but not statistically significant. These results contribute to our knowledge of the ecological dynamics of Chabahar Bay and will help to design management strategies to maintain the health and productivity of this valuable coastal ecosystem.

42. Biodiversity and Flora of epiphytic diatoms of the QaraChai River and Saveh Dam in Central Province of Iran

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Diatoms are single-celled, eukaryotic organisms that are brown algae and carry out photosynthesis. They serve as vital biological indicators of surface water quality in all global aquatic ecosystems. These tiny algae belong to the Bacillariophyta phylum and the Bacillariophyceae order, which have two classifications: pennate (elongated) and centric (circular). One of the most important goals of this research has been to help prepare and complete the Iran diatom flora project. Qara Chai River is located in Hamadan and Central provinces and originates from two main branches. This study involved sampling water and epiphytic substrate from aquatic plants at 5 stations every two months. Three replicates were taken by shaving stems or leaves, placing them in 250 cc jars with 4% formalin, fixing them, preparing permanent slides in the lab, and examining them with a light microscope. In this research, the physicochemical factors of ORP, EC, DO, PH and T were measured at the site and the parameters of BOD, COD, NO₃⁻, PO₄⁻, Cl⁻ and TDS were measured in the hydrometric laboratory of the natural resources of the university. Throughout the period under examination, a total of 434 species were discovered and classified across 79 genera and 41 families. Within this group, 426 species were found within the epiphyte habitat. Additionally, 3 previously unknown species of Flora were identified in Iran, with the dominant genera being

Ulnaria, Fragilaria and Cymbella. Understanding the diversity of diatoms is a crucial national need in Iran as it can impact the quality, health, and taste of drinking water sources due to physical and chemical factors influencing their distribution, ecology, and blooms. By examining the overall density of diatoms, it appears that both the Acidic River and Saveh Dam waters are experiencing oligotrophic conditions.

43. Removal of copper ions from aqueous solution by biochar modified with metal-mineral compounds

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As a cost-effective and environmentally friendly material, biochar has recently garnered significant attention. In this study, biochar derived from peach endocarps was directly modified using potassium permanganate and diatomite as metal-mineral modifiers at various temperatures and ratios and tested for the removal of copper ions from aqueous solutions. The adsorption capacity of modified biochar at different ratios and temperatures of 500, 600, and 700 degrees Celsius was examined. The composite prepared at temperature of 600 degrees Celsius with ratio of 1-1-1 had the highest adsorption capacity (71 mg/g), which represents a 188% increase compared to the adsorption capacity of raw biochar produced under the same conditions (24.7 mg/g). X-ray diffraction (XRD), fourier-transform infrared spectroscopy (FTIR), and thermogravimetric analysis (TGA) were used to investigate the crystallinity, functional groups and thermal resistance of the prepared adsorbents. The results indicated that the crystallinity of the modified biochar was higher than that of the raw biochar, the functional groups related to potassium permanganate and diatomite (SiO, Si-O-Si, OH, Mn-O) were successfully incorporated onto the biochar surface and TGA analysis showed that the thermal resistance of the prepared composite has increased from 75.89% to 84.46% compared to the raw biochar. The results of this study suggest that the production of metal-mineral-modified biochar is an attractive approach for water purification with high technical and economic feasibility.

44. Cryopreservation of the genome of the *Parrotia persica* species

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Cryopreservation, the storage of biological samples in liquid nitrogen tanks, is the most effective method for long-term preservation of plant genetic resources. In all cryopreservation methods, the removal of water plays a crucial role in preventing ice damage and ensuring the survival of samples after they are removed from liquid nitrogen. The International Union for Conservation of Nature (IUCN) has categorized the *Parrotia persica* species as Near Threatened (NT). This species is native to the northern forests of Iran. This tree is called the "iron wood" and is resistant to fire. Therefore, the preservation of the seeds of this species in cryopreservation is of great importance. For the purpose of preserving the *P. persica* seeds in cryopreservation, they were first subjected to various treatments including cryoprotectants, vitrification solutions, and physical dehydration, in order to increase their tolerance to low water content and cryogenic processes. The treated seeds were then removed from liquid nitrogen and immediately thawed at 42°C. For breaking dormancy, the treated and control seeds were planted in moist sand and kept at 4°C. The investigation of seed germination rates showed that the vitrification treatment had the highest germination percentage (72%) and seed vigor index compared to other treatments ($P \leq 0.05$). Vitrification is likely to increase the concentration of the extracellular solution and consequently reduce the intracellular water, as well as stabilize the cell membrane during dehydration and cooling, helping to maintain

membrane integrity and prevent layer separation. Thus, four accessions of this species collected from different regions were subjected to vitrification treatment and stored in a special liquid nitrogen tank, in order to enable the revival and conservation of this species under critical conditions.

45. A cost-effective way to produce electric current through microbial fuel cells

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Energy is the biggest challenge of mankind and its demand is increasing in the world. Alternatives that are based on carbon, in addition to being non-renewable, cause pollution and climate change. Radioactive waste from nuclear energy for energy production is also an important environmental challenge. Therefore, types of renewable and environmentally friendly energy can be a good alternative. Existing technologies such as solar, wind, geothermal and biomass will be needed to meet future energy needs, but they have spatial, temporal and atmospheric limitations. Microbial fuel cells that convert biochemical energy into electrical energy are a suitable alternative. During this process, two chambers are used, one is the anode, where the bacteria are in anaerobic conditions, and the other is the cathode, which is exposed to oxygen. The two compartments are separated by a cation exchange membrane, which ideally allows the exchange of protons so that the flow of electrons continues continuously. Daily current and electrical resistance were recorded. The obtained data and information were programmed by Python and Excel software and graphs were drawn. According to the graphs obtained, a downward trend in the generation of electric current and an upward trend in the electrical resistance of the microbial fuel cell were observed. This process of reducing the electric current can be caused by the limited food source of bacteria in the anode chamber, so it is suggested to place a permanent food source to meet the needs of the bacteria in the anode chamber.

46. Synthesis of composite biochar adsorbent C@Mn from biomass waste for the removal of lead ions from aqueous solution

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Recently, the development of green and environmentally friendly adsorbents based on biochar has gained significant attention. In this study, biochar obtained from peach endocarp was directly modified by potassium permanganate at different temperatures and tested for the removal of lead ions from aqueous solutions. The adsorption capacity of the modified biochar at temperatures of 500, 600, and 700 degrees Celsius was investigated. The highest adsorption capacity was achieved by the adsorbent prepared at 600 degrees Celsius with a 1:1 ratio, which amounted to 160 mg/g, showing a 5.5-fold increase compared to the raw biochar prepared under the same conditions (29.1 mg/g). X-ray diffraction (XRD), scanning electron microscopy (SEM), and energy-dispersive X-ray spectroscopy (EDAX) analyses were used to examine the crystallinity, surface characteristics and morphology and to determine the elemental composition of the prepared adsorbents, respectively. The results of these analyses indicated that the crystallinity of the modified biochar was higher than the raw biochar. Additionally, EDAX and SEM analyses showed that the surface porosity and manganese and potassium content of the biochar were enhanced after modification, and X-ray energy dispersive analysis confirmed the presence of lead on the adsorbent after lead ion adsorption. The results of this study suggest that the production of modified biochar with manganese-containing compounds is an attractive approach for water purification with high technical and economic feasibility.

47. Biomonitoring of Pb in Hamon wetland

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The increase of pollutants in freshwater and saltwater ecosystems can poison the health effects to aquatic organisms. Therefore, it is necessary to assay the pollutants in aquatic ecosystems. One of the suitable methods to determine the state of an ecosystem from the point of view of various pollutants is biological monitoring. Due to their ability to concentrate environmental toxins, especially heavy metals in their tissues (bioaccumulation), fish are used as environmental indicators in various studies. Considering the water supply of Hamoun wetland from transboundary rivers and the lack of sufficient information on the status of factors affecting the water quality of rivers, it is necessary to investigate the concentration of heavy metals in this wetland. According to the suitable population of common carp (*Cypinus carpio*), in this research, in order to investigate the quality of the lake in terms of lead concentration, the concentration of Pb in the liver, kidney and muscle tissues of common carp in different parts of Hamoun wetland was measured. In this way, after catching fish samples from the three parts of Pouzak, Hirmand, and Sabouri, acid digestion of the tissues was done and the concentration of lead was measured by PerkinElmer Optima 8300 ICP-OES atomic absorption spectrophotometer. The concentration of Pb in muscle, liver, gill and kidney tissues of Pouzak fish was 0.23, 0.28, 1.02 and 0.53 $\mu\text{g/g}$, respectively. Also, concentrations of 0.28, 0.29, 0.6 and 0.54 $\mu\text{g/g}$ were measured in the mentioned tissues in Sabouri section, respectively. Concentrations of 0.23, 0.22, 0.73 and 0.47 $\mu\text{g/g}$ were also measured in muscle, liver, gill and kidney tissues of Hirmand fishes. In all parts of the wetland, the highest concentration was measured in the gill tissue. Also, Pouzak had the highest concentration of Pb in the gills (ANOVA, $p < 0.05$). Compared to other tissues, the gill tissue is directly exposed to water and therefore the increase in concentration can be caused by the direct accumulation of elements. Also, the longer route traveled by the rivers entering Pouzak can play an effective role in increasing the concentration of this element. Therefore, based on the results, common carp can be a suitable indicator for the bioassay of lead element in Hamoun wetland.

48. Measuring the amount of lipid peroxidation of plant species adjacent to Sarcheshme Copper mine

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Environment contamination with heavy metals has increased over the years. Among the cost-effective and environmentally friendly methods, phytoremediation has been proposed as an option. Sarcheshmeh Copper mine is located in south-west of Kerman. It is one of the important mineral and industrial site of Iran. The plants in the area with the soil around their roots had collected and in addition to identifying the plants, measuring the copper element in the soil and plants (using an atomic absorption spectrophotometer) and the amount of lipid peroxidation of plants was also evaluated too. From the studied species *Stipagrostis plumose*, *Artemisia aucheri*, *Onopordon acanthium* carried the highest level of heavy metal in its aerial organs. Also, according to analyzes carried out, it was found that the amount of malonaldehyde in these three plant species was lower than the other species, and this decrease was significant in *Stipagrostis plumosa* species compared to other plants.

49. Classification of Different Ecotypes of Vetch (*Vicia Peregrina* L.) Using Heatmap Analysis in Hamadan Province

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In this study, morphological and agronomic characteristics of six ecotypes collected in early June 1403 (2024) were evaluated in a randomized complete block design with three replications. The plant materials included ecotypes from Hamadan, Asadabad, Bahar, Tuyserkan, Kangavar, and Sahneh from the western provinces of Iran, specifically Hamadan and Kermanshah, which were maintained at the central laboratory of the Agricultural Department at Payam Noor University, Asadabad. The traits studied included leaf chlorophyll index, plant height (including stem and root), total fresh weight of three plants, total dry weight of three plants, number of leaves per plant, fruit capsule length, total fresh weight of five capsules on the stem, and total dry weight of five capsules on the stem. Statistical analyses were performed using R software, and the variance results of the traits showed significant statistical differences among the ecotypes studied. Heatmap analysis also revealed that the six ecotypes were classified into two distinct groups. The first group included the ecotypes Kangavar and Asadabad, which had the highest values in terms of dry weight and fresh weight of five capsules. The second group consisted of the Tuyserkan, Bahar, Sahneh, and Hamadan ecotypes, which had the highest values in terms of fresh weight of three plants, dry weight of three plants, SPAD chlorophyll content, and the number of leaves per plant. Additionally, there was a very significant correlation ($r^2=0.92$) between SPAD chlorophyll content and the number of leaves per plant.

50. Screening of phenol decomposers from Isfahan-activated sludge

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Technology planning is essential. About 6 million tons of phenol are produced worldwide every year. Therefore, it is possible to remove it from the drinking water environment in the cheapest and least dangerous way, the development of activated sludge and the use of microorganisms to remove the idea is very efficient. In this research, activated sludge from the Isfahan refinery, activated sludge from Karaj pleasant factory, and a paint factory located in Caspian town on Qazvin road were sampled. After determining the number of populations using CFU and MPN methods, the important analytes were isolated and identified. After two weeks and during two stages of screening, 10 strains that were able to grow in the culture medium containing phenol were selected, to select the best strain, a stability test (E24), DCIP test, and phenol decomposition test were performed, and among them strain D as bacteria The superior phenol decomposer was identified and finally confirmed with the help of biochemical and molecular methods. Optimum conditions in terms of yeast extract concentration, phenol concentration, and the presence or absence of glucose in the culture medium were designed and checked with the help of Design expert software. The results showed that bacteria in optimal conditions were 1.653 grams per liter of yeast extract and 589.795 PPM of phenol. In the presence of a glucose carbon source, it can remove 94.354% of phenol, the high ability of this strain to remove phenol makes it possible to use this strain in the field to rehabilitate sites contaminated with phenol.

51. Abundance and spatial distribution of antibiotics in the waters of the southern Caspian Sea

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Marine environments play a crucial role in absorbing land-based pollutants. While the presence of pharmaceuticals in various marine settings worldwide is well-documented, there is a lack of data regarding pharmaceutical occurrence in the south Caspian Sea. This study examined the presence and spatial distribution of 14 antibiotics in the surface waters of the south Caspian Sea during summer of 2020. Our findings revealed that antibiotics were widespread in this region, with total concentrations reaching up to 3499.9 ng/L. The detection frequencies of the studied antibiotics ranging from 22.0% to 67.0%. Trimethoprim, ofloxacin, and sulfamethoxazole were commonly detected, with detection frequencies exceeding 56.0%. Ofloxacin (235.8 ng/L) and Erythromycin-H₂O (2.3 ng/L) had the highest and lowest detected concentrations among the studied antibiotics. Furthermore, fluoroquinolones exhibited notably higher concentrations compared to other antibiotic groups. The highest concentrations of most antibiotics were found in surface waters collected from Ramsar and Chalus stations, located in the middle section of the coastline. Multivariate analysis revealed that antibiotics, phosphate, nitrate, and COD were all positively correlated with stations Ram-1, Ram-20, Cha-1, Cha-20, and Tor-1, where the highest antibiotic levels were recorded. Recommendations for future investigations include studying pharmaceutical pollution in various parts of the Caspian Sea (to develop appropriate management programs and to highlight the need to further control pollution in coastal areas), detecting antibiotics in aquatic organisms, and assessing antibiotic concentrations in sediments of the Caspian Sea.

52. Calculation of Berger-Parker index using Python code

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Biodiversity shows the quality of ecosystems. To determine the amount of this quality, various measurements are used that are indicators to determine the quantity and quality of biodiversity of ecosystems. Among these indices, there are different Berger-Parker indices that show an understanding of the dominance of various living species, which are used in this article. It has been chosen that Python code will be used to implement this index in order to use it in very large samples. For this purpose, a test sample was taken in two different areas from the plants of Shanjān Shebaster pastures, and after writing the Python code for the Berger-Parker diversity index for the first sample, the study index was calculated manually and then it was written with the code. Calculate and for the second initial sample, the index is written by the code and then it is calculated manually and by machine. to be An index is calculated and can be done from this code with 100% confidence for any calculation required for the Berger-parker index for large data that the possibility of calculating with a machine takes a lot of time and effort.

53. Introduction of alien plant species in Iran with Emphasis on Invasive species in the Hyrcanian region

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The sustainability of ecosystems is shaped by the balance and natural relationships among organisms and their physical environment. The boundaries of the presence of species are determined based on geographical and ecological limits, the needs of each species, the power of diffusion, and competition with other species. Some species move beyond their natural range into ecosystems outside their typical distribution and exhibit different behaviors under new conditions.

Exotic species become invasive when they succeed in competing with native species for available resources, pushing them out of their natural habitats or causing their extinction. Invasion by non-native species is the second main factor leading to global biodiversity loss after major climatic changes. Additionally, these species can negatively affect all components of the environment, natural resources, agriculture, health, and food security. The number of alien species in Iran, like in many other countries, is significant and increasing due to the absence of a strong quarantine system and adequate monitoring. A list of non-native species will provide comprehensive information for researchers and greatly assist in mitigating negative impacts and improving their management and control operations. This paper will introduce alien species in Iran and highlight notable and highly invasive species within the Hyrcanian region.

54. A primer to content of urban forest management plans (UFMP)

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Nowadays, urban planners and managers face challenges in managing complex urban environments. Therefore, they must deal with the challenges of ensuring sustainability in the urban environment more than ever. Creating managed urban forests is necessary to encounter these challenges because urban forests have a significant contribution to the sustainable development of the economic and environmental viability of urban environments. An urban forest environment needs thorough planning, design, and management to achieve its full potential. An urban forest management plan (UFMP) includes a set of practical and measurable steps that specify activities and resources to achieve the expected results in a time frame. By creating clear goals and a reasonable schedule in a city, it is possible to identify the regions that need more attention, and the management can reach the goals in a long-term and consistent plan. The UFMP is a guideline that ensures the prospect of creating a sustainable urban canopy for the future. This program conducts urban specialists to provide maximum long-term benefits for the urban community to benefit from the forest environment with effective management in the cities. The UFMP is a plan that provides recommendations based on an analysis of current conditions, including information on funding, schedules, implementation, guidelines and policies, standards, training programs, monitoring programs, and rules that can develop work plans and annual budgets based on the long-term UFMP. The urban management plan provides a path to maintain and improve the urban forest. In addition, there are recommendations to sustain the urban forest for the present and the future. This study introduces the content of UFMP, shows that it is a necessary and complete guide for successful urban forestry programs, and thoroughly describes the conditions of urban forestry management. UFMP can create the best plans and management tools for a sustainable future in the urban environment. Finally, it presents a comparison of UFMP guidelines implemented in several countries.

55. The role of chamomile (*Anthemis odontostephana*) in the phytoremediation of lead

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The chamomile plant, acknowledged as one of the prominent medicinal plants, is valued not only for its therapeutic properties but also for its environmental capabilities. This study aims to investigate the ability of chamomile to absorb lead from lead-contaminated soils. After identifying the collected plant samples, they were prepared for necessary analyses. The amounts of lead, electrical conductivity, and pH were measured, and the samples' capacity to absorb and accumulate lead was evaluated by calculating the Bio-Concentration Factor (BCF) and the Translocation Factor (TF). The results indicated that the total lead concentration in the soil ranged

from 89 to 2730 mg/kg dry weight, while the exchangeable lead concentration in the soil varied from 8.6 to 13.3 mg/kg dry weight. The average pH of the soil samples was determined to be between 7.5 and 7.7. The findings also revealed that the maximum average lead concentration in chamomile was 245 mg/kg in the roots, 38 mg/kg in the aerial parts, and 165 mg/kg in the soil. Plants with a Bio-Concentration Factor (BCF) greater than one and a Translocation Factor (TF) less than one are considered suitable for phytostabilization. The studies showed that the Bio-Concentration Factor for chamomile was 1.48, while the Translocation Factor was 0.2. Therefore, based on the obtained results, this plant is recognized as a suitable option for phytoremediation through phytostabilization.

56. A comparison of the heavy metal concentrations in tea leaves and tea infusion of commercially available tea in Tehran, Iran

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Tea (*Camellia sinensis*) infusion is the most frequently consumed beverage worldwide including Iran, next to water, with about 20 billion cups consumed daily. Nowadays heavy metals in tea products are of increasing concern. In this study, contents of Magnesium, Copper and Cadmium in commercially available black tea leaves and its infusion was measured by ICP-OES and compared. To this purpose a total of 10 samples of Iranian and 22 samples of imported tea, which were commonly used in Iran, were bought from local supermarkets in Tehran. Obtained results showed that concentrations of measured heavy metals in sampled tea leaves and tea infusion were different according to the brands. The mean of Mn, Cu and Cd were 662.08, 26.14 and 0.179 µg/g, respectively, in sampled tea leaves, and 179.03, 5.54 and 0.057 µg/g, respectively, in tea infusion. The results of this reaserch suggest that consumption of tea infusions would not cause significant health risks for consumers, if other sources of toxic metals contaminated food are not taken the same time. Because according to the obtained results, although tea leaves can be contaminated with heavy metals, the content of these metals in brewed tea is greatly reduced.

57. Review of Certain Heavy Metals and Their Threats to Human Health and the Environment, and Strategies for Prevention and Mitigation

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Heavy metals (HMs) are globally recognized as major pollutants resulting from human activities in coastal and marine environments. Due to their toxicity, persistence, and bioaccumulation characteristics, these metals pose a serious threat to human health, living organisms, and natural ecosystems. Although heavy metals and metalloids naturally occur in the Earth's crust, human activities have led to increased concentrations of these substances in aquatic environments, exacerbating pollution levels. Heavy metals can bioaccumulate in higher organisms through the food web, thereby affecting human health. In an aquatic environment, various combinations of heavy metals exist, which can interact with other environmental pollutants, including microplastics and persistent organic pollutants, resulting in synergistic or antagonistic effects on aquatic organisms. Therefore, to understand the biological and physiological impacts of heavy metals on aquatic organisms, it is crucial to assess the effects of exposure to mixtures of these metals along with other environmental factors. This article examines effective methods for reducing heavy metal pollution and emphasizes the need for monitoring and controlling the quality of marine products. Collaboration and coordination among relevant organizations at national and international levels are essential to implement appropriate strategies for managing and reducing

heavy metal pollution. These measures not only help protect public health but also contribute to the preservation of marine ecosystems and food security for society.

The First International Microbial Biology Conference

Oral Presentation

1. Dietary dairy products: Inducing satiety effect

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Worldwide, the prevalence of overweight and obesity, and associated comorbidities, is increasing significantly energy imbalance is considered the main cause of obesity. Conventional weight management are based on dietary intervention, physical activity, behavioral therapy which have disadvantages of short-term weight loss and a few medical aspects. One strategy would be developing foods that combine good palatability with limited food intake, by enhancing satiety signals. A number of food ingredients (e.g., green tea, hydroxycitrate, grape-seed extract) are reported to have satiety-inducing effects. In this respect, the role of organic acids, and in particular short-chain fatty acids (acetic acid, propionic acid, butyric acid, lactic acid), as satiety-inducing triggers seems to be of interest. In rats, it was shown that infusion of short-chain fatty acids into the colon stimulated the release of peptide YY (PYY), a gut peptide which might induce an appetite-suppressing effect. It was hypothesized that the dairy beverage obtained by fermenting a substrate with a mixture of lactic acid bacteria and propionic acid bacteria induces more satiety and a greater decrease in energy intake than a non-fermented dairy product End products of fermentation include short chain fatty acids (SCFA). Mainly acetate, propionate and butyrate and gases (H₂, CO₂ and in some cases CO₄). The amount and molar ratios of the three main SCFAs vary substantially, depending on the substrate type. In this paper impact of fermented foods and beverage in induction of satiety effect has been reviewed.

2. Mechanisms and biological functions of probiotics in human health and diseases

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Today, understanding the mechanisms of action of probiotics has led us to produce a variety of useful products, including postbiotic, parabiatic, phagebiotic, psychobiotic, pharmabiotic molecules and also finally produces next generation probiotics (NGP). In the human body, more than ten times the number of human cells, microorganisms such as bacteria, fungi, viruses, and protozoa are alive, and their total genes is more than 100 times of the host's genes. This community which is called microbiome, by producing its own metabolites, plays an important role in human health and disease. Therefore, any manipulation of this community will push the balance of the body towards more health or disease. In this lecture, some examples of the research activities carried out in the Biotechnology Department of the Iranian Research Organization for Science and Technology (IROST) to evaluate the mechanisms of action of probiotics will be presented. Lactic acid bacteria as starter cultures and probiotic of dairy products, screened to production of antioxidant, anti-diabetic, anti-hypertensive, anti-*Helicobacter pylori* and anti- Melanogenesis bioactive compounds. Their biological mechanism will be discussed based on the production of dairy synbiotics, postbiotics and bioactive peptides derived from them to use in the food industries. The production of inhibitor molecules of alpha-amylase, alpha-glucosidase, tyrosinase and anti-attachment of pathogenic bacteria to stomach and intestinal cells are the tools of action of these useful bacteria.

3. Postbiotics: From research to application in the food industry

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Postbiotics, as non-living microorganisms and bioactive metabolites derived from the activity of probiotics, have garnered increasing attention from researchers and industry professionals in the food sector. Postbiotics, which include organic acids, polysaccharides, peptides, various vitamins, short-chain fatty acids, antioxidants, and others, can exert health-promoting effects on multiple hosts without the need for live bacteria. Given the greater stability of postbiotics under different production, processing, and storage conditions, there is potential for their wider application in food products. Evidence from studies indicates that postbiotics, in addition to their technological effects on food, such as improving organoleptic properties and food safety, also possess extensive health benefits, including anti-inflammatory effects, immune system enhancement, and improved gastrointestinal health. However, the industrial application of postbiotics faces challenges such as determining effective doses, standardizing production methods, and evaluating their interactions with other food components. The type of microorganism used in postbiotic production, the culture medium, fermentation conditions, and inactivation methods significantly influence the technological and health-related effects of postbiotics. Furthermore, achieving the appropriate concentration of postbiotic compounds is crucial for the effectiveness of the produced postbiotic. It is anticipated that future research in the field of postbiotics in the food industry will focus on standardizing the use and production of these compounds in food, assessing their technological and health-related effects in the short and long term, and providing a more comprehensive understanding of this subject.

4. Advance application of biopreservation in increasing shelf life of dairy products

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The dairy products are highly perishable due to high nutritional and moisture content in nature. These foods require proper preservation to maintain quality and safety. There are many preservation techniques such as refrigeration, freezing, pasteurization, sterilization and preservation using certain chemicals. Nowadays modern preservation techniques like Bio-preservation and hurdle technologies are also common. Biopreservation refers to extended storage life and enhanced safety of foods using the natural microflora and (or) their antibacterial products. Lactic acid bacteria (LAB) have a major potential for use in biopreservation because they are safe to consume and during storage they naturally dominate the microflora of many foods. LAB metabolites also used as bio-preservation and have promising role in dairy products storage. As these are economically important due to their drastic advantages like non-toxic, availability, non-immunogenic and broad activity so, they are considered to be good agent for biopreservation. This review will focus on application of biopreservatives to increase the shelf-life and safety of milk and milk products.

5. Challenges and requirements of Iran's dairy industry in the field of microbiology and microbial biotechnology

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Today, the use of new microbiological technologies in the dairy industry has become common and widespread. The use of colorimetry, impedance, flow cytometry and bioluminescence methods in different parts of dairy products production has helped the experts and specialists of this industry

very effectively. When raw milk enters dairy companies, it is common to use colorimetry and flow cytometry methods to grade raw milk. It is very necessary and necessary to use bioluminescence methods to control the sterility of lines before producing products. During the production of dairy products and during the quarantine of products, the use of quick methods to detect microbial contamination can prevent large losses. The use of native strains of probiotics, gas-producing yeasts in the production of fermented carbonated drinks and the use of bacteriocin-producing strains to increase the shelf life of dairy products are other needs of the country's dairy industry. The production of rennet, the production of sports supplements using biopeptides in whey, and the production of native starters that evoke the taste of traditional products for the consumer are other needs of the dairy industry. Experts in microbiology and microbial biotechnology of Iran can help in the study and production of useful microorganisms and their valuable products and localize the methods needed by the country's dairy industry, and in addition to the scientific benefits, they can prevent foreign exchange from leaving the country.

6. Corrosion of metals and its types, how to control it in industries and the use of microbial technologies in identifying and controlling biological corrosion of metals

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Corrosion is the destruction of material due to reactions with corrosive environment. Damages caused by corrosion in developed countries are usually about 8% of the gross national product (GNP). There is nothing less than this in Iran. Despite the fact that the country has had an oil ministry for more than a century. Corrosion can occur in different forms and the presence of bacteria, both aerobic and anaerobic. They can aggravate it and irreparable damage to production facilities such as oil, gas, water, and etc. Corrosion has different types: 1) General Corrosion or uniform attack, which most carbon steels are very prone to this type of Corrosion. 2) Localize Corrosion, which are classified into different types: Pitting Corrosion, Crevice Corrosion, Grain Boundary or Intergranular Corrosion, Galvanic Corrosion, Erosion Corrosion, Stress Corrosion Cracking, Microbial Influenced Corrosion (MIC). The methods used to identify types of corrosion are different according to their type, such as thickness measurement and NDT inspections, and for biological corrosion, biochemical and PCR tests are used to identify bacteria. Various methods are used to control each type of corrosion, such as cathodic protection inhibitors injection, follow-up and in biocontrol methods such as the use of biocides, phages are used. It is concluded that in order to identify and control the types of corrosion, relevant action should be taken according to the type.

7. Management of microbial corrosion using advanced methods of microbial contamination detection

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Microbiologically Influenced Corrosion (MIC) is an increasingly concerning issue across various industries, particularly in the oil, gas, petrochemical, steel, and power plant sectors. MIC refers to the often detrimental effects that substances can experience due to the presence of microorganisms. Despite significant research and industrial focus on MIC, our understanding of the conditions under which it forms and the extent of the damage it can cause remains limited. A key factor in the development of microbial corrosion is biofilm formation, which occurs when bacteria adhere to surfaces and proliferate. Even systems with significant levels of free-floating bacteria are prone to biofilm development. The use of novel detection methods can provide experts with critical information rapidly, enabling timely interventions to manage and mitigate microbial activity.

Although many of these new methods rely on molecular techniques, their effectiveness is often compromised under the challenging conditions typical in industrial settings. Consequently, there has been a resurgence in the use of culture-based kits, which are now being refined to enhance detection speed and versatility. These advancements are essential for enabling field experts to promptly address and control corrosion, thereby mitigating potential damage.

8. Microbiologically influenced corrosion challenges in oil industry

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MIC presents a significant threat to the Iranian offshore oil industry, exacerbated by the extensive use of seawater in drilling, hydrotesting, and well production operations. Seawater, containing various microorganisms and high chloride levels, not only accelerates MIC through the proliferation of bacteria influencing corrosion but also contributes to scaling, fouling, and formation damage in equipment and reservoirs. Furthermore, the corrosion of downhole equipment, reservoir compartmentalization, water quality issues, and environmental concerns associated with seawater injection require careful attention. The mechanisms through which seawater contributes to MIC involve the presence of sulfate reducing bacteria (SRB), which thrive in anaerobic conditions and produce hydrogen sulfide as a byproduct. This hydrogen sulfide reacts with metal surfaces, forming metal sulfides and promoting corrosion processes. Additionally, the high chloride content in seawater can induce pitting corrosion in susceptible materials, further exacerbating the effects of MIC. Apart from SRBs, other microbial species such as acid-producing bacteria (APB) and iron-oxidizing bacteria (IOB) can also contribute to MIC by altering the local environment around metal surfaces, creating conditions favorable for corrosion. APB produce organic acids that lower the pH, accelerating metal dissolution, while IOB facilitate the formation of biofilms on metal surfaces, promoting localized corrosion. In combating MIC induced by seawater, understanding the complex interactions between different microbial species and their corrosive mechanisms is crucial. By implementing preventive measures such as biocide treatments, corrosion-resistant coatings, and regular monitoring of microbial populations, Iranian offshore oil industry can mitigate the detrimental effects of MIC and ensure the longevity of equipment in offshore operations. By prioritizing preventive measures and leveraging innovative solutions, the industry can enhance asset protection, reduce maintenance costs, and sustain operational efficiency in offshore oil operations.

9. The use of rhamnolipid for controlling microbial corrosion caused by *Amorphoteca resinae*

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The cost of microbial corrosion accounts for approximately 20 to 50 percent of the total corrosion costs. This study investigated the use and impact of rhamnolipid biosurfactant as a natural corrosion inhibitor, as well as zinc oxide nanoparticles, the combination of these two, and EDTA on the fungus *Amorphoteca resinae* on aluminum alloy 7075. Following this, SEM, EDS, CLSM, 3D profilometry, weight loss, and electrochemical tests were conducted. The results of serial dilution tests showed that rhamnolipid at 70 ppm, zinc oxide nanoparticles at 78 ppm, the combination of rhamnolipid and zinc oxide nanoparticles at 39 ppm, and EDTA at 100 ppm exhibited inhibitory effects on the fungus *A. resinae*. Qualitative and quantitative test results indicated that the combination of rhamnolipid and zinc oxide nanoparticles was more effective than other biocides, achieving inhibition rates of 87.5%, 88.75%, and 91.93% over 25, 50, and 75 days, respectively. The results from CLSM showed that the thickness of the biofilm formed on the

surface of the coupon treated with this biocide was lower than that of other biocides at all three-time intervals. The depth of the pits created on the surface of the coupon was also less in the sample treated with this biocide compared to the others. This study's findings indicated that using nanomaterials and natural surface tension-reducing inhibitors can effectively mitigate the microbial corrosion process caused by *A. resinae* on aluminum alloy.

10. The use of surface-active compounds to enhance the efficiency of biocides in controlling microbial corrosion

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Microbiologically influenced corrosion (MIC) poses a significant challenge across various industries. Among the numerous strategies to control MIC, biocides have proven to be one of the most cost-effective solutions. However, the excessive use of biocides to combat biofilm resistance has led to the development of microbial resistance and subsequent environmental pollution. Recent research has demonstrated that combining surfactants with biocides holds great potential for increasing the efficiency of MIC control. The synergistic use of surfactants and biocides ensures better distribution and contact with microbial cells, effective biofilm penetration, and disruption, which significantly enhances MIC control. These properties contribute to reducing the overall biocide dosage required, thereby minimizing environmental impact and the risk of corrosion associated with higher concentrations of biocides. To explore this approach, *Pseudomonas aeruginosa* PAO1 was cultured in a medium to form a 24-hour matured biofilm on carbon steel coupons. The results demonstrated that, when used separately at lower concentrations, the biocide "B15" and the surfactant "S20" achieved 54% and 39% biofilm destruction, respectively. However, when used in combination, the destruction rate of corrosive biofilms increased to 96%, illustrating a significant synergistic effect. The enhanced biocidal effectiveness of "B15" was achieved by increasing the biofilm's vulnerability with the surfactant "S20." These findings suggest a new and efficient approach to controlling MIC, not only enhancing the action of biocides while reducing their overall dosage but also addressing environmental concerns and microbial resistance associated with conventional biocide applications.

11. Potential role of microbiota in health

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In human GI, there are more than 1000 bacterial species named microbiota. Microbiota is an asset of microorganisms living in various body organs like the human intestine, in response to the external environment changes. The microbial population can be transmitted from a generation to the other one and this plays a key role in preserving human health. Gut could affect lung health through a relationship between gut and lung microbiota, which is named gut-lung axis. Dysbiosis in the gut microbiota plays a role in pathogenesis of various pulmonary disease states, so GI diseases were found to be associated with respiratory diseases. Over one hundred million neurons exist in the gut, which can be linked to brain through the secretion of neurotransmitters. Many gut microbiota are able to produce neurological active neurotransmitters that have no appropriate functions in the absence of flora. One of the most important factors affecting the gut microbiota is dietary regimen. Food is a main source of energy that lead to growth, develop, immunity, tissue repair, homeostatic regulation, as well as source of energy for gut microbiota. The relationship of the gut microbiota with probiotic source is so prominent in human and animal disease treatment.

Regular consumption of probiotics, foods or supplements containing beneficial bacteria is a critical approach to establish eubiosis condition, which is a state of gut microbiota balance. So targeting microbiota axis through dietary supplements containing probiotic can be an effective way in disease management. However, further studies are needed.

12. The lung microbiome, dysbiosis and lung diseases

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The lung is a vital organ, and lung diseases are the second cause of death worldwide. Past researchers believed the lung is a sterile environment, but recent studies confirm the existence of the lung microbiome. Although the lung microbiome includes a small biomass, it has high diversity and dynamic changes. The microbiome of a healthy lung consists mostly of *Streptococcus* sp., *Veillonella*, *Prevotella*, and, in very limited areas, *Haemophilus*. The relationship between the gut and lung microbiome as the gut-lung axis has recently received attention. This communication is carried out through chemical messengers such as short chain fatty acids and other metabolites. The metabolites have important effect on the balance of the immune system. For example, the presence of a normal level of butyric acid produced by the gut microbiome can protect from developing asthma. On the other hand, the excessive release of microbial lipopolysaccharides from the intestine induces oxidative stress pathways in the lung and as a result damages tissue. Furthermore, the lung microbiome is in a balance with the microbe's immigration and elimination by the immune system and the movement of respiratory cilia. Disturbance of the balance causes a change in the microbial load of the lungs, which will subsequently lead to respiratory problems. Studies confirm the occurrence of dysbiosis in the lung microbiome in people with cystic fibrosis (CF), chronic obstructive pulmonary disease (COPD), and many infectious lung diseases. Despite all the points mentioned, it is recommended to focus on lung microbiome studies to gain more knowledge.

13. Gut microbiota and inflammatory bowel disease (IBD)

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Inflammatory bowel disease (IBD) is a chronic inflammatory disease of the gastrointestinal tract and is an umbrella term that comprises two distinct disease entities, ulcerative colitis (UC) and Crohn's disease (CD). IBD is thought to develop as a result of complex interactions between the immune system, microbiome, and environment in genetically susceptible hosts. Recent studies have revealed that alterations in gut microbiota and metabolites are linked to changes in human health and various diseases, including inflammatory bowel disease (IBD). The gut microbiome is a community of over 1000 species of microorganisms, with each individual hosting at least 160 distinct species that play a commensal role in the human gastrointestinal tract and influence countless physiologic processes. Studies have shown the composition of the gut microbiota is different between healthy participants and IBD patients. The use of antibiotics also leads to the onset of IBD due to the alteration of the composition and function of the gut microbiota. Thus, a crucial relationship exists between IBD and the microbial communities in the human gut. Improved intestinal environment alleviates IBD. Modulating gut microbiota, such as probiotics, fecal microbiota transplantation (FMT), and gut microbial metabolites, can alleviate IBD symptoms by suppressing gastrointestinal inflammation. The key factor for IBD is a dysregulated immune response to specific components of the intestinal microbiota in a genetically susceptible

host as well as the intestinal barrier function of IBD is tightly associated with the microbiota. The increasing prevalence of inflammatory bowel diseases in developing countries, as well as the ineffectiveness of drugs and the high costs of treatment, have highlighted the importance of using probiotics in the discussion of prevention and treatment. In our research the expression of *tlr2* and *tlr4* genes (inflammatory genes) were investigated in presence of *Lactobacillus reuteri* in inflamed HT-29 cell line (trigger by $\text{TNF-}\alpha$) by flow Cytometry as well as the expression level of *tlr2* and *tlr4* genes was checked by qPCR method. The results show that the probiotic native *Lactobacillus reuteri*, having anti-inflammatory properties, can be a suitable drug candidate for treating and improving the symptoms of inflammatory diseases, including Inflammatory Bowel Diseases (IBD). Our results have shown that the native *Lactobacillus reuteri*, can be provide protection from inflammatory disease through modulating the immune responses, therefore can be a suitable alternative candidate for improving the symptoms or treatment of inflammatory diseases.

14. Toxic metabolites of gut microbiota

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Approximately 100 trillion microbial cells spanning around 3000 species inhabit the human body. Around 97% of these cells are bacteria in the colon and ~2–3% extra-colonic bacteria. With more 1000 times genomic information compared to our cells, adverse effects are also not as negligible as the positive effects. In contrast, the remaining two-thirds are unique for each person and only 18 species are present in all human populations. The presence (cell components) or activity (metabolites) of microbiota can trigger or worsen disease in our body. Molecules of cellular structure like LPS, Peptidoglycan or murenopeptides and cell products including secondary metabolites, enzymes, signal molecules, non-coding RNAs and primary metabolites like short-chain fatty acids can induce or modulate pathways or regulations leading to serious disorders. Bacterial metabolites like trimethylamine, advanced glycation end products, phenylacetylglutamine and LPS have correlation with atherosclerotic and cardiovascular diseases. Neurodegenerative disorders are accelerated by microbiota metabolites like d-valerobetaine, β -N-methylamino-alanine, nitrite and histamine. Cancer can be induced by multiple microbiota-mediated mechanisms including mutagenesis in the human genome, influencing the host cell proliferation and death altering immune system activity and affecting host metabolism. Microbiota products like conjugated linoleic acids, indole-3-aldehyde, Trimethylamine-N-oxide, farnesol, indoxyl sulphate, polyamines, taurine and histamine are also shown to influence the function of the immune system negatively. Some contradictory reports on the toxic effects of microbiota metabolites originate from a variable condition of assessment, non-human models or bifunctionality at different concentrations.

15. What is the role of PBs in mRNA metabolism?

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Non-membrane-bound compartments such as P-bodies (PBs) and stress granules (SGs) play important roles in the regulation of gene expression following environmental stresses. They are protein and RNA assemblies that form condensates under conditions where translation is repressed. In previous studies we have systematically and quantitatively determined the protein and mRNA composition of PBs and SGs formed after nutrient stress. We uncovered numerous common protein and RNA components across PBs and SGs that support a complex interaction profile during the maturation of these biological condensates. We have extended these studies to

examine the functional requirements for PBs during nutrient stress. PBs were originally hypothesised to be sites of cellular mRNA decay. However, PBs have more recently been proposed to act as storage sites for translationally repressed mRNAs that can exit PBs and re-initiate translation. These two functions are not mutually exclusive, and we are testing the hypothesis that PBs function in a targeted manner either to remove specific mRNAs, or to sequester them for storage. The outcomes of the study will present our recent data examining mRNA fate and PB formation in mutants lacking individual PB proteins identified in our proteomics analysis. Our experiments have highlighted key PB components that are required for PB function, and we are currently examining their roles in mRNA metabolism during nutrient stress. These studies are important since the aberrant assembly or disassembly of these granules has pathological implications in cancer, viral infection and neurodegeneration.

16. Personalized cancer prediction through microbiome data in artificial intelligence platform

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Person-centered medicine has the potential to maintain individual health by modulating the microbiota composition of each person using tailored methods. The microbiota composition is unique to each individual and is influenced by genetic and environmental factors, including lifestyle. Emerging evidence suggests that intestinal microbiota contribute to the development of cancers. The role of the microbiota and microbiome in cancer, as well as their function as biomarkers, is central to the person-centered medical approach. The human microbiome holds significant potential for the diagnosis, prognosis, and treatment of cancer, offering a promising area for research. However, deriving biomarkers from this complex system presents challenges in data analysis. Machine learning (ML) methods, a subset of artificial intelligence, play a crucial role in analyzing gut microbiota data. ML approaches have become essential tools in exploring cancer-microbiome relationships, encompassing processes from sample collection and modeling to final prediction. Notably, algorithms such as neural networks and decision trees are employed for data analysis. This study discusses various machine learning and deep learning models used for cancer prediction based on microbiome data. Additionally, it outlines the types of databases, machine learning steps, and the applications of artificial intelligence in microbiota data analysis.

17. Environmental Challenges of the Oil, Gas, and Petrochemical Industries

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The activities of the oil, gas, and petrochemical industries, as one of the economic pillars of the country, are always accompanied by serious environmental challenges. These industries, due to their extensive operations in the extraction, refining, and production of hydrocarbons, can have significant negative impacts on the environment. One of the most important environmental issues arising from these industries is water pollution. The leakage of chemicals, industrial wastewater, and effluents resulting from refining and petrochemical activities can harm surface and groundwater resources. These pollutants typically include hydrocarbons, heavy metals, and toxic substances that threaten the health of aquatic ecosystems and living organisms. Given the importance of these industries in providing energy and producing raw materials, sustainable management and pollution reduction are essential requirements for preserving environmental health and improving human quality of life. The adoption of innovative solutions and the use of clean technologies can help reduce these pollutants and facilitate sustainable development.

Biotechnology, as a modern and growing science, has significant potential for cleaning up pollutions caused by the oil, gas, and petrochemical industries. The use of microorganisms for the degradation and removal of pollutants is an effective and sustainable method for improving the quality of water and soil resources, especially in industrial areas and oil, gas, and petrochemical hubs. Specific microorganisms can convert toxic materials and hydrocarbons into non-toxic compounds, thereby accelerating the bioremediation process.

18. Microbial methods for bioremediation of hydrocarbon pollution in groundwater using metagenomic data

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Groundwater is one of the vital sources of freshwater, widely used in agriculture, industry, domestic and drinking water. In arid and semi-arid regions like our country, groundwater resources become even more crucial for providing freshwater. However, pollution of this valuable resource due to oil spills, chemicals, industrial and agricultural wastewater, and mining activities has become a serious challenge. Groundwater pollution can have negative impacts on human health, ecosystems, and agricultural production. One of the most effective and sustainable methods for addressing groundwater pollution is the use of microorganisms and biotechnological methods. These microorganisms, such as bacteria and fungi, have the ability to degrade and remove pollutants and can convert toxic materials and hydrocarbons into non-toxic compounds, a process known as bioremediation. Bioremediation methods for groundwater pollution include bio-stimulation or increasing the number of indigenous bacteria in the aquifer and bio-inoculation or adding pollutant-degrading microorganisms to groundwater to accelerate the biodegradation. Additionally, a method known as Soil Vapor Extraction (SVE), followed by bioremediation of contaminated air flow by biofilters, is also an effective approach for removing subsurface pollutions. Today, the selection of appropriate methods and targeted utilization of microbial potential based on specific pollutants of groundwater have become much more precise with the help of metagenomic techniques. In this paper, we summarize the methods employed to remediate groundwater pollution in an industrial area covering 100 hectares, and then compare the data obtained from a metagenomic study of the microbial population in groundwater across three wells: non-polluted control, high-pollution area, and an intermediate zone, assessing the impact of pollution on microbial diversity and hydrocarbon degradation genes.

19. Metagenomic insights into the efficiency of enzymes and microorganisms in different sections of the carbon cycle

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Metagenomic studies have revolutionized our understanding of microbial roles in the carbon cycle across diverse aquatic environments, from oligotrophic to oil-polluted ecosystems. Traditional methods often fail to uncover the full metabolic potential of uncultivable microorganisms. Our research utilized metagenomics to investigate microbial responses and enzymatic efficiencies in different carbon cycle sections, focusing on hydrocarbon degradation and carbon fixation. In the Persian Gulf, a chronically oil-polluted region, we collected water and sediment samples along a pollution continuum. Using advanced metagenomic techniques, we identified key taxa like Oceanospirillales and Alteromonadales that bloom under oil contamination, highlighting microbial adaptability and division of labour in bioremediation. Expanding on this, we analyzed 24,000 publicly available bacterial and archaeal genomes to assess the diversity of enzymes involved in

aerobic hydrocarbon degradation. Our gene-centric approach uncovered extensive diversification and horizontal gene transfer of key enzymes, particularly within Proteobacteria and Actinobacteriota, showcasing the microbial capacity to adapt to various hydrocarbon substrates. Our study of deep groundwater systems in the Fennoscandian Shield, one of the most nutrient-limited environments, revealed that microbial community is driven by metabolic cross-feeding interactions. Contrary to the streamlining theory, larger genomes were more prevalent in these oligotrophic environments, where nutrient scarcity and limited dispersal create distinct ecological niches reliant on cross-feeding. These findings underline the importance of metabolic interactions in shaping community structure and genome evolution. These findings underscore the transformative impact of metagenomics in revealing microbial metabolic potential and roles in carbon cycling across diverse aquatic environments, informing bioremediation strategies and understanding microbial survival strategies in extreme conditions.

20. Monitoring the bioremediation process of petroleum aromatic compounds in the unsaturated zone model

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More than eighty percent of pollutants enter the environment due to human activities, and their effects extend beyond the immediate areas of incidents. Petroleum hydrocarbons, which infiltrate the soil, are primary pollutants. Some hydrocarbons present in crude oil are volatile and become trapped in the unsaturated soil zone. This zone, crucial for supporting life, faces significant environmental risks from toxic compounds, posing threats to humans and other living organisms. In this study, soil samples from unsaturated zones contaminated with petroleum compounds were collected and enriched. Two microbial consortia were developed and applied under laboratory conditions to degrade single-ring aromatic compounds in the unsaturated soil zone. To model the unsaturated zone, three rectangular glass cubes with a height of 70 cm and a width of 20 cm were prepared. Three holes were installed on one side of each cube to facilitate ventilation and to accommodate sensors at various distances from each other. Soil samples for preparing the laboratory model of the unsaturated zone were collected from areas contaminated with petroleum compounds. The soil was then sieved and homogenized. Subsequently, the soil was distributed into the cubes, and the moisture content was adjusted to 50%. Temperature, pH, and moisture levels were monitored regularly. The results demonstrated that, at a temperature of 30°C and a moisture level of 50-55%, over 99% of the aromatic compounds were removed. This indicates that the use of microbial consortia was highly effective in eliminating these pollutants.

21. Fungal-bacterial consortia: a promising strategy for the removal of petroleum hydrocarbons

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Nowadays, petroleum hydrocarbon pollution is one of the most widespread types of contamination that poses a serious threat to both public health and the environment. Among various physicochemical methods, bioremediation is an eco-friendly and cost-effective way to eliminate petroleum hydrocarbon pollutants. The successful degradation of all hydrocarbon components and the achievement of optimal efficiency are necessary for the success of this process. Using potential microbial consortia with rich metabolic networks is a promising strategy for addressing these challenges. Mixed microbial communities, comprising both fungi and bacteria, exhibit diverse

synergistic mechanisms to degrade complex hydrocarbon contaminants, including the dissemination of bacteria by fungal hyphae, enhancement of enzyme and secondary metabolites production, and co-metabolism of pollutants. Compared to pure cultures or consortia of either fungi or bacteria, different studies have shown increased bioremediation of particular contaminants when combined fungal-bacterial treatments are applied. However, antagonistic interactions, like microbial competition, and the production of inhibitors or toxins can have observed between members. Furthermore, optimizing environmental factors (pH, temperature, moisture, and initial contaminant concentration) is essential for consortium performance. With the advancements in synthetic biology and gene editing tools, it is now feasible to design stable and robust artificial microbial consortia systems. This review presents an overview of using microbial communities for the removal of petroleum pollutants by focusing on microbial degradation pathways, and their interactions. It also highlights the new strategies for constructing optimal microbial consortia, as well as the challenges currently faced and future perspectives of applying fungal-bacterial communities for bioremediation.

22. Microbial biotechnology and bioprocess engineering in sustainable management of agricultural residues: latest achievements

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Annually, about 200 million tons of different kinds of lignocellulosic agricultural wastes and residues such as crops straw and stalk, bagasse, branches of trees and municipal solid wastes are produced in the country, and their lack of proper management in many cases leads to different environmental problems. These residues and wastes could be used to produce a variety of value-added bioproducts using microbial biotechnology and bioprocess engineering. During the past 15 years, a megaproject has been performed in ABRII with collaboration of private sector to produce bioproducts from sugarcane bagasse and stalks, rice straw, and municipal wastes. To do this, the native effective microbial strains in the rapid production of enriched biocompost and humic acid were isolated, identified and evaluated from the existing processes using the classical methods of microbiology, genomics and metagenomics. Following, using these strains, additives and design of new bioprocesses, the rapid production of enriched biocompost, humic acid and biogas has been optimized at the laboratory, pilot, semi-industrial and industrial levels. Finally, 3 technologies of fast production of enriched biocompost from sugarcane waste, municipal waste and rice straw has reached the commercial stage, and extension to farmers. Moreover, the production of humic acid and biogas has reached the pilot stage with the cooperation of the private sector, and their semi-industrial production is in pipeline.

23. Livestock, poultry and aquatic biological products: from lab to cell

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The importance of using various additives in livestock, poultry, and aquatic animal production cannot be understated. Application of different feed additives such as probiotics, prebiotics, synbiotics, enzymes, toxin binders, amino acids, acidifiers, vitamins, antioxidants, etc., is very important to increase productivity, improve performance indicators and reduce the consumption of antibiotics. The global market for feed additives is about 42 billion USD and is expected to reach 60 billion USD by 2030. Iran's share should be at least 1 to 3 percent of the global market (0.6 to 1.8 billion USD), which is currently much less than this amount. Until the last decade, the majority of these additives were supplied through imports, however, by development of

knowledge-based companies into this field, some of these products, especially probiotics and prebiotics and toxin binders, are currently produced inside the country. Although some additives are now produced locally, challenges remain in achieving self-sufficiency, particularly in the production of enzymes, vitamins, and amino acids. The country's need for livestock, poultry and aquatic probiotics is about 7-10 thousand tons, currently domestic production is less than 3000 tons, but the production technology of industrial enzymes, vitamins, antibiotics and amino acids in the country are not completely localized and, in some cases, they are supplied in the form of imports. This article explores Iran's progress in domestic production of biological feed additives and discusses the challenges faced in this sector, including technological, managerial inefficiencies, and economic obstacles.

24. Biofertilizers: achievements and challenges in Iran

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Biofertilizers are environmentally friendly alternatives or supplements for chemical fertilizers in the sustainable production of agricultural products. The use of biofertilizers provides opportunities for rhizosphere engineering and element cycle and bioremediation of pollution and soil health, which can be very effective in preserving the environment and increasing production. Consortium, multi-strain formulations enriched with specific nutrients and additives have the potential to revolutionize the biofertilizer market and enable customized solutions for a wide range of biofertilizers. These innovations may be complemented by market dynamics and the integration of nanotechnology. A better understanding of soil-plant interactions, root bioengineering and biofortification of agricultural products has made the prospect of biofertilizers promising. Although the challenges of producing this product are not so few and its development requires investment, technology upgrade and development of the consumer market, these problems do not have simple solutions. Consumers play an important role in shaping the demand and developing technology, the demand for organic and bio-sustainable products requires increasing awareness among consumers and the stability of the quality of biofertilizers. Research and promotion institutions should have the necessary funds and support for the development of technology, increasing the durability, effectiveness and long-term effects of biofertilizers so that these products maintain their strength and stability in competition with subsidized chemical fertilizers.

25. Endophytic fungi and their beneficial potential capabilities: The way forward for their applications

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Higher plants provide a multi-layered environment for the life of many and diverse species of microorganisms. Fungi are the dominant components of this species complex, occupying the surface of plant organs as epiphytes and inside foliar organs, bark, wood, and roots as endophytes. Fungi are a group of living organisms with a great variety of species that play a major role in life. Among them, endophytic fungi have special effects on plant biology. Endophytic fungi are members of diverse fungal divisions that spend part or all of their life cycle in plant tissues without causing disease symptoms. By producing different metabolites, these fungi play a major role in increasing the plant growth fitness and resistance of host plants against various biotic and abiotic stresses. Also, the presence of endophytic fungi in the plant changes and improves host metabolism in order to increase growth and resistance. Endophytic fungi play an effective role in the production of bioactive metabolites such as terpenoids, steroids, quinones, phenols and coumarins. These

fungi are an important source for the discovery of new drugs. Endophytic fungi play the role of chemical reservoirs in medicinal plants and by producing anti-cancer, immune system regulating, antioxidant, anti-parasitic and anti-viral compounds, they play an effective role in the pharmaceutical industry. The role of endophytic fungi in controlling pest insects and plant pathogenic microorganisms has been known, so that they are important as sources for the production of biological pesticides in agriculture. The cryptic presence of endophytic fungi in plant tissues and their beneficial symbiotic relationship with the host has increased the interest in knowing these fungi and their application in agricultural and pharmaceutical industries.

26. *Trichoderma*: A Multipurpose Plant Beneficial Microorganism for Sustainable and Effective Agriculture and Industry

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Due to the environmental challenges posed by the use of chemical fertilizers and pesticides, the need for sustainable methods has increased. The fungus *Trichoderma* plays a crucial role as a biocontrol agent and biofertilizer, significantly reducing the need for chemical inputs and enhancing the sustainability of agricultural systems. Additionally, *Trichoderma* serves as a source of industrial enzymes, such as cellulases and chitinases, used in the food, textile, paper, and biofuel industries. Genetic engineering and molecular biology are employed as modern approaches to improve *Trichoderma*'s efficiency, especially in industry. We used protein engineering to enhance *Trichoderma*'s biocontrol activity. By adding the ChBD region to the N-terminal of Chit42, a chimeric chitinase with 1.7 times higher enzymatic activity was created, which improved biocontrol efficiency. Additionally, to increase cellulase production, protoplast engineering between two enzyme-producing strains was performed, resulting in recombinant isolates with a significant 1.8-fold increase in cellulase activity compared to the parent strains. qPCR analysis of key genes in the cellulase production pathway, including *cbh1*, *cbh2*, *egl3*, and *bgl1*, showed increased gene expression in the recombinant strains. This research can pave the way for achieving a more sustainable and healthy industrial and agricultural system.

27. Use of microbial pesticides for management of forest lepidopteran pest outbreaks

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The climate changes, global warming and human activities are among the most important concerns affecting natural populations of insect pests and their natural enemies. Forest ecosystems have well experienced the detrimental effects of these changes, where some previously unimportant insect species have emerged as new pests. The regular or periodic outbreak of defoliating pests (Insecta: Lepidoptera) in forests ecosystems has been an important issue in society of Iran. Unlike agricultural systems, the use of synthetic pesticides is not acceptable in forest ecosystems because of their adverse effects on the environment and non-target organisms. Today, only some specific pesticides such as Diflubenzuron (Dimilin) and Tebufenozide (Mimic) are still used in some countries in Europe and North America. In most cases, other control strategies such as light traps, pheromone traps and mechanical methods are not of satisfactory efficacy during outbreaks. Microbial pesticides, formulated based on bacterial, fungal and viral entomopathogens, are an important group of environmentally-friendly alternatives for integrated management of forest pest outbreaks. The success of microbial agents as commercial pesticides depends on some factors, including the practicality and ease of mass production, satisfactory efficacy against the target pest under outbreak condition, and having minimal adverse effects on non-target organisms and

environment. This study, explores the status of microbial pesticides in management of forest pests by reviewing the history, as well as limitations and probable concerns associated with the use of these agents in forest ecosystems.

28. Baker's Yeast: Challenges and Future Aspects

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In this study, the historical development process of *Saccharomyces cerevisiae* yeast production is investigated according to the types of raw materials, production methods and future developments of this industry. Yeast production requires substrates such as molasses, nitrogen sources, mineral salts and various vitamins. Alternative substrates and the increasing tendency to produce yeast-derived products such as single-cell protein and enriched yeast types are discussed. In addition, the benefits of using products produced from yeast to be used in animal feed and to strengthen their immune system are investigated by using products such as β -glucan and mannan. Also, attention has been paid to the challenges of industrial production of yeast, which include environmental aspects, choosing the right strain and optimizing fermentation conditions. Undoubtedly, the innovation and sustainability of production can lead to the development of new and valuable products in the yeast production industry. Considering the importance of this issue, it is suggested that in the future development of this industry, sustainable development should be prioritized with regard to protecting the environment and producing products with high nutritional and added values.

29. Optimization of industrial strains with evolutionary engineering and CRISPR approach: Opportunities and challenges

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The development of microbial strains is a challenging and complex process, mainly due to the complexities involved in understanding metabolic pathways, gene regulators, and intercellular communication systems. Genetic engineering and metabolic optimization are critical for the development of industrial strains, which are obtained through fermentation and cell recovery processes. Time, cost, and continuous production pose significant barriers when applying microorganisms in various industries. However, these challenges can be effectively addressed by using biological databases, synthetic biology and evolutionary engineering to enhance the development of industrial strains and evaluate cell performance in industrial processes. In the present research, an evolutionary engineering approach was employed to enhance the complex trait of ethanol tolerance in the yeast *Saccharomyces cerevisiae*. Prior to laboratory adaptive evolution, mutagenesis was conducted, resulting in improved ethanol tolerance in the obtained isolates. Throughout a 144-day adaptive evolution experiment, yeast's specific growth rate was utilized as a criterion for selecting superior isolates, under both ethanol and 1-butanol stress. For the investigation of single nucleotide polymorphism (SNP) changes, the laboratory strain CEN PK 113-7D was utilized. After confirming the enhancement in both specific growth rate and ethanol production, the genome of the selected isolates was extracted. Subsequently, the whole genome of the evolved strains was sequenced, and a comparison was made with the parent strain, revealing the single nucleotide polymorphism changes in the genes associated with this trait. Increased tolerance to 1-butanol stress led to increased tolerance to ethanol. Investigating the effect of increasing the specific growth rate under stress during the adaptive evolution experiment showed that the ethanol production rate of the selected isolates has increased. Two isolates named F128

and F121 were identified as the superior isolates for further investigation in the bioreactor, which increased the ethanol production rate of the parental strain from 90.56 g/L to 114.52 and 114.195 g/L, respectively. The findings from sequencing the entire genome of the evolved strains and comparing it to the parent strain revealed the alterations in single nucleotide polymorphisms (SNPs) of the genes associated with this particular trait. These modifications were observed in genes linked to intracellular substance transport, as well as the pathways involved in the composition and structure of the cytoplasmic membrane, cell wall structure, sugar metabolism, and lipid metabolism. The reverse engineering analysis of the SNPs demonstrated a unique and singular enhancement of ethanol tolerance in the parental strain.

30. Hybrid yeast strains: Applications in bioethanol production and bakery Industry

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Hybrid yeast strains represent a significant breakthrough in optimizing bioethanol production and bakery applications. By merging traits from various yeast species or strains, these hybrids enhance substrate utilization, stress tolerance, and overall efficiency. Techniques such as natural mating, protoplast fusion, genetic engineering, and molecular breeding have been instrumental in their development. For instance, hybrid strains engineered to ferment both hexoses and pentoses demonstrate a 30-40% increase in ethanol production from lignocellulosic biomass, a critical feedstock for second-generation bioethanol. Additionally, these strains reduce by-products like glycerol and acetic acid, channeling more substrate carbon into ethanol, thereby boosting overall yield. In the bakery industry, hybrid yeast strains are designed to improve flavor profiles, dough performance, and nutritional content. Strains producing specific volatile compounds, such as isoamyl acetate, contribute to enhanced flavor and aroma in baked goods. Moreover, hybrid strains engineered to overproduce vitamins, such as folate, increase the nutritional value of bread, offering health benefits to consumers. Despite these advantages, challenges such as genetic stability and regulatory hurdles persist. The genetic stability of hybrid strains over successive generations is a critical factor, as instability can compromise performance. Nonetheless, advancements in synthetic biology and molecular breeding are expected to drive further innovations, enabling the creation of multi-functional yeast strains that optimize bioethanol production and bakery processes. These hybrids offer a promising future for sustainable and efficient industrial applications.

31. Biorefinery: A new approach to manage food industry waste and effluents and complete their value chain

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Biorefinery is a complex that uses biomass raw materials with different processing or non-biological raw materials (methane, carbon dioxide,...) with biological processing (fermentation, enzyme,...) for a wide range of products and raw materials of industries. becomes The concept of biorefinery is a combination of three propositions: 1) processing, separation, and use of renewable raw materials, 2) converting raw materials into a wide range of products through different processes, and 3) a closed cycle approach; with this concept that the production waste and effluent will reach the least/safest state for the environment and the most economical state for the unit as much as possible, with value-adding and management methods. The concepts of value addition, circular economy, waste management, economic development, growth of non-oil products, self-sufficiency, job creation, import reduction, export development, local development, economic growth, value chain to prevent crude sales, etc. lie in the heart of the biorefinery concept. Sugar

and sugar industries, slaughterhouses, yeast, alcohol production, dairy, conversion are among the groups that produce extensive by-products and waste in the country, and unfortunately, they are not managed properly at the moment, and in addition to extensive environmental pollution, added value its production product is low or the price of the production product is high and less competitive. This article addresses various aspects of biorefinery development as one of the new approaches to completing the value chain of food products, the optimal management of their waste and effluents, reducing the country's dependence on imported products derived from them, etc.

32. Introduction of the first biorefinery for the production of fuel bioethanol in Iran

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Sustainable development is the only way for mankind to continue its path in the modern world. Without paying attention to all aspects of development, including human, planet, environment and society, long-term development does not lead to welfare and improving the quality of human life. The issue and role of energy in human life has always been one of the important parts of development, prosperity and progress. In sustainable development, the use of new and renewable energies has an important and special place. Fuel bioethanol as a green and renewable fuel and refinery green octane booster has the largest share among biofuels in the world. Zagros Green Fuel Development Company has established the first and largest biorefinery in Kermanshah with an annual production capacity of 66 million liters of fuel bioethanol. Here we will learn about the different dimensions of this biorefinery.

33. Evaluation of the therapeutic effect of a novel bacteriophage in the healing process of infected wounds with *Enterococcus faecalis* in mice

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Enterococcus faecalis is one of the most frequently isolated bacterial species across all types of wounds, including diabetic foot ulcers, burns, and surgical sites. The resistance of *E. faecalis* to multiple antibiotics, makes it difficult to treat and control. Therefore, *bacteriophages* as anti-bacterial agents, may offer an alternative treatment for bacterial infections. In this *study*, we assessed the effectiveness of isolated *bacteriophage* in the treatment of *wound infections* associated with *E. faecalis*. A lytic phage against *E. faecalis* was isolated and identified. The effectiveness of phage in the treatment of wound infection in mice was investigated. The results showed that the isolated phage belonged to the *Siphoviridae* family. This phage effectively eliminated bacteria from wounds. In addition, mice in the phage therapy group were in better physical condition. Our results demonstrated the success of phage therapy in the treatment of mice wounds infected with *E. faecalis*. These results indicate the feasibility of topical phage therapy for the safe treatment of wound infections.

34. Isolation of microbial viruses from Urmia Lake: Preserving genetic resources

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Soil microorganisms are essential for the nutrient cycle and the life of ecosystems. Many studies show viruses play an important role in the evolution of their bacterial hosts. Urmia Lake is the third largest saline lake in Iran, located in the north-western part of the country. In recent years, due to drought and the loss of many biological species in this lake, the identification and conservation of the lake's genetic resources have become critical. In this study, soil and sediment from the southern part of the lake were collected and transferred to the laboratory. Using culture-dependent approaches, archaea, bacteria, and phages were isolated. Bacterial and archaeal hosts

were identified, and plaque-isolated viruses were characterized by transmission electron microscopy. Serial dilutions of soil and sediment samples were cultured on SWN or MGM 23% media. Bacterial colonies were isolated and purified. Molecular identification of bacterial microorganisms was performed by 16S rRNA sequencing. To perform a plaque assay, the filtered lysate was inoculated onto hosts. After plaque isolation, viruses were purified with a spot assay, and morphological analysis was performed by negative staining and transmission electron microscopy. The morphological analysis proposes that the virus is related to Myoviral like form and pleomorphic viruses while another showed spherical morphology with an inner membrane surrounded by an icosahedral capsid.

35. Management of some zoonotic disease using livestock and poultry vaccination

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Zoonotic diseases, such as Malt fever in ruminants and avian influenza, cause significant economic losses, which affect the health of livestock and poultry as well as their production, and subsequently cost millions of lives in risk. Vaccination of domestic and wild animals is considered as a key solution to prevent the transmission of some infections and interspecies diseases from animals and birds to humans. In this regard, efforts to develop and implement vaccination operations using effective vaccines, in order to reduce the effects of zoonotic diseases, are often limited to the veterinary and agricultural sectors, but require a multifaceted "One Health" approach in which Animal vaccination plays an important role, so opportunities for joint development of animal and human vaccines, expansion of vaccine use to include animal reservoirs, and the strategic use of vaccines to interrupt complex transmission cycles should be considered Countries, zoonosis prevention and control programs centered on vaccination to reduce human exposure to zoonosis diseases have been successfully implemented. In short, humans can be protected against zoonoses by removing the pathogen from animal reservoirs or reducing its prevalence.

36. Recent scenario of antibiotic resistant and bacteriophage therapy

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Bacterial infections due to antibiotic-resistant bacteria are responsible for high morbidity and mortality in clinical settings. Many infections that would have been cured easily in the past by antibiotics are now resistant, resulting in longer hospitalization. The economic impact of antibiotic-resistant infections is found to be very high all over the world. Our team researches the antibiotic-resistant bacteria in the clinical samples, specifically studying the Carbapenem-resistant *Enterobacteriaceae*(CRE), mechanism of Colistin resistance among Gram-negative bacteria, emerging tigecycline resistance in *Klebsiella* through hetero-resistance mechanisms, studies on the appearance of persister cells in *Pseudomonas aeruginosa* and *Staphylococcus aureus*. Some of our important finding includes the first study report on the emergence of bla_{NDM-1} carbapenemase among *P. aeruginosa* in India, first report for the emergence of bla-NDM producer in clinical isolates of *E. hormaechei* and *P. rettgeri* in India, emergence of OXA-181 among Gram-negative bacteria in South India and for the first time we report the emergence of NDM-1 and OXA-30 genes within class-1 integron gene cassette regions in *Escherichia coli*. Also, we were the first to report the rare and emerging opportunistic pathogen *Ochrobactrum intermedium* encoding the OXA-181 gene in its plasmid. Due to the rising antibiotic resistance, there has been a renewed interest among the scientist to find an alternative medicine, phage therapy is one such alternative to combat the problem of antibiotic-resistant bacteria. The use of

bacteriophages in therapy is halted in 1940s after the discovery of antibiotics but developing resistance has allowed renewing this age-old therapy (Phage). Our phage group works on isolating and therapeutic characterizing bacteriophages infecting Gram-negative and Gram-positive bacteria. Some of our notable findings from our phage research includes whole genome sequence and analysis of *Escherichia* phage, *Klebsiella* phage and *Enterobacter* phage. To study the in vivo effect of the host and phages, we have performed in vivo studies in *G. mellonella* and application of bacteriophages to treat infections caused by *Vibrio* species in Shrimp and fishes. Here I share some of my insights into bacteriophages as an alternative therapy for treating infections caused by Gram positive and Gram negative bacterial pathogens.

37. Phage therapy in Belgium

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Phage therapy is increasingly put forward as a promising tool to help curb the global antimicrobial resistance crisis. However, industrially manufactured phage medicinal products are not available on the global market. In addition, the business purpose-driven phage products currently navigating the development pipeline mainly target commercially viable bacterial species and clinical indications, using defined phage cocktails. Hospitals or phage therapy centres aiming to help all patients with difficult-to-treat infections urgently need phage preparations targeting all bacterial pathogens involved in all indications. In 2018, Belgium developed a national phage therapy framework based on the magistral preparation of personalized phage products, which to date provided a solution for more than 180 patients with difficult-to-treat infections and could complement future industrially manufactured products. The first 100 consecutive cases were analysed, showing clinical improvement in 77.2% and microbial eradication of the targeted strain in 61.3% of infections. Just like Belgium, other (European) countries could develop a magistral phage preparation framework that would exist next to the conventional medicinal product development and licensing pathways. However, it is important that the current producers of personalized phage products are provided with pragmatic quality and safety assurance requirements, which are preferably standardized and are tiered based on benefit–risk assessments at the individual patient level. Finally, the logistical issues of personalised phage therapy could be solved by devices that synthetically produce (synthetic biology) predicted (artificial intelligence) personalised phage products, instantly and on-site.

38. Progress in alternative strategies to combat antimicrobial resistance: Focus on antibiotics

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Antibiotic resistance, and, in a broader perspective, antimicrobial resistance (AMR), continues to evolve and spread beyond all boundaries. As a result, infectious diseases have become more challenging or even impossible to treat, leading to an increase in morbidity and mortality. Despite the failure of conventional, traditional antimicrobial therapy, in the past two decades, no novel class of antibiotics has been introduced. Consequently, several novel alternative strategies to combat these (multi-) drug-resistant infectious microorganisms have been identified. The purpose of this review is to gather and consider the strategies that are being applied or proposed as potential alternatives to traditional antibiotics. These strategies include combination therapy, techniques that target the enzymes or proteins responsible for antimicrobial resistance, resistant bacteria, drug delivery systems, physicochemical methods, and unconventional techniques, including the CRISPR-Cas system. These alternative strategies may have the potential to change the treatment of multi-drug-resistant pathogens in human clinical settings.

39. New bioactive molecules from bacteria: The challenges of production in laboratory

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Today, the bioactive molecules-based strategies are used to control infectious and non-infectious diseases. In addition to causing infection in different organisms from plants, animals and fungi, the vast microbe's world, produce a variation of bioactive molecules to limit the neighbor microbial communities leading to survival. The use of bioactive molecules known as antibacterial, antifungal, cytotoxins and antiviral compounds is an integral part of "therapy". Changes in both, pathogens (drug-resistant microorganisms) and hosts (quantitative and qualitative changes) bring a need for new bioactive molecules with new and specific features to treat diseases. Problems in discovering new molecules by screening, their production, purification and mode of action in Iran, on the other hand, the role of laboratory equipment's and materials as well as the bioinformatics tools are discussed here. Moreover, it is talked over the ways to overcome the problems including creating "laboratory models".

40. Role of plant microbiome in promoting the antimicrobial properties of medicinal plants

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Medicinal plants have been known from long time ago for infection control. The emergence of antibiotic resistant and biofilm producing pathogens that lead to treatment failure, attracted more attention to medicinal plants as natural resources for antibacterial compounds. Low yield and variability of antimicrobial compounds in medicinal plants caused limitations in their widespread application. Plant microbiome play significant role in quality and quantity of antimicrobial secondary metabolites. These microorganisms through control of gene expression, modulating metabolic pathways and induction of resistance in stressed plants, can increase bioactive antimicrobial metabolites and hence promote the effectiveness of medicinal plants in infection control. Furthermore, they also produce antimicrobial compounds and hence their presence as plant microbiome can significantly promote their antimicrobial effects. One reason for different effectiveness of a medicinal plant species in different researches is difference in their microbiome. Hence, identification of medicinal plant microbiome is of great importance in order to increase their population in host plant and as a natural source for production of antimicrobial agent production. The bioactive product in this symbiotic relationship is promising for achieving antibacterial, anti-biofilm, anti- quorum sensing and multidrug resistant control agents. Microbial ecology techniques can accelerate characterization of these symbiont microorganisms and using them in order to increase the effectiveness of medicinal plants and production new antimicrobial agents.

41. iChip technique as a novel screening method for the isolation of antibacterial compound producing actinobacteria

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With the increase of resistant bacteria due to the widespread use of antibiotics, it is very important to find a new source of antimicrobial compound production to control infectious diseases. Actinobacteria are an important source of secondary metabolites and various antimicrobial active compounds in particular. Therefore, finding new methods for screening native microorganisms with the ability to produce new antimicrobial compounds is very important. To this end, the iChip technique dramatically paves the way to discover new environmental microorganisms that cannot

be cultivated using conventional methods. The novel iChip tool consists of a plastic plate containing hundreds of holes, each of which is a diffusion chamber where each microorganism is trapped. After attaching the membrane filter on both sides of the plastic plate, the iChip was immersed in the diluted soil liquid environment. The diluted soil samples were loaded into the iChip and placed in the natural soil environment for two weeks. Microcolonies grown in iChip wells were transferred to SCA and SMS culture media. To isolate active actinobacteria, primary screening was performed using the cross-streak method. After extracting the crude extract from the growth medium of the active isolates, their antibacterial activity was investigated using the disc diffusion method. Out of 87 isolated actinobacteria, four isolates with the highest antibacterial activity against some Gram-positive and Gram-negative pathogenic bacteria were selected. The results demonstrated that all isolates belonged to the genus *Streptomyces* and had antibacterial activity against *Staphylococcus aureus*, *Bacillus subtilis*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Enterobacter aerogenes*, and *Shigella sonnei*. Moreover, the results revealed that the screening of natural samples using the iChip method can potentially be useful in finding new microbial species and domesticating them.

42. Solid compounds containing potent oxidizing agents as cold sterilant and strong multi-purpose disinfectant

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The production of highly potent synthetic antimicrobial substances with other appropriate properties is very important in the sterilization of some surgical equipment and also medical instruments that come into contact with the patient's body or enter the patient's digestive tract, e.g., in endoscopic procedures and so on. Peracetic acid and hydrogen peroxide are the most important selective agents for this type of applications. Peracetic acid as one of the strong antimicrobial agents for sterilizing heat-sensitive hospital instruments in the medical field and surfaces in contact with food and even CIP production lines in factories has wide and effective applications. Solid and stable commercial compounds that release the active ingredient peracetic acid and hydrogen peroxide in aqueous solutions have been designed and manufactured by foreign companies. According to the manufacturer's claim, this compound contains a strong source of oxidative agents, which is released in water in the presence of other active substances in it, leads to the production of hydrogen peroxide and subsequently peracetic acid. In product evaluation studies, claims of antimicrobial effects were evaluated for medical applications. Providing a set of documents to prove the properties of the product and antimicrobial quality assurance documents to obtain the mandatory license from the Food and Drug Administration was followed up. The possibility of application of antimicrobial substances requires going through the process of obtaining the necessary license from the domestic Food and Drug Administration, which was successfully fulfilled in this process. This article deals with the transfer of knowledge acquired in the process of obtaining licenses for the use of an effective antimicrobial substance. According to general insights and international studies, also based on CDC guidelines and standards, the use of peracetic acid-base compounds is expanding in global markets. Properties such as a broad, fast and strong microbiocidal effectiveness spectrum (bactericidal, mycobactericidal, fungicidal, virucidal and sporicidal), causing no, or low allergy and cytotoxicity and environmental effects on the patient and operator during the preparation of the solution and performing the disinfection process, effectivity at low concentrations (1 to 2 percent), cost-effectiveness for use in the healthcare system, industries, as well as biocompatibility and no need for neutralization process before disposal, make this compound as a successful and ideal candidate to replace other compounds includes aldehydes, tetravalent ammoniums and phenols.

Poster

43. Isolation of methanotrophic strains using different culture media

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Methane is one of the atmospheric greenhouse gases that plays a significant role in global warming and climate change. It is estimated that this gas has a greenhouse effect four times greater than that of carbon dioxide. Methanotrophs are a group of bacteria that can grow aerobically or anaerobically on methane-containing sources and convert this gas to carbon dioxide through oxidation processes, thereby playing an important role in reducing the atmospheric concentration of the greenhouse gas methane. The aim of this study was to compare the culture media in order to culture and isolate methanotrophic bacteria. In this study, soil from the Bandar Abbas oil refinery were used for the isolation of methanotrophs. The selected media contained potassium nitrate and ammonium chloride salts as nitrogen sources, respectively. It should be noted that 1.5% sodium chloride was added to the basal media. Afterwards, all types of media were enriched with methane as the only carbon source. The soil sample were cultured in the mentioned media using the dilution method. Subsequently, the resulting bacterial suspension was transferred to solid medium in order to achieve pure cultures for each. After multiple subcultures, satellite heterotrophs were eliminated. Based on the number of grown colonies, a saline basal medium containing ammonium chloride along with 1.5 % sodium chloride is recommended for isolation

44. Investigating the antimicrobial effect of *Lavandula* and *Punica granatum* peel plant extracts on *Escherichia coli*

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The augmentation of antibiotic-resistant strains of bacteria such as *Escherichia coli* has necessitated the exploration of alternative antimicrobial agents. Plant-derived compounds, particularly those found in *Lavandula officinalis* and *Punica granatum* peel have been recognized for their potential antimicrobial properties. According to the reviews, *Escherichia coli* is one of the main factors of microbial nosocomial infection. *L. officinalis* and *P. granatum* peel are samples of medical plants. The antimicrobial effect of the ethanolic and acetonic extracts of mentioned plants has been investigated on *E. coli*. After collecting the plants, in vitro situation the Minimum Inhibitory Concentration (MIC) and Minimum Bactericidal Concentration (MBC) rate of the acetonic and ethanolic extracts of the mentioned plants were investigated by macro dilution method in the Mueller Hinton Broth culture medium and the antimicrobial effect of the extracts were checked and evaluated on *Escherichia coli* bacteria. According to that, it was determined that the ethanolic *Punica granatum* peel at a dilution of 31.25 extract exhibits strong antimicrobial and growth inhibitory effects against *Escherichia coli*. The ethanolic *Lavandula officinalis* at a dilution of 15.6 extract was also found to be a potent inhibitor. Also, the acetonic extracts of these two plants in higher dilutions have antimicrobial properties. The ethanolic *L. officinalis* extract was also found to be a potent inhibitor. Also, the acetonic extracts of these two plants in higher dilutions have antimicrobial properties. The effect of ethanolic and acetonic extracts of both plants were checked. The order of efficacy of the extraction from the most antimicrobial to the least is as follows: first is ethanolic *P. granatum peel*, second is ethanolic *L. officinalis*, third is acetonic *P.*

granatum peel and fourth is acetonc *L. officinalis*. Therefore, following this sequence, which can be utilized to inhibit the growth of *E. coli*.

45. Clinical examination of pregnant women to diagnose aerobic vaginitis

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Aerobic vaginitis was first recognized as a cause of genital tract infection in 2002. The most common bacteria associated with aerobic vaginitis in previous studies were *Enterococcus faecalis*, *Escherichia coli*, *Staphylococcus aureus* and coagulase-negative *Staphylococci*. In this study, a total of 60 pregnant women were examined to diagnose aerobic vaginitis. At first, the clinical characteristics of the women, including the presence of yellow to green secretions, the presence of itching and burning, and the pH of secretion were recorded. Then, the samples were taken from the secretions. A smear of secretions was prepared for whiff test and microscopic examination. The degree of lactobacilli was determined and the number of toxic leukocytes was counted with a light microscope. Aerobic vaginitis is introduced with a score of 4 or more. Mild aerobic vaginitis was defined with a score of 4-5, moderate aerobic vaginitis with a score of 6-7 and severe aerobic vaginitis with a score of 8-10. In this study, 25 pregnant women were diagnosed with aerobic vaginitis that 12 patients had mild aerobic vaginitis, and 13 patients moderate aerobic vaginitis. None of the women had severe aerobic vaginitis and the highest pH of the secretions of the examined women was 8 and the lowest was 5, while the pH of healthy women was less than 4.5. Among the women with aerobic vaginitis, 48% had yellow discharge, 40% yellow-white mixed discharge, and only 12% had green discharge. The whiff test was negative for all patients. More researches need to be done to identify the bacteria involved in aerobic vaginitis.

46. Evaluation of genetic distances of lactic acid bacteria (LABs) in breast milk using PCR-based molecular markers

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Breast milk has a very high biological value for the child due to having a wide range of probiotic bacteria. Considering the high importance of lactic acid bacteria (LABs) and their probiotic properties, the present study was conducted to isolate and investigate the genetic diversity of this group of bacteria in breast milk using REP and BOX molecular markers. Breast milk samples were collected from different geographical areas of Lorestan province and after culturing the bacteria in the studied samples, morphological methods, gram tests, catalase and antibiogram were used for initial confirmation. Genetic distances between 20 selected samples were estimated using REP-PCR and BOX-PCR markers. Based on the initial results, 3 isolates were selected from heterogeneous groups and 16SrRNA gene amplification and sequencing and alignment were used to determine the type of bacteria. The results showed that the studied bacteria were coccobacilli, gram positive and catalase negative. The grouping and drawing of the dendrogram showed that the studied bacteria with a minimum of 23% and a maximum of 86% polymorphism were placed in 5 different groups and the groups formed were in relative agreement with the geographical distances. The results of 16SrRNA gene sequencing indicated the identification of 3 species of *Lactobacillus fermentum*, *L. konkei* and *L. apodemy* in breast milk samples. According to the obtained results, it can be stated that breast milk contains a wide range of lactic acid bacteria and DNA-based molecular markers can be an effective tool in their grouping and identification.

47. Loading of RON2-AMA1 recombinant protein in alginate-chitosan nanoparticles to produce an oral vaccine against chicken coccidiosis

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Food supply and sustainable protein production are global priorities. The poultry industry, a major supplier of Chicken and eggs, faces significant economic damage from coccidiosis. This disease, caused by an obligate intracellular parasite of the *Eimeria* genus, severely impacts the poultry intestine. RON2 and AMA1 proteins contribute to this damage by creating mobile pores, disrupting nutrient absorption, and leading to diarrhea, dehydration, weight loss, and increased mortality. In this study, the RON2-AMA1 chimeric protein was expressed in *E. coli* BL21(DE3) and purified using an NI-NTA chromatography column. After dialysis, the protein was encapsulated with alginate and chitosan polymers for oral administration to poultry. The protein loading percentages in nanoparticles were 71%, 81%, and 82%. The dynamic light scattering (DLS) values were 146, 202, and 97 nm, and the zeta potentials were -8.97, -4.25, and -4.79 mV. Given the invasive nature and stress associated with injectable vaccines, we opted for oral administration. To protect the vaccine from digestive enzymes, we encapsulated it in alginate and chitosan polymers, ensuring safe delivery to the target tissue (intestine). The small size of nanoparticles enhances their adhesion to the intestinal mucosa. Future evaluations should consider varying protein concentrations, polymer ratios, and stirrer speeds to optimize the formulation. Additionally, in vivo studies are recommended to assess the vaccine's efficacy and immune response in poultry, aiming for an effective and practical solution to combat coccidiosis.

48. Genome study of α -, β -, and γ -carbonic anhydrases from the thermophilic microbiome of marine hydrothermal vent ecosystems

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Carbonic anhydrases (CAs) are metalloenzymes that can help organisms survive in hydrothermal vents by hydrating carbon dioxide. In this study, we focus on alpha (α), beta (β), and gamma (γ) CAs, which are present in the thermophilic microbiome of marine hydrothermal vents. The coding genes of these enzymes can be transferred between hydrothermal-vent organisms via horizontal gene transfer (HGT), which is an important tool in natural biodiversity. We performed big data mining and bioinformatics studies on α -, β -, and γ -CA coding genes from the thermophilic microbiome of marine hydrothermal vents. The results showed a reasonable association between thermostable α -, β -, and γ -CAs in the microbial population of the hydrothermal vents. This relationship could be due to HGT. We found evidence of HGT of α - and β -CAs between *Cycloclasticus* sp., a symbiont of *Bathymodiolus heckerae*, and an endosymbiont of *Riftia pachyptila* via Integrins. Conversely, HGT of β -CA genes from the endosymbiont *Tevnia jerichonana* to the endosymbiont *Riftia pachyptila* was detected. In addition, *Hydrogenovibrio crunogenus* SP-41 contains a β -CA gene on genomic islands (GIs). This gene can be transferred by HGT to *Hydrogenovibrio* sp. MA2-6, a methanotrophic endosymbiont of *Bathymodiolus azoricus*, and a methanotrophic endosymbiont of *Bathymodiolus puteoserpentis*. The endosymbiont of *R. pachyptila* has a γ -CA gene in the genome. If α - and β -CA coding genes have been derived from other microorganisms, such as endosymbionts of *T. jerichonana* and *Cycloclasticus* sp. as the endosymbiont of *B. heckerae*, through HGT, the theory of the necessity of thermostable CA enzymes for survival in the extreme ecosystem of hydrothermal vents is suggested and helps the conservation of microbiome natural diversity in hydrothermal vents. These

harsh ecosystems, with their integral players, such as HGT and endosymbionts, significantly impact the enrichment of life on Earth and the carbon cycle in the ocean.

49. Identification of gram-positive bacteria in pregnant women with aerobic vaginitis using classic methods

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Aerobic vaginitis causes an imbalance of vaginal microflora, which contains aerobic and intestinal pathogens with different degrees of inflammation. Aerobic vaginitis in pregnant women increases the risk of negative pregnancy outcomes such as premature birth, miscarriage, etc. Gram-positive bacteria, common in aerobic vaginitis during pregnancy are *Enterococcus*, *Streptococcus*, *Staphylococcus aureus* and coagulase-negative *Staphylococci*. In this study, 25 pregnant women with aerobic vaginitis were examined. The vaginal swab were cultured on different media such as Mannitol Salt Agar (MSA), Blood Agar. After purifying the isolates and preparing gram stained slides, bacteria were identified using biochemical tests. A total of 9 gram-positive bacteria were identified. The biochemical test results for 3 gram-positive cocci included negative catalase and oxidase tests, growth on bile, growth on 6.5% NaCl and alpha hemolysis on blood agar, which indicates to *Enterococcus*. The results of the tests for 6 isolates with cluster morphology of cocci including positive catalase and negative oxidase test, growth on MSA, observation of beta hemolysis on blood agar, urease and coagulase test for 5 bacteria were negative, and for one bacterium was positive. The results of novobiocin sensitivity test were negative for 6 bacteria, which indicates to *Staphylococcus*. Any *Streptococcus* was not detected in this study. The pathogenesis of aerobic vaginitis, which causes negative pregnancy outcomes needs further research.

50. Investigating the relationship between human papilloma virus and esophageal cancer in the biopsy samples of patients referred to Hazrat Vali Asr hospital in Qom during 2013-2014

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Esophageal cancer is a highly lethal disease that has become increasingly prevalent worldwide. Numerous studies have explored the role of various viruses, particularly Human Papilloma Virus (HPV), in the etiology of this cancer. However, the findings from these studies have been inconsistent and inconclusive. Given the critical role HPV is thought to play in esophageal cancer, this study aims to investigate the potential association between HPV and esophageal cancer in biopsy samples from patients treated at Hazrat Vali Asr Hospital in Qom between 2013 and 2014. This case-control study was conducted using esophageal biopsy samples from 60 patients aged over 25 years, comprising 30 cases and 30 controls. The samples were processed and examined at the Pathology Unit of Hazrat Vali Asr Hospital in Qom during 2013 to 2014. Histological analysis was performed after hematoxylin-eosin staining to identify cytological changes, including the presence of degenerated and vacuolated cells, as well as the detection of HPV. Data analysis was carried out using SPSS software, with chi-square tests applied to assess statistical significance. The analysis revealed no significant association between HPV infection and esophageal cancer. The gender distribution showed that 64.8% of the patients in the case group and 35.2% in the control group were male. Chi-square tests indicated no significant differences in gender distribution between the two groups. Furthermore, the study found no significant correlation

between the tumor location and HPV infection, with 5% of infected patients having an undetermined tumor location and the remaining 12 cases showing no link between tumor location and HPV infection. The findings from the esophageal biopsy analysis of 60 patients indicate that there is no significant association between HPV infection and the development of esophageal cancer. The lack of correlation between tumor location and HPV infection further supports these results, suggesting that HPV may not play a significant role in esophageal carcinogenesis in this patient population.

51. Enhancing the production of bioplastic poly-3-hydroxybutyrate-co-3-hydroxyvalerate from *Bacillus cereus* strain N6

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Poly (3-hydroxybutyrate-co-3-hydroxyvalerate) (PHBV) is a biodegradable, non-toxic, and biocompatible polymer produced by many microorganisms, including bacteria. These properties make PHBV a promising polymer with great potential to replace typical non-degradable polymers, making it an outstanding material with wide applications in various industries. This study aimed to improve PHBV production by *Bacillus cereus* N6 strain for industrial-scale applications. We investigated the effects of carbon and nitrogen source concentrations, inoculum age, and incubation period on PHBV yield. Carbon and nitrogen sources were increased at a 6:1 ratio (1.5, 2, 3, 4, and 5 times the initial concentration). Inoculum ages of 13.5, 15, 18, and 20 hours were tested. Biopolymer extraction was performed after 20, 22, 24, 26, 28, 30, 35, and 40 hours of incubation. Improved conditions led to an increase in PHBV yield from 125 mg/L to 990 mg/L. Maximum productivity and polymer accumulation reached 28.5 mg/h and 40%, respectively. The most favorable conditions were identified as an inoculum age of 13.5 hours and an incubation period of 35 hours in the fermentation medium. Quadrupling the carbon and nitrogen sources, using an inoculum age of 13.5 hours, and incubating for 35 hours significantly enhanced PHBV production by *B. cereus* N6. These findings contribute to the development of more efficient PHBV production processes for potential industrial applications.

52. Production of *Bacillus mojavensis* probiotic microcapsules

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Probiotics are alive microbes that when added to food, improves the florid microbes in digestion system and it has positive effect for the host body. Study shows that the bacteria producing lactic acid specially bacillus in high temperature remain stable because of having endospore, and keep the probiotic features at cooking temperatures. The goal of this study is the separate resistant bacillus from the soil and to produce microcapsules of a strong species. In this research first, we took five sample from Jamshidieh Park randomly, then by serial dilution and thermal agitation to separate exclusively bacillus in this research. Next purification of grown colonies and coloring the spore's catalase test, oxidase test verifies the first material of bacillus was conducted. Next, some test such as acid resistance, salt test, bile salt test, and antibiotics resistance test were done to check the probiotics being of the bacillus which were purified, in order to clearly specify the material and species of the stronger one's probiotic molecular sequencing (*16srRNA*) were conducted. Next stage, the production of microcapsules, the bacillus probiotic using sodium alginate were done. The analyses to verify production of microcapsules were done. In this study 32 strain of bacillus were separated in which 7 strain has probiotic features and finally (ZK1) was the specific strain

with all the feature of probiotics was selected. After sequencing (*16srRNA*) the special strain had similar characteristic of *Bacillus mojavenensis* up to 99.8% percent was identified. Microcapsuling result with sodium alginate in the mentioned process microcapsules with the size of 12-5 micrometer with uniform dispersion were verified. By the result of this study, we can say that the local soil in this country and the sample bacillus separated from it, is a good source to produce and identification of local valuable bacteria and non-pathogenic as new source of probiotic bacteria. In this study we found that bacillus whit spores which have probiotic feature for great maintenance can be use in food and pharmaceutical industries.

53. The survey of antibiotic resistance pattern and prevalence of Tetracycline resistance (*tetC*) gene in *Escherichia coli* isolates collected in Tabriz hospitals

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Escherichia coli is the most important member of normal intestinal flora in humans and animals, and can causing opportunistic infections. Tetracyclines are a family of antibiotics that inhibit protein synthesis by preventing the attachment of aminoacyl-tRNA to the ribosomal acceptor (A) site. They are also used to treat *Escherichia coli* infections. However, the continued widespread use of antibiotics has led to the development of resistant organisms. This study was conducted to investigate the resistance to tetracyclines and investigate the frequency of *tetC* gene among *Escherichia coli* isolated from patients hospitalized in Tabriz hospitals. 120 bacterial samples with initial diagnosis of Gram-negative bacillus (Enterobacteriaceae family) were collected from difference Hospitals. Samples were processed for microbial and biochemical characterization. Antibiotic susceptibility test was carried out by using disc diffusion method. The distribution of tetracycline resistance (Tcr) gene (*tetC*) in isolates were detected by PCR. from 100 samples were recognized as *E. coli*. The higher resistance rate was 97% to Amoxicilline. and the lowest resistance rate was 14% to Gentamycine. 76% and 69% of the isolates, were resistant to Tetracycline and Doxycycline respectively. *tetC* gene was founded in 69 isolates. The increase in the resistance of tetracycline with high diversification is an indication of antibiotics overuse. Strict enforcement of regulation is urgently needed to control and prevent the spread of tetracycline resistant strains which are detrimental to the environment.

54. Investigating the emulsifying properties of exopolysaccharide extracted from *Limosilactobacillus* sp. UTM C 3823

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Bioemulsifiers are high molecular weight, biodegradable compounds capable of creating emulsions with hydrophobic substances. Bacterial exopolysaccharides are widely utilized in the food, cosmetic, and pharmaceutical industries. This research investigates the potential of the lactic acid bacteria strain *Limosilactobacillus* sp. UTM C 3823, identified in previous studies, for exopolysaccharide production. The strain was cultured in MRS broth medium containing 200 g/L sucrose, incubated at 37°C and pH 5.7 for 2 days. Biomass was subsequently separated by centrifugation at 2500 g. The exopolysaccharide was extracted using ethanol at 4°C, decolorized with 80% trichloroacetic acid, dried at 50°C. An experiment was conducted to evaluate the emulsification index of different concentrations of the crude and purified exopolysaccharide, and to determine the necessary concentration for Complete and stable emulsion. Emulsion stability was assessed under varying NaCl concentrations, temperatures, and pH levels, and compared to a control emulsion made with sunflower oil after 24 hours. The results indicated that the

exopolysaccharide predominantly formed oil-in-water emulsions. Both the crude and pure polymer formed a complete and stable emulsion at a concentration of 190 mg/mL. The emulsion remained stable at temperatures of 4°C, 28°C, 40°C, and 60°C, across a pH range of 2-8, and at salt concentrations of 10% and 30%. The suitable functional characteristics of this exopolysaccharide under various conditions are promising for its use as a biological emulsifier in the food and cosmetic industries. Future studies will explore the interaction effects between the emulsifying activity of this polymer and active ingredients used in cosmetics and health products.

55. Molecular characterization and genetic variability of coat protein gene of onion yellow dwarf virus isolates in northern Iran

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Onion yellow dwarf virus (OYDV), (genus *Potyvirus*, family *Potyviridae*), is one of the significant and damaging pathogens in garlic, onion, and other *Allium* species, posing a significant limitation to these crops globally. The coat protein (CP) gene of potyviruses serves as a primary molecular marker for their diagnosis and classification. To investigate the genetic diversity of OYDV in northern regions of Iran, three isolates named Sa, K, and Beh were collected from garlic fields in Mazandaran, and their RNA was extracted. A portion of their 3' genome region (1112 bp) was amplified using virus-specific primers (OYDVVKBF/VKBR) through reverse transcription-polymerase chain reaction (RT-PCR) and subsequently sequenced. After trimming the sequences, the complete CP gene of 771 nucleotides was obtained, encoding a protein with a molecular weight of 29.05-29.25 kilodaltons and consisting of 257 amino acids. The three isolates showed 86.05-89.66% nucleotide (nt) identity and 91.44-96.11% amino acid (aa) identity. The nt and aa sequences of the three isolates were compared with other sequences in GenBank. Results indicated that the Beh isolate (from Behshahr) had the highest nt (98.32%) and aa (99.61%) identity with the G78 isolate (MN059603) from China. The K isolate (from Kelardasht) had the highest nt identity (91.1%) with the G50-2 isolate (MN059587) and the highest aa identity (96.5%) with the G78 isolate from China. The Sa isolate (from Sari) had 89.92% nt identity and 94.55-94.94% aa identity with the sd (AJ409311) and Huimin4 (MT358355) isolates from China. These results indicate high genetic diversity among OYDV isolates in Iran.

56. Investigating the number and percentage of each subtype of Blastocystis in people with cancer and different phases of IBD compared to healthy subjects

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Blastocystis is a protozoan parasite in the intestines of humans and a wide range of animals. The pathogenicity and the possibility of this protozoan being transmitted from animals to humans is unclear. The increase in the number of people suffering from IBD and cancer in all societies, as well as transmission of infection from animals to the people, have necessitated the study of this microorganism. This study aimed to investigate the prevalence and determine the different subtypes of Blastocystis protozoa among people with IBD and cancer with immunodeficiency with or without gastrointestinal symptoms compared to the healthy group. Stool samples were collected from 81 people with IBD, 60 people with cancer and 140 healthy people in two specialized centers for digestion and liver, and a questionnaire was completed for all groups. The samples were analyzed using direct expansion, concentration method, and specific culture of DMEM to detect

Blastocystis. The presence of protozoa in the samples was confirmed by PCR method and finally, the positive samples were determined by SSU RNA gene sequence. The prevalence of Blastocystis in IBD (18/81) was 22.22% and a significant relationship was observed between the presence of parasites in the acute phase and the chronic phase of IBD. The prevalence of Blastocystis was significantly higher in the acute phase of IBD than in the chronic phase. The prevalence of Blastocystis in people with cancer was (7/60) and in healthy people (20/140). All the products were sequenced in the PCR stage to determine the Blastocystis subtype, and ST1, ST2, and ST3 were identified. ST1 was the most common subtype (88.8%) in the IBD group and ST3 was the most common subtype (71.4%) in the cancer and control groups.

57. Serum DHEA level in COVID-19: Implications for disease severity and management

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COVID-19, a viral disease caused by SARS-CoV-2, has affected millions worldwide. Dehydroepiandrosterone sulfate (DHEAS), a steroid hormone produced by the adrenal glands, plays a crucial role in the immune system and has been linked to various health outcomes. This study aims to investigate the multifaceted role of DHEAS in COVID-19, focusing on disease status and temporal patterns. The study quantified DHEAS levels using ELISA in COVID-19 patients, including inpatients (hospitalized) and outpatients (non-hospitalized), and compared them to healthy controls. A longitudinal analysis tracked DHEAS concentration in COVID-19 patients over different days, comparing inpatients and outpatients. The results showed that COVID-19 patients, especially inpatients, have lower levels of DHEAS compared to controls, but DHEAS was not strongly associated with mortality or the need for intensive care. The study revealed a dynamic pattern of DHEAS levels during COVID-19 disease, with an initial decline followed by recovery. In conclusion, DHEAS, with distinct temporal dynamics, emerges as a biomarker for measuring COVID-19 severity. These findings provide valuable insights into the multifaceted aspects of COVID-19 and its interaction with COVID-19 severity, highlighting the need for tailored approaches to manage COVID-19 patients.

58. Isolation and investigation of antibiotic properties of lactobacillus probiotic bacteria of the oral cavity against gram-positive and gram-negative pathogens

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The human body contains a natural flora of a wide range of symbiotic bacteria that play an important role in the physiology and metabolism of the body and in various biological processes such as digestion and absorption of nutrients, protection against pathogens, modulation of immune responses, regulation of fat storage and intestinal stimulation. Among the most important symbiotic bacteria in the digestive system, including the oral cavity, are lactic acid bacteria of the *Lactobacillus* type. In order to isolate and investigate the antimicrobial effects of bacteriocin produced by *Lactobacillus* bacteria in the oral cavity, 100 elementary and secondary school boys and girls were selected and after culturing the sample prepared from the oral cavity on the specific growth medium (MRS), by morphological techniques, biochemical and molecular with 16SrRNA gene amplification and sequencing, *Lactobacillus* bacteria were isolated and identified. Bacteriocin of each strain was isolated and purified after cultivation in culture medium. In order to investigate the antimicrobial effects of bacteriocin of isolated bacteria, the minimum inhibitory and bactericide concentration (MIC and MBC) tests and the well diffusion test were used. The

isolated bacteria were bacilli-shaped, gram-positive and catalase-negative and showed a similar antibiogram pattern with the use of common and commercial antibiotics. Antimicrobial tests showed that the antimicrobial effects of the isolated bacteriocins on the gram-negative bacteria *Escherichia coli* and *Pseudomonas aeruginosa* were higher than on the gram-positive bacteria *Staphylococcus aureus*. Based on the obtained results, it can be stated that the symbiotic *Lactobacillus* in the oral cavity play an effective role in preventing gastrointestinal infections.

59. Antibacterial therapy of Vancomycin/Trimethoprim on expression level of *bla*_{CTX-M33} gene of ESBL-producing *Escherichia coli* isolated from patients with urinary tract infection

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Combination therapy could be one of the gold strategies for the treatment of extended-spectrum β -lactamases (ESBLs)-producing bacteria such as ESBL-*Escherichia coli*. We aimed to evaluate the antibacterial effects of Vancomycin/Trimethoprim combination on β -Lactamase resistant gene of *E. coli* isolated from patients with urinary tract infection referring to the Shahid Rajaii hospital of Gachsaran. Firstly, 90 isolates of *E. coli* were identified from patients with UTIs and subsequently, ESBLs isolates were identified using the confirmatory combined disc method based on CLSI guidelines (M₁₀₀-S₂₃). The combination index assay was performed via microdilution broth test (M₀₇-A₁₀) and interpreted with the fractional inhibitory concentration (FIC) for vancomycin alone and in combination with trimethoprim. Eventually, the relative expression level of *bla*_{CTX-M33} 3 gene was determined using qPCR. Findings showed that 15 isolates (24%) were identified as the ESBLs. Data indicated that combination of vancomycin/Trimethoprim with exerted synergistic effects in ESBLs isolates with FIC index ranged from 0.281 to 1.5. On the other hand, combination of vancomycin /Trimethoprim could reduce significantly the expression level of *bla*_{CTX-M33} gene in different concentrations tested ranging from 1.85 to 2.16 fold based on MICs. Indeed, the expression level of *bla*_{CTX-M33} was down-regulated 5953 and 8477 fold, respectively, causing knockdown of gene expression. These results suggest the possibility of vancomycin/Trimethoprim to treat UTIs with a higher efficiency. It is concluded that Vancomycin/Trimethoprim combination may diminish resistance in the *E. coli*-producing ESBL isolated from UTI patients.

60. Investigating the antimicrobial properties of *Convolvulus* honey and comparing it with nutritional honey

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Honey has long been used as food and also in traditional medicine for the treatment of various diseases. Indiscriminate use of antibiotics has caused variety of antibiotic resistance that is the most serious problem in treatment of infectious disease. The intrinsic characteristics of honey, has made it an antimicrobial agent with multiple target sites against bacteria. *Convolvulus* honey is a natural honey with high nutritional value. The aim of this study is to evaluate the antibacterial activity of the *Convolvulus* honey of Qazvin (Buin Zahra) in comparison with the nutritional honey. Minimum Bactericidal Concentration (MBC) and Minimum Inhibitory Concentration (MIC) were studied by disk diffusion and microdilution method for two honey samples. The results showed that nutritional honey did not form an inhibition zone on any of the studied bacterial species, but *Convolvulus* honey in some cases had antibacterial effect as same as antibiotic. The MIC of *Convolvulus* honey was 9.4% for *E. coli*, *P. aeruginosa* and *S. typhimurium* and 18.8% for *S. aureus*. Meanwhile, the MIC of nutritional honey for *E. coli*, *P. aeruginosa*, *S. aureus*, and

S. typhimurium was 18.8, 56, 56, and 37.5 percent, respectively. The MBC of *Convolvulus* honey for *E. coli*, *P. aeruginosa* and *S. typhimurium* was 8/18% and for *S. aureus*, 5/37% while the MBC of nutritional honey for *E. coli*, *P. aeruginosa*, *S. aureus* and *S. typhimurium* were 37.5, 75, 75 and 56 percent respectively. Totally, the antibacterial activity of *Convolvulus* honey was significant compared to nutritional honey.

61. The impact of chlorination on removing antibiotic resistant *Enterococcus* in municipal wastewater

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Today, wastewaters have brought many environmental hazards with them. Wastewaters provide conditions where antibiotic resistant bacteria can grow and multiply in it. Furthermore, antibiotic resistant genes remain in the final effluent, and thus in this way can be spread into the environment. In several studies, the presence of pathogenic *Enterococcus*, carrying antibiotic resistant genes have been reported in water and wastewater, and therefore, tracking this bacterium in environment is important. In this research, we aimed to evaluate the chlorination's effect on improving wastewater quality in point of removal of resistant *Enterococcus* to antibiotics. Sampling of raw and effluent wastewater before and after chlorination from the treatment plants in the south of Tehran was taken in three seasons, including autumn, winter and spring. After preparation of serial dilutions, the colony forming unit (CFU) was determined using pour plate culture method. Then, by using Bile Esculin Azide Agar as a selective medium the bacteria was isolated, and identified based on biochemical tests. From raw sewage and wastewater before chlorination step, the antibiotic resistant bacteria have been isolated. Thus, antibiotic susceptibility test was assessed through disk diffusion method. In our results, all isolates were sensitive to vancomycin, ciprofloxacin and amoxicillin. Furthermore, 40% of isolates were resistant to gentamicin, 40% resistant to azithromycin and 20% resistant to tetracycline. Considering the lack of detection of *Enterococcus* in wastewater after chlorination step, it can be concluded the chlorination was an effective method on removing this genus of bacteria from wastewater.

62. Investigating the effect of magnetic cellulose containing silver nanoparticles on reducing the growth of *Staphylococcus aureus*

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Today, the indiscriminate use of antibiotics has led to the creation of antibiotic-resistant strains, especially in gram-positive *Staphylococcus aureus* bacteria. This study investigates the antibacterial activity of silver nanoparticle alone and in combination with antibiotics ampicillin and cefixime on reducing the growth of *S. aureus* bacteria. In this research, nanoparticles were synthesized by chemical reduction method. Fe₃O₄/Cellulose was used as substrate and NaBH₄ was used as reduction. After centrifugation in serial dilutions of 75, 100, 200 and 400 µg/ml, it was investigated against *Staphylococcus aureus* bacteria. The properties of nanoparticles were investigated using TEM and XRD analyses. Antibacterial activity of nanoparticles alone and in combination with ampicillin/cefixime was evaluated using disk diffusion assay and MIC. In this research, TEM imaging showed that silver nanoparticles are spherical and the average particle size is between 3 and 9 nm. The results of investigating the bacterial growth halo in different concentrations showed that the diameter of the halos increases with the increase in the concentration of nanoparticles, which indicates the antibacterial effect of this compound. Finally,

we could not determine the MIC because it was from the highest selected concentration of nanoparticles. However, the results of this compound show that it can be used as an antibacterial agent against *S. aureus*.

63. Identification and dispersal of *Phytophthora* spp, the causal agent of pistachio gummosis in Razavi Khorasan province

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Pistachio is one of the most important horticultural products of Iran, with an area under cultivation of about 560 thousand hectares of fertile gardens and a production of 287 thousand tons in 1401. Razavi Khorasan province with about 120,000 hectares of pistachio orchards and production of 55,000 tons of pistachios ranks second in production among the provinces. Crown and Root Rot Disease of pistachio trees is one of the most important and common diseases in pistachio growing areas of Iran and Razavi Khorasan province. Therefore, according to the importance of the subject, the expected goals in this research include the identification of contaminated areas, the identification and distribution of *Phytophthora* species, the causative agent of Pistachio Gummosis Disease, and the determination of the dominant species. For this purpose, a number of pistachio orchards located in Feiz Abad and Sabzevar regions were visited in spring, summer and autumn of 2019. During these visits, parts of the contaminated tissue of crowns and roots of diseased trees and the soil around them were collected and transferred to the laboratory. In the laboratory, fungi isolation was performed using PARPH, selective culture medium and baiting method. The obtained isolates were studied through mycelium tips and in terms of morphology of sexual and non-sexual organs, important growth temperatures and other characteristics for species identification and pathogenicity test through root and crown inoculation. According to the results of the experiments, *P. citrophthora* and *P. drechsleri* species were identified as the agents of Gummosis disease in the region. 72% of the isolates belonged to *P. citrophthora* species and 28% belonged to *P. drechsleri* species. *P. citrophthora* was identified as the dominant species. With determination of infected trees in studied orchards, frequency of gummosis in Khorasan-Razavi province was estimated and approximately 2.1%.

64. Influence of gut microbiome diversity on the immunological landscape in *Streptococcus* induced pneumonia

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Pneumonia induced by *Streptococcus pneumoniae* is a leading cause of morbidity and mortality worldwide, particularly among the elderly and immunocompromised populations. The gut microbiome, an intricate ecosystem of microorganisms residing in the gastrointestinal tract, has emerged as a key player in modulating host immunity. This study explores the relationship between gut microbiome diversity and the immune response to *S. pneumoniae* pneumonia, with the aim of identifying potential microbiome-based interventions to bolster host defenses. This study was designed as a prospective cohort analysis, encompassing a sample size of 250 patients diagnosed with *S. pneumoniae* pneumonia. The demographic breakdown included 150 male and 100 female participants, with an average age of 70 years, reflective of the population most susceptible to pneumococcal infections. Microbiome diversity was assessed through comprehensive 16S rRNA gene sequencing of stool samples collected from each participant. Concurrently, a battery of immunological assays was employed to quantify the expression of immune response markers,

including but not limited to cytokine profiles and leukocyte differentials, at the onset of infection and at various intervals throughout the disease course. The results were indicative of a pronounced association between gut microbiome diversity and the immune response to pneumococcal pneumonia. Patients with a higher diversity of gut flora demonstrated significantly enhanced immune responses, as evidenced by elevated leukocyte counts and cytokine levels. The high-diversity group exhibited an average leukocyte count of 12000 cells/ μ L, in contrast to the 9,000 cells/ μ L observed in the low-diversity cohort. Cytokine analysis further corroborated these findings, with the high-diversity group showing an average interleukin-6 (IL-6) expression of 250 pg/mL, compared to 180 pg/mL in their low-diversity counterparts. The correlation between gut microbiome diversity and the immune response to *S. pneumoniae* pneumonia underscores the gut microbiome's integral role in host immunity. The study advocates for a paradigm shift in the management of pneumococcal infections, where microbiome modulation strategies could be integrated into standard care protocols to augment the immune response. This approach holds promise for reducing the severity and improving the prognosis of pneumococcal pneumonia, particularly in vulnerable populations

65. Biosynthesis of selenium nanoparticles using *Lactobacillus rhamnosus* bacteria and investigation of its antimicrobial properties against pathogenic bacteria

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The use of nanotechnology and nanoparticles in medical sciences and health care has expanded greatly. Metal nanoparticles are synthesized in different ways. The biosynthesis of nanoparticles using organic compounds, including bacteria, is of interest to many researchers due to its high safety and low cost. Considering the bacterial resistance to existing antibiotics and the antimicrobial effects of nanoparticles on pathogenic bacteria, selenium nanoparticles were synthesized biologically using selenite-resistant *Lactobacillus rhamnosus* bacteria. High tolerance to selenium ions and intracellular biosynthesis are the most important features of this bacterium. The characteristics of the synthesized selenium nanoparticles were evaluated using electron microscopy and X-ray diffraction (XRD), and after confirming the synthesis of the nanoparticles, their antibiotic potential was evaluated using the techniques of minimum inhibitory concentration, minimum bactericidal concentration (MIC and MBC) and well diffusion. It was evaluated on *L. monocytogenes* bacteria. The results showed that the detected nanoparticles had the highest absorption at the wavelength of 330 nm and their average diameter was 50 nm. Investigation of antimicrobial effects showed that the greatest antimicrobial effect of synthesized nanoparticles was at a concentration of 50 micrograms per milliliter. In general, it can be said that the synthesized selenium nanoparticles have significant antibacterial properties and in addition to having probiotic properties, they can be used in the production of antimicrobial compounds.

66. Investigating the effect of carbon source containing acetate on cell growth and pigment production in *Xanthophyllomyces dendrochus* yeast

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Astaxanthin is a fat-soluble carotenoid nutrient derived from the oxidation of beta-carotene. This pigment is naturally synthesized as a secondary metabolite by microalgae, yeasts, and wild or genetically modified bacteria. Due to its high antioxidant and coloring properties, there is an increasing demand for the production of this carotenoid in aquaculture, pharmaceutical, food, and cosmetic industries. *Xanthophyllomyces dendrochus*, previously known as *Phaffia rhodozyma*, is

a yeast with high potential for astaxanthin production and is considered one of the most promising microorganisms for commercial production of this carotenoid. In this study, *X. dendrorhous* yeast was used to investigate the effect of sodium acetate on cell growth and astaxanthin synthesis. Sodium acetate concentrations of 1, 2, and 3g/l were added to YM culture medium containing glucose, yeast extract, malt extract, and peptone. The highest biomass yield and pigment production were achieved by adding 3g/l of sodium acetate, which was 2.2 times higher than the control group. The results of optimizing the culture medium indicate that cell growth and carotenoid biosynthesis in this yeast are enhanced by the addition of sodium acetate.

67. Investigating the antibacterial effect of magnetic nanocomposite containing silver nanoparticles in reducing the growth of *Escherichia coli*

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Nanoparticles have emerged as a new alternative to overcome multidrug resistance, which is faced worldwide due to improper use of antibiotics. The most important parameters that affect the antimicrobial potential of nanoparticles include size, shape, electrical charge, concentration, or other antiviral, antifungal, anti-inflammatory properties, etc. This study investigates the antibacterial effect of magnetic nanocomposite containing silver nanoparticles, as well as the synergistic effect of antibiotics (ampicillin and cefixime) with silver nanoparticles against *Escherichia coli*. In this method, silver nanoparticles were synthesized with Fe₃O₄/Cellulose by chemical reduction method. Silver nitrate was used as precursor and NaBH₄ as reducing and stabilizing agents. And in dilutions of 200 and 400 µg/ml, it was investigated on *E. coli* bacteria. Its physicochemical properties were investigated by XRD, TEM and FTIR analyses. The antibacterial effect of nanoparticles was studied by well diffusion and MIC against *E. coli* bacteria. Examining the physicochemical properties of the results showed that the synthetic compound has magnetic properties, brown color and spherical shape. The size of silver nanoparticles was measured between 3 and 9 nm. When antibiotics were combined with silver nanoparticles, a significant increase in inhibition against *E. coli* bacteria was observed. The inhibition zone of the combination of ampicillin and silver nanoparticles was in the range of 11±1 mm, while the inhibition zone of the combination of cefixime with silver nanoparticles was more in the range of 28±1 mm. However, the synergistic effects of cefixime with silver nanoparticles against *E. coli* bacteria were greater. However, the results are not conclusive about the antimicrobial effects of silver nanoparticles because it requires a lot of research on other bacteria and also the toxicity of silver nanoparticles.

68. Interaction study of the newly designed peptide with outer membrane osmoporin (OmpC) of *Salmonella*

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Gram-negative *Salmonella* belong to the family *Enterobacteriaceae* and are responsible for a large disease burden worldwide. Outer membrane osmoporin (OmpC) is a vital membrane protein in *Salmonella* that plays a complex role in pathogenicity. OmpC increases the microorganism's adhesion, invasion, colonization, and proliferation capacities, and also this protein is related to antibiotic resistance. This research aims to study the inhibitory potential of the newly designed peptide against the outer membrane osmoporin of *Salmonella*. The current study utilized the 3D structure of the *Salmonella typhi* osmoporin with PDB ID: 3UU2, number chain: 3, Resolution:

3.59 Å as the receptor. The software Discovery Studio was used for receptor preparation. In the next step, by HyperChem software, a peptide with a length of 9 amino acids and sequence ALA1, GLY2, GLN3, LEU4, ARG5, TRP6, HIS7, GLY8, and GLY9 was designed and then optimized in terms of energy as ligand. Finally, docking simulations were performed. Based on our results, the studied ligand showed HBond interactions with 8 receptor residues, including ASP105, ARG37, TYR94, LEU107, PRO108, GLY111, GLN55, and ARG132. The formation of these hydrogen bonds with protein inhibits its normal function in microorganisms. The docking score of the ligand-receptor complex was -240.25. This study revealed that this newly developed peptide can be a potent inhibitor of outer membrane osmoporin. However, in vitro, antimicrobial efficacy is required to verify these results.

69. Investigating the prevalence of intestinal parasitic infections among primary school students in Oshnavieh city in 2022

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Intestinal parasitic infections are common diseases in children, especially in schools. Investigating and determining the contamination of students with these infections at different degrees in rural and urban areas is one of the research priorities for the purpose of diagnosis and treatment in the healthcare system. The purpose of this study is to determine the prevalence of intestinal parasitic infections and related risk factors among elementary school students in Oshnavieh city. In this cross-sectional descriptive study, 480 students aged 7-13 from 6 schools were selected by simple random cluster method. Prepared stool samples were tested by wet diffusion and formalin-ether sedimentation methods. Out of 480 students studied, 110 (22.9%) were infected with intestinal parasites. In terms of the prevalence of intestinal protozoa, *Giardia lamblia* in 88 cases (18.3%), *Blastocystis hominis* in 37 cases (7.7%), *Entamoeba coli* in 31 cases (6.4%) and *Iodamoeba butschili* in 3 cases (0.6 %), were diagnosed. In terms of the prevalence of intestinal worms, *Enterobius vermicularis* was diagnosed in 45 cases (9.3%). This study shows that the prevalence of parasitic infections in elementary schools is high, so health education in the field of personal hygiene is necessary for students and parents, especially mothers.

70. Isolation of lactic acid bacteria (LABs) from dairy and fermented products of Lorestan province and investigation of their antimicrobial effects on Gram-negative and Gram-positive pathogens

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Traditional dairy products and native fermented products contain a wide range of probiotic bacteria. *Lactobacilli* are a diverse group of microbial flora of fermented and dairy products and their use in the food industry is increasing due to their high probiotic properties. In order to isolate lactobacillus bacteria present in dairy and fermented products, 100 samples were collected from different geographical areas of Lorestan province and after cultivation on special growth medium (MRS), various tests were performed, including gram test, antibiogram, oxidase, catalase and fermentation. It was used for identification and initial grouping of isolated bacteria. In order to investigate the antimicrobial effects of bacteriocins of isolated bacteria on gram-negative and gram-positive pathogens, the minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) tests were used using tetrazolium chloride reagent and finally the antimicrobial potential was determined using It was estimated from the well diffusion test. The results showed that almost all the isolated bacteria were gram-positive, catalase-negative and

bacilli-shaped. The results of the investigation of antimicrobial effects showed that the most antimicrobial effect of the isolated bacteriocin was observed on Gram-positive bacteria (*Staphylococcus aureus* and *Staphylococcus guaiaculase*) and the least antimicrobial effect was observed on Gram-negative bacteria (*Escherichia coli*, *Klebsiella pneumoniae* and *Pseudomonas aeruginosa*). According to the obtained results, it can be said that the use of *Lactobacillus* bacteria as starter and additives in the production of dairy products and improving fermentation, while having probiotic properties, has a high potential to improve bacterial diseases.

71. Antifungal resistance pattern of *Candida* species isolated from cases of vaginitis in Gachsaran

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Vulvovaginal candidiasis (VVC) is one of the most frequent reasons for gynecological consultations which is caused by an overgrowth of *Candida albicans* in the majority of cases. Currently, VVC caused by non-*albicans* *Candida* species, which are resistant to routinely used antifungals, is on the rise. The aim of this study was to investigate the pattern drug resistance in the *Candida* species isolated from patients with vaginitis in the Shahid Rajaii Hospital of Gachsaran. High vaginal swabs were collected from 150 women with VVC clinical signs. Indeed, sample processing consisted of germ tube and culture onto CHROM agar, carbohydrate assimilation test and supplementary PCR. Then, the inhibitory effect of antifungals such as ketoconazole, fluconazole and amphotericin B was measured using the disc diffusion and microdilution broth assay based on CLSI guidelines (M₂₇M₄₄S). Findings shown that 50 cases were vaginal candidiasis that resulted from: *C. albicans* (70%), *C. krusei* (28%) and *C. tropicalis* (2%). Importantly, the incidence of candidiasis was estimated at 33.33%. Pregnancy and diabetes were the most frequently implicated risk factors (71.2% and 39.8%). In addition, resistance to ketoconazole and amphotericin B in *C. albicans*, *C. krusei* and *C. tropicalis* was 40-50%, 35-43% and 33-66%, respectively. While, resistance to fluconazole was 25%, 10% and 0% for *C. albicans*, *C. krusei* and *C. tropicalis*, respectively. This study demonstrated that resistance to antifungals was found to significantly increase with time. Continued surveillance of changes in species distribution and susceptibility to antifungals are necessary to guide treatment.

72. Inhibitory effects of MurG protein on leptospirosis

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Leptospirosis is a zoonotic disease transmitted through contaminated water or soil, with acute or chronic manifestations depending on the host and bacterial serovar. Pathogenic leptospires can survive in various environments and enter the body through skin or mucous membranes. Lipopolysaccharides (LPS) and peptidoglycans play key roles in pathogenesis and antibiotic sensitivity, while the enzyme MurG is crucial for cell wall synthesis. *Teucrium capitatum* plant has been historically used for their antibiotic properties, with Capitatin 4 showing potential antibiotic effects. Research aims to find compounds inhibiting MurG to prevent bacterial wall synthesis, with Capitatin 4 showing promise in binding energy studies using Pyrx and Autodock. Discovery Studio further investigates the binding of Capitatin 4 with MurG. The MurG protein has a binding energy of -2.6kJ with the Uridine-diphosphate-n-acetylglucosamine (UD1) which is original ligand. To compete with UD1, a compound must have more negative energy. Capitatin 4 was investigated in the active site, showing a binding energy of -6.0kJ, double that of the original ligand. Capitatin 4 binds to MurG protein's active site involving several amino acids.

This study uncovers plant compounds that can bind to enzyme active sites, like Capitatin 4 from *Teucrium Capitatum*, inhibiting the binding of the main ligand UD1 to prevent bacterial wall synthesis. The higher binding energy of -6.0kJ for Capitatin 4 compared to -2.6kJ for UD1 indicates a more stable bond. This demonstrates the potential of plant compounds in treating various diseases by targeting specific enzymes.

73. train producing alkaline lipase enzyme and Isolation and identification of a bacterial s activity assessment of the produced enzyme

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Lipases are a subclass of esterases that play an important role in the digestion and processing of lipids in most organisms. These enzymes are used in various fields, including food, leather, cosmetics, paper, and detergent industries. They also have great importance in biosensor development, biodiesel production, and bioremediation. In recent years, microbial biotechnology specialists have turned their attention to the commercial use of microbial lipases, and several microbial strains have been screened and identified for lipase production. For example, *Pseudomonas helmanticensis* HS6 and other bacterial and fungal genera have been employed to produce lipases for use in the detergent industry and to optimize the degreasing of sheep leather. In the present study, with the aim of isolating lipase-producing bacteria, water samples with alkaline pH and different temperatures were collected from the Qainarcheh thermal spring in Ardabil, Iran, and cultivated in a mineral saline base medium containing olive oil, as the carbon source. Following the incubation at 25-60°C for 72 h, lipase-producing strains were isolated by preparing serial dilutions and spread on plates containing tributyrin agar medium. To assay the enzymatic activity of the isolated strains, pNPP substrate was used and the most lipase-producing strain was selected. Polyphasic analyses showed that this strain belonged to the genus of *Serratia*. This strain showed an enzyme activity of 2500 U/L, which was the highest activity among other isolates. The enzyme activity can be improved after optimizing factors such as pH, temperature, different sources of nitrogen and oily carbon, shaking speed, and inoculation rate. In conclusion, the results of the present study show that *Serratia* spp. are a potential source of alkaline lipases and a proper candidate for industrial applications.

74. Formation of biofilm and cellular adhesion of *Acinetobacter baumannii* ATCC 19606 and a clinical isolate on Hela Cell line in the presence and absence of anti-Oma87 antibody and acute cytotoxicity of the antigen

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Acinetobacter baumannii, recognized in recent decades as an opportunistic nosocomial pathogen, poses a significant threat to the health of hospitalized patients. The presence of various multifaceted factors involved in the pathogenicity of *A. baumannii* has made its treatment and control challenging. The World Health Organization has classified *A. baumannii* among the most dangerous pathogens. One of the most critical virulence factors in *A. baumannii* is the porins present in its outer membrane. Oma87, or BamA, is one of the key components of the Bam complex, which is essential for incorporating various proteins into the membrane of *A. baumannii*. This complex is crucial for the survival of Gram-negative bacteria, making Oma87 a promising candidate for combating *A. baumannii*. In three doses, the Oma87 protein was expressed using an expression vector, and *E. coli* as a host was purified and injected into BALB/c mice. Blood samples

were collected after each injection, and the antibody titer was evaluated. The acute toxicity of the protein was also assessed following its injection into the mice. Biofilm formation tests were conducted in the presence and absence of the anti-Oma87 antibody. HeLa cells infected with both standard and clinical strains of *A. baumannii* were treated with anti-Oma87 serum, and cellular toxicity, adhesion, and internalization tests were performed. The role of actin microfilaments in HeLa cells in the entry of *A. baumannii* was also evaluated by disrupting the cytoskeletal synthesis using cytochalasin. The anti-Oma87 antibody was found to significantly reduce biofilm production by both the standard and clinical strains. Furthermore, the results of the cellular tests indicated that Oma87 could induce incomplete apoptosis through autophagy stimulation, potentially increasing bacterial proliferation within the host cell. The findings of this research suggest that the Oma87 protein could be evaluated as a new therapeutic option. The aspects investigated in this study and the analysis of the results provide valuable insights into the pathogenicity of *A. baumannii* and its virulence, paving the way for more effective therapeutic strategies against *A. baumannii*.

75. Fixation of *pfprt* resistance allele associated with Chloroquine resistance in *Plasmodium falciparum* isolates from Southeast of Iran

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Malaria is a significant public health challenge in the world, with *Plasmodium falciparum* being the deadliest species. *P. falciparum* resistance to Chloroquine is a significant challenge for malaria control. In Iran, since 2007 Chloroquine was removed from first-line treatment of *P. falciparum* because of the emergence of *pfprt* mutant allele at position K76T. In this study, molecular surveillance of chloroquine drug resistance allele (K76T position in *pfprt* gene) was carried out in *P. falciparum* isolates collected from southeast of Iran. A total of 50 blood samples were collected from patients diagnosed with *P. falciparum*. Genomic DNA was extracted from each sample and used as a template for Nested-PCR amplification of the *pfprt* gene. The PCR products were then subjected to restriction fragment length polymorphism (RFLP) analysis using the restriction enzyme *ApoI*. The result of PCR-RFLP analysis showed high prevalence of mutant allele at position 76 of *Pfprt* (94% frequency), which indicates the fixation of mutant allele of *pfprt* in Iranian *P. falciparum* isolates. The fixation of mutant allele of *pfprt* gene at position K76T despite the absence of Chloroquine pressure might indicate that Chloroquine cannot be reuse in endemic areas of Iran. Further surveillance and comprehensive molecular studies in larger population size are recommended to inform about the molecular markers associated with anti-malarial drug resistance.

76. Osteo-inductive accelerating potential of myxobacterial secondary metabolites

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Even though human life expectancy has increased in recent decades, skeletal disorders remain one of the leading disabling factors that affect millions of elderly people worldwide. Myxobacteria are one of the major producers of biologically active secondary metabolites with distinctive structures that make them ideal as a source in biopharmaceuticals. The effects of Myxobacteria metabolites were investigated on bone marrow stem cell differentiation into osteoblasts in the present study. To collect secondary metabolites, the strains were transferred to a 1/2 H fermentation medium,

and secondary metabolites were obtained by liquid-liquid extraction. As part of the study, the MTT assay was used to assess the effect of metabolite Myxobacteria exposure on bone marrow stem cell viability. Quantitative measurement of calcium deposition and level of Alkaline phosphatase (AKP) enzyme activity, followed by expression of osteoblastic markers, and calcium nodules was conducted to evaluate the osteoinductive activity of the metabolites. The results showed that myxobacterial extracts at 0.048 and 0.096 $\mu\text{g/ml}$ concentration induces differentiation of bone marrow stem cells by enhancing AKP activity, along with increasing calcium deposition and expression of Osteopontin (OPN) and Osteocalcin (OCN). Data suggest that myxobacterial metabolites may have therapeutic potential in repairing by promoting osteogenesis. As a result of the high differentiation induction of Myxobacterial extracts at minimal concentrations, they have the potential to be further investigated in animal studies following the purification of the active compound.

77. Antimicrobial activity of Field Horsetail on *Staphylococcus aureus* and *Pseudomonas aeruginosa*

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Staphylococcus aureus is considered the most important species from the medical point of view. *Staphylococcus aureus* is one of the most common hospital infections, especially wound infections. Also, *Pseudomonas aeruginosa*, which is a potential pathogen and can cause severe disease. *Equisetum arvensis*, or horsetail, is a perennial herb that is native to the temperate regions of the Northern Hemisphere. First, we dried the plant in the shade and then ground it. Then acetone and ethanol solvents were added to them and extracted by maceration method. Then the extracts were kept in the refrigerator for 24 hours. After that, the extracts were filtered and poured into the plate and dried. Then, in a 24-well plate, 1000 microliters of Mueller Hinton's broth were added to each well of the plate with 500 microliters of stock solution containing dimethyl sulfoxide. In addition, 500 μL of bacterial suspension was added to each well and kept in an incubator for 24 hours. Finally, MIC and MBC were investigated. Based on laboratory studies, the data related to the antimicrobial activity of ethanolic and acetone extracts of *E. arvensis* plant on *S. aureus* were converted to 15.6 mg/ml and 3.9 mg/ml. Also, ethanolic and acetone extracts of the mentioned plant were converted to 31.2 mg/ml and 15.6 mg/ml on *P. aeruginosa*. According to the results, the acetone extract of *E. arvensis* was more effective on *S. aureus* and *P. aeruginosa*, and secondly, the ethanolic extract of the mentioned plant is effective on *S. aureus*.

78. Structural modeling of alkaline and detergent-resistant protease of *Aeromonas caviae*

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Extracellular detergent-resistant alkaline proteases found in bacteria, such as subtilisin and metalloprotease, are widely employed in various industries, including detergents. Because of their economical production and capacity to eliminate protein stains like blood have become an essential component of the washing powder business. Here, molecular modeling was used to obtain the 3D structure of this enzyme for the first time. The enzyme sequence was obtained from NCBI (ACCESSION: BBT67059). The 3D structure was modeled using AlphaFold2. Chimera was used for visualization and structural analyses. The resulting structure folds with 340 amino acids including 12 β -sheets, and 12 α -helices. The overall structure exhibits high confidence (IDDT) except for C-terminal (1-23) amino acids, which were not properly folded. The overall structure

of the enzyme is consisting of two subdomains: Immunoglobulin-like and Catalytic Domain. Histidine residues (293 and 297) that function as zinc ligands at the active site in other proteases are also present here. The third zinc ligand is an aspartate in the conserved G303T304xD306xxT309G310 motif. As the critical active site residues and the main domains are conserved in this enzyme and it shows high confidence in most of the structural assembly, it could be used in industry and for enhanced performance purposes. This model could be a prime target for rational design and engineering of the enzyme.

79. The first report of *Alcea koelzii* as a new host for *erysiphales* fungi

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In the present time, there is a growing global interest in medicinal plants and traditional remedies. One important group of medicinal plants is the *Alcea* L., which is belongs to the Malvaceae family. This genus was originally classified under the *Althaea* L. genus, and later reclassified. It is now recognized as one of the most complex and challenging plant species in the Middle East, with 39 species in Iran. These plants grow in mountainous places, farms, gardens, and alongside roads. The flowers of these plants have medicinal properties and some genetically modified varieties are used for ornamental purposes. Approximately 22 species of *Alcea* are unique to Iran, and other species also grow in Turkmenistan, Afghanistan, Central Asia, Anatolia, Iraq, Transcaucasia, Palestine, and Syria. According to the Barcode of Life Data System (BOLD), this genus is native to Asia and Europe, and has been used by people in these regions for many years. To study *Erysiphales* infecting *A. koelzii* L. Riedl, samples of the infected plant were collected from various areas in Lorestan province. The collected samples were taken to the laboratory for identification. Macroscopic signs of fungi on the host were recorded, and the organs of the fungi were described through microscopic observation. The fungal agent was identified using the *Erysiphales* key and new articles, revealing the presence of *Leveillula contractirostris* Heluta & Symonian. In Iran, previous reports had identified *Erysiphe malvacearum* Fr. on the species of *Alcea Hausknechtii* Boiss from the Kurdistan Region and *L. taurica* (Lev.) G. Arnaud (synonymous of *L. malvacearum* Golov. F. althaeae Jarz) on the species of *A. kurdica* (Schltdl.) Alef. in the Karaj and Kermanshah Regions. However, there are no reports of *Erysiphales* fungi on the plant species of *A. koelzii* L. in the world. Therefore, the identification of *L. contractirostris* Heluta & Symonian on *A. koelzii* L. Riedl represents a new record.

80. Introducing the medicinal plant of *Gundelia tournefortii* L. as a susceptible species plant to powdery mildew disease

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The plant species *Gundelia tournefortii* L. belongs to the Asteraceae, which is the largest flowering plant family, with about 900 genera and more than 13,000 species. In Iran, the *Gundelia* genus has only one species, which is a perennial herb. This plant also grows in Iraq, Turkmenistan, Afghanistan, Cyprus, Syria, Egypt, Turkey, Jordan, Azerbaijan, and Armenia. It is both an edible vegetable and a native medicinal plant in some temperate, mountainous, and semi-desert regions. It is an important medicinal plant in parts of Iran, especially in the Zagros area. Samples of infected plants were collected from the Lorestan province at an elevation of 2016 m to study the infectious fungi of *Erysiphales*. The collected samples were transferred to the laboratory, and herbarium samples were prepared then identified using the morphological characteristics with the identification keys of Flora Iranica (Rechinger 1963-2010) and Flora of Iran (Assadi 1989). From

each of the chasmothecia, asci, ascospore, and conidia, 50 specimen were examined with a calibrated microscope. The identified fungi that infects this plant was *Leveillula taurica* (Lev.) G. Arnaud. Previously, the fungi species of *Golovinomyces sordidus* (L. Junell) V. P. Heluta was reported in the Zagros on *G. tornefortii* L. by Rabenhorst (1871). However, the report of *L. taurica* (Lev.) G. Arnaud from Zagros and Lorestan province is a new record.

81. Investigating the antimicrobial effect of acetonic and ethanolic extracts of black seed on *Escherichia coli*

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In addition to creating drug resistance, antibiotics have the ability to change the body's natural flora. Considering the history of medicinal plants and the use of their extracts to treat diseases, it made scientists to use plants. In this study, the antimicrobial effect of ethanolic and acetone extracts of black seed on *Escherichia coli* was investigated. After collecting black seeds, the extracts were prepared by the maceration method. By the 24-well plate, half of McFarland's microbial suspension, stock with a concentration of 0.5 mg/ml, as well as the Mueller Hinton agar/broth culture medium, the sensitivity of the tested bacteria to determine the minimal bactericidal concentration (MBC) and the minimum inhibitory concentration of Growth (MIC) was evaluated by macrodilution and serial dilution method. Based on the dilutions prepared by the serial dilution method, MIC of the ethanolic and acetone extracts of black seed on *E. coli* were 31.2 and 62.5 mg/ml, respectively, as well as MBC of ethanolic and acetone extracts of black seed on *E. coli* were measured as 62.5 and 125 mg/ml, respectively. Ethanol extract of black seed has higher antimicrobial properties and shows antimicrobial effect in low concentrations, also the data of this study shows that acetone extract of black seed has antimicrobial effect in high concentrations.

82. Investigating the antimicrobial effect of acetonic and ethanolic extracts of shallot on *Escherichia coli*

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Compounds derived from plants are important from a medical point of view due to their antimicrobial properties, and due to the resistance of microorganisms to some antibiotics, researchers are seeking to use alternative antimicrobial substances, among which medicinal plants shine brightly. In this research, the antimicrobial effect of ethanolic and acetone extracts of shallot plant on *Escherichia coli* bacteria was investigated. After preparing ethanolic and acetone extracts of shallot plant by maceration method, to determine the minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) of this extract on *E. coli* bacteria, macrodilution method and preparation of dilution by serial method were used. we won for this purpose, 24-well plates, half McFarland microbial suspension, 0.5 mg/ml stock solution and Mueller Hinton agar/broth culture medium were used. The minimum growth inhibition concentration of ethanolic and acetone extract of shallot on *E. coli* bacteria is 15.6 and 31.2 mg/ml, respectively, and the minimum lethal concentration of ethanolic and acetone extract of shallot on *E. coli* bacteria is 31.2, respectively. and 62.5 mg/ml was measured. The ethanolic extract of the shallot plant has higher antimicrobial properties, and the data of this study shows that the acetone extract of the shallot plant has an antimicrobial effect in high concentrations.

83. Characterization of biosurfactant produced by a *Candida* strain

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Biosurfactants are amphipathic complexes classified into two categories based on molecular weight: low and high molecular weight. More attention has been paid to biosurfactant production recently due to their perceived advantages over synthetic surfactants, mainly their ease of biodegradation, which significantly reduces the environmental burden compared to chemical processing. In this research, a yeast strain was first investigated with standard biosurfactant identification tests, including oil stain removal, emulsification index, CTAB plate, and hydrocarbon decomposition. Then, this strain was analyzed using the *ITS* gene, and BLAST data analysis determined that the strain belonged to *Candida haemulonii* species. By examining the CTAB plate results, it was concluded that this biosurfactant is non-glycolipid and non-anionic. This strain showed a halo with a diameter of 11 cm in the oil stain expansion test and reduced the surface tension to 41.3 mN/m. Additionally, the hydrophobicity level of this cell was estimated to be 33%. Based on crude oil analysis data, this strain can remove crude oil and use it as a carbon source. The emulsifying ability of this strain for toluene and olive oil was 48% and 50%, respectively. Moreover, its ability to dissolve crude oil in salt and fresh water was much higher than the market's 1.2% solution of common surfactants. Studies related to salinity, temperature, and pH showed that this biosurfactant's stability decreases under extreme conditions. Based on the obtained results, the produced biosurfactant has a high potential for use in various industries, including agriculture and petrochemicals.

84. Photodynamic inactivation of *Acinetobacter baumannii* in planktonic form using a photosensitizer and silver nanoparticles

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Acinetobacter baumannii is a significant opportunistic pathogen and a cause of infections in hospital intensive care units. Recently, antibiotic-resistant strains of *A. baumannii* have increased significantly, making the development of new and effective therapeutic methods necessary to combat infections caused by this bacterium. Photodynamic inactivation involves the use of a non-toxic dye (photosensitizer) combined with visible light of a specific wavelength in the presence of oxygen, resulting in the production of reactive oxygen species, oxidative damage to biomolecules, and cell death. The use of nanoparticles aids in the solubility and permeability of the photosensitizer in microbial cells. For photodynamic inactivation of the planktonic form, *A. baumannii* ATCC 19606 and *A. baumannii* AB58ST strains were used. The minimum inhibitory concentration and minimum bactericidal concentration for silver nanoparticles were determined. Bacteria with a concentration of 1×10^8 CFU/ml were prepared and then treated in 96-well plates with a combination of silver nanoparticles and erythrosine B for 20 minutes, followed by exposure to laser light (530 nm). The number of bacteria after treatment was measured by dilution and colony counting. In both bacterial strains, the use of erythrosine B alone resulted in an approximate 1-log reduction in bacterial count. Adding silver nanoparticles to the photosensitizer resulted in an approximate 7-log reduction in bacterial count for both strains. The results indicate that the use of silver nanoparticles enhances the bactericidal effect of photodynamic inactivation.

85. Isolation and identification of phenol-degrading bacteria of *Lutjanus erythropterus* in Persian Gulf

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Pollution refers to the introduction of harmful substances into the environment, which are known as pollutants. Marine pollution is an important environmental issue that affects the health of marine ecosystems and the well-being of human populations. Among all water pollutants, phenol is one of the most common pollutants, also, phenol and its derivatives can change the taste and smell of water and make it very toxic to aquatic life, animals and humans. Phenol is a polycyclic aromatic hydrocarbons (PAHs) that have been reported to be toxic or lethal to fish at concentrations of 5-25 mg/L. Biodegradation involves the introduction of microorganisms to enhance the degradation of pollutants such as (PAHs). In this project, after taking samples from the Persian Gulf and culture on Bushnell agar medium, phenol-degrading bacteria were isolated from the intestines of *Lutjanus erythropterus*, then tests were performed to screen the best strain, which included DCPIP color test, degradation test, E24 test and measurement. Phenol was removed. By obtaining the results of the tests and selecting the best phenol decomposer strain, using Expert Design software and designing tests to optimize the best strain, the s1 strain with the highest degradation rate was selected, and with the molecular identification of this strain, it was named *Pseudomonas Stutzeri*-strain 1-4-2 was identified. After obtaining effective phenol-degrading bacteria from the polluted environment and studying their degradation characteristics, it is expected that these strains will play an important role in reducing environmental pollution.

86. Investigating the quantity of naphthalene-degrading bacteria in two shank fish and ewe fish in the Persian Gulf

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Pollution creates significant environmental challenges worldwide. Land sources and discharge into the sea are the main causes of sea pollution. The Persian Gulf faces significant pollution challenges such as oil spills, shipping accidents, and oil extraction processes. Polycyclic aromatic hydrocarbons (PAHs) are a group of organic compounds, the simplest representative of which is naphthalene, which is a toxic air pollutant. Excessive consumption of this compound can lead to environmental pollution and harmful effects to marine life, especially fish. Naphthalene-degrading bacteria are organisms that have the power to break down naphthalene and destroy naphthalene by creating a biological process. CFU and MPN counts were used to check the amount of bacteria. Formula was used to count CFU and MPN Calculate software was used to count MPN. Finally, after the investigation, it was found that shank fish has a higher number of decomposing and heterotrophic bacteria than ewe fish. Also, according to the molecular identification of *Pseudomonas sp.* S2-1 was detected. This research will help identify suitable bacterial isolates for future cleanup processes at hydrocarbon-contaminated sites and underscore the importance of these new strains in environmental bioremediation efforts. It is expected that naphthalene reducing strains will play an important role in reducing environmental pollution.

87. Synthesis of chitosan-silver nanocomposite film based on acetic acid and ascorbic acid and comparison of their antimicrobial effect

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Antibiotic resistance is a new global problem and there is a need to develop new antimicrobial agents. Nanomaterial-based therapies are promising tools to combat difficult bacterial infections, featuring the capacity to evade existing mechanisms associated with acquired drug resistance. In addition, their unique size and physical properties give them the capability to target biofilms, overcoming refractory infections. In this research, we developed the synthesis of silver nanoparticles (Ag-NPs) using chitosan as a stabilizer and organic acid as a reducing agent. After preparing the chitosan solution in acetic acid and ascorbic acid, silver nitrate was gradually added to the chitosan solutions. The color change to brown indicates the formation of Ag-NPs. CS-Ag NC films with two different organic bases were cut into 5-mm-diameter circles and their antibacterial performance were determined using the disc diffusion test. A number of isolates resistant to antibiotics similar to *Klebsiella pneumonia*, *Pseudomonas aeruginosa*, *Escherichia coli* and *Staphylococcus aureus* as well as a number of standard bacteria were selected for antimicrobial tests. The highest antibacterial activity was obtained with CS-Ag NC film with acetic acid base with mean of inhibition zone diameters of 21.2 and 30.25 mm against clinical and standard isolates, respectively. The mean of inhibition zone diameters for CS-Ag NC film with ascorbic acid base against clinical and standard isolates were 11.18 and 14.68 mm, respectively. We know that antimicrobial activity depends on the size of nanoparticles. The smaller the diameter of the particles, the higher the surface-to-volume ratio, and as a result, the surface oxidation and subsequent release of ions increases, which ultimately leads to an increase in the bactericidal effect. Here, we have presented an improved synthesis method that the use of acetic acid as a reducing agent causes proper dispersion of the synthesized very small silver nanoparticles in the chitosan polymer and as a result increases the contact surface of the silver nanoparticles with the microbial cells.

88. Prevalence of hydatid cyst in cattle slaughtered at Tabriz slaughterhouse: A detailed study

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Hydatidosis, caused by the larval stages of *Echinococcus granulosus*, is a zoonotic parasitic disease that significantly impacts livestock, leading to economic losses due to reduced productivity and condemnation of infected organs. This study aims to determine the prevalence of hydatid cysts in cattle slaughtered at the Tabriz slaughterhouse over a five-month period, with a focus on gender and age-related differences in infection rates. A total of 1354 cattle (609 males and 745 females) were examined at the Tabriz slaughterhouse between October 2023 and February 2024. The cattle were divided into two age groups: 764 cattle aged 2 to 4 years and 590 cattle aged more than 4 to 6 years. Post-mortem examinations were conducted to identify the presence of hydatid cysts in the liver and lungs of the animals. Out of the 1354 cattle examined, 83 (6.1%) were found to be infected with hydatid cysts. The prevalence of infection was higher in females (8.3%) compared to males (3.4%). Statistical analysis revealed no significant correlation between infection rates and different age groups ($p=0.441$). However, cattle aged 2 to 4 years had a slightly higher infection rate (6.3%) compared to those aged more than 4 to 6 years (5.9%). This study highlights the prevalence of hydatid cysts in cattle slaughtered at the Tabriz slaughterhouse, with a higher infection rate observed in females. Despite the lack of significant age-related differences, the findings underscore the need for targeted interventions and control measures to reduce the impact

of hydatidosis in livestock populations. Further research is recommended to explore the underlying factors contributing to the observed infection patterns.

89. Prevalence of macroscopic *Sarcocystis* cysts in slaughtered cattle at Tabriz slaughterhouse

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Sarcocystis is a parasitic protozoan that infects a wide range of animals, including cattle, leading to the formation of cysts in various tissues. The presence of macroscopic *Sarcocystis* cysts can result in economic losses due to condemnation of affected meat and reduced carcass value. This study aims to assess the prevalence of macroscopic *Sarcocystis* cysts in different organs of cattle and to determine if there is any significant association between infection rates and the gender or age of the cattle. A total of 1371 cattle were inspected post-mortem at the slaughterhouse, with their organs (diaphragm, heart, muscles) thoroughly examined for the presence of macroscopic *Sarcocystis* cysts. The sample included cattle of various ages and both genders. Statistical analysis was performed to evaluate any potential correlations between infection rates and the cattle's gender and age. The inspection revealed that 25 muscle samples (1.8%) were infected with macroscopic *Sarcocystis* cysts. There was no significant correlation between the infection rates and the gender or age of the cattle, indicating that these factors did not influence the prevalence of the infection in the examined population. This study highlights the presence of macroscopic *Sarcocystis* cysts in the muscles of cattle slaughtered at a local abattoir, with no significant differences observed based on gender or age. These findings suggest that control measures should focus on broader management practices rather than targeting specific groups based on gender or age. Continued surveillance and improved farm hygiene are recommended to reduce the prevalence of *Sarcocystis* infection in cattle populations.

90. Comparing antioxidant properties of two lactic acid bacteria cultivated in skimmed milk

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In recent years, there has been increasing interest in lactic acid bacteria for their numerous health benefits. These beneficial microorganisms have various valuable properties, such as antioxidant capability, which can play a role in slowing down aging, reducing inflammation, preventing DNA damage, and inhibiting the formation of cancer cells. The research focuses on identifying probiotics and lactic acid bacteria with strong antioxidant properties and the ability to counteract reactive oxygen species (ROS), thereby potentially preventing DNA damage, cancer cell growth, and the aging process. The aim of this study is to explore and compare the antioxidant properties of two strains of lactic acid bacteria, specifically *Lactobacillus plantarum* PTCC1901 and *Lactobacillus helveticus* PTCC1930 to uncover novel strategies for disease prevention and health improvement. In current study, the *Lactobacillus plantarum* PTCC1901 and *Lactobacillus helveticus* PTCC1930 strains were cultured in de Man, Rogosa, and Sharpe (MRS) broth and the bacterial strains were moved to 8% skimmed milk and incubated for an additional 24 hours at the same temperature in microaerophilic conditions. Then strains were separated through centrifugation to isolate the bacterial cells. The resulting cell-free supernatant and extract were collected for use as test samples to assess their antioxidant properties. The results showed that the CFS of two strains, *L. helveticus* PTCC1930 and *L. plantarum* PTCC1901 exhibited superior antioxidant capabilities compared to CFE samples derived from *L. helveticus* and *L. plantarum* PTCC1901 (P-value<0.05). The antioxidant activity of *L. helveticus* PTCC1930 CFS (57.15%)

and *L. plantarum* CFS (55.58%) surpassed that of CFE (25.11%) and CFE (21.82%). Particularly, cell-free supernatants (CFSs) displayed notably higher antioxidant efficacy than cell-free extracts (CFEs). To conclude, the research underscores the reinforced antioxidant capabilities of two probiotic strains cultivated in 8% skimmed milk. The result showed that strains can be further applied to inhibit cancer cell proliferation, mitigate aging processes, and alleviate inflammatory responses.

91. Cloning, Expression and purification of chimeric proteins comprising antigenic regions of *FliD*, *UreB* and *Omp18* proteins and evaluation of its applicative potential for serodiagnosis of *Helicobacter pylori* infection

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Helicobacter pylori (*H. pylori*) infection is accepted as the primary cause of chronic gastritis. Among the diagnostic methods of *H. pylori* infection, serological tests as an antibody-based method are widely available and relatively sensitive to detect *H. pylori* infection. However, the low specificity limits its application. The present study was aimed for designing, cloning and expression of *UreB* - *Omp18* protein from Iranian *H. pylori* strains. After extraction of genomic DNA from focal *Helicobacter pylori* strain, *ureB* and *omp18* genes were amplified by primers designed for these genes by PCR reaction and cloned into pET-22b expression vector after enzymatic cleavage. The expression of the resulting recombinant protein was induced by IPTG and purified with high purity by affinity chromatography. The antigenic properties of the purified recombinant protein were confirmed by Western blotting. In this study, two *UreB* and *Omp18* gene fragments were amplified by PCR as 597 and 479 bp fragments, respectively, and cloned as a hybrid fragment in the pET-22b vector. The expression of the recombinant protein in *E. coli* BL21 (DE3) appeared as a fragment of about 60 kDa on SDS-PAGE and was purified by Ni-NTA column. Western blot results of purified chimeric antigen with sera of *H. pylori* infected patients showed the antigenic properties of the recombinant protein. In the present study, for the first time, the recombinant *UreB-Omp18* protein was produced from the native strain of *Helicobacter pylori*, which can be a suitable candidate for designing a *Helicobacter pylori* diagnostic kit in the region.

92. Improvement of bioethanol production and tolerance of *Saccharomyces cerevisiae* under some stresses to reduce water consumption

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Bioethanol has been known as the mostly used biofuel worldwide and improving the production process of bioethanol for economic and environmental reasons is a priority research field on an international scale. ethanol-manufacturing is a water-intensive industry. One of the most important challenges of bioethanol production units is reducing water consumption. One of the strategies to reduce water consumption is using Persian Gulf sea water as a free and abundant source instead of fresh water in bioreactors. However, yeast strains must be Salt tolerance and able to produce ethanol in sea water. Therefore, in this research, the yeast *Saccharomyces cerevisiae* with the ability to tolerate stress and high ethanol production was isolated and identified. The isolated yeast was able to produce 7.6% (v/v) ethanol with an efficiency of 0.84 g L⁻¹ h⁻¹ during fermentation at 37°C with 18 °Brix (190 g L⁻¹), 0.7 M salt and inoculum size of 1.1 × 10⁸ cells/ml. In order to improve the tolerance of yeast to salinity, 15 times of serial cultivation were carried out in 0.7 M

salt for the adaptive evolution of the isolate. Based on this, the growth of the adapted isolate was observed to be almost ten times that of the unadapted isolate within 24h. Therefore, based on the obtained results, the isolate has the potential of fermentation under the stresses of high sugar gravity, high temperature and salinity and can be further evaluated, improved and optimized for industrial bioethanol production and reducing water consumption during bioethanol production.

93. Prediction of ligands interacting with CpxA to reduce drug resistance

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The CpxAR two-component regulatory system protects cells against stresses. In response to membrane stress, CpxA by phosphorylating CpxR up-regulates the expression of genes involved in membrane repair and down-regulates genes encoding pathogenic factors. In addition, the Cpx system is involved in the multidrug resistance (MDR) of various human pathogens. Therefore, pharmacological targeting of the CpxAR system by inhibiting/decreasing the phosphorelay activity of CpxA can act as an antimicrobial strategy. Ligand-protein interaction comparison and analysis web server (LPIcom) was utilized to analyze the protein binding affinity of the periplasmic domain of *Escherichia coli* CpxA and the 10 desired ligands. Bioinformatics studies were performed based on homology analysis at the level of amino acid sequence and three-dimensional structure of the CpxA protein for homology with human proteins to determine possible effects of ligands in the human body. Enrichr was employed for enrichment analysis. According to the results of ligand-protein interaction analysis, Myristic acid showed the most binding affinity and is a suitable candidate for docking investigation. Homology studies showed low similarity with 5 human proteins (MEIOB, GLYCTK, CRAT, RAD52 and PAPSS1). The enrichment analysis results of these human proteins are related to the DNA repair and cellular metabolic process pathways. The low similarity of CpxA protein with human proteins makes the CpxA protein a promising drug target. Identifying ligands that inhibit/decrease the phosphorelay activity of the CpxA component of this system can be effective in identifying natural compounds with antibiotic properties and reducing the severity of pathogenicity and drug resistance.

94. Investigation and isolation of gut and feces bacteria of *Paralauadokia caucasia* by molecular method in Taleghan city, Alborz province

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Reptiles are cold-blooded vertebrates whose bodies are covered with scales or horny plates, which separates them from other vertebrates. They do not have an aquatic larval stage and are often oviparous. Lizards belong to the Suria suborder and constitute the largest population of vertebrates in Iran, Afghanistan, and Central Asia, after the bird branch. Reptiles often carry bacterial pathogens that can cause dangerous diseases in humans or economically relevant animals. *Paralauadokia caucasia* usually lives near humans along with other reptiles in rural and urban areas. Therefore, it is crucial to determine the possibility of transmission of various pathogens by this lizard. Microorganisms, especially bacteria, help in nutrient absorption and immune response in the host and impact behavior, growth, reproduction, and host health. Rare studies in the microbiota of reptiles include Johnson Delaney's (1996) study on the gut microbiome of green iguana, Seyed *et al.* (2019) on the flora of *Laudakia nupta*, and Bunker (2022) on the cloacal microbiome of *Sceloporus virgatus*. Taleghan City is located in the Northwest of Alborz province. The results

were obtained from aerobic bacteria investigation in the gut microbiome and feces of the Caucasian agama by isolation and purification in the nutrient-rich media and phylogenetic analysis (using universal primers 27F and 1429R). Five species from the gut and three in feces were identified with the same two species in both samples. The identified bacteria are *Bacillus cereus*, *Brevibacterium frigoritolerans*, *Lactococcus garvieae* subsp. *bovis*, *Kocuria carniphila*, *Lysinibacillus capsici*, and *Enterobacter ludwigii*. Their 16s rRNA gene sequence was submitted in the GenBank database under accession numbers OR079309, OR079438, OR079444, OR079486, OR079741, OR079894, OR079913 and OR079922. It is suggested to investigate the biotechnological properties of these bacteria in future studies.

95. Optimization of cellular heat treatment process and evaluation of protein content produced as animal feed

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With the increasing world population, the demand for various food resources, including protein, is growing, and with the depletion of protein reserves and the increase in population growth, meeting the required protein needs poses a challenge. Single Cell Protein (SCP) has recently gained attention as a suitable substitute for animal and plant proteins, and mass industrial production of SCP using microbial fermentation will be a solution to address this shortage. SCP is derived from various sources including bacteria, yeast, and algae, with bacteria having the highest protein content evaluated. Among a wide spectrum of bacteria used in SCP production, *Methylococcus capsulatus* has the highest protein content (around 70%) in its cell wall and cytoplasm. To make this protein more readily available to the digestive enzymes of livestock, it is necessary to break down its cell wall and release the contents inside. The most economically efficient method for breaking down the cell wall is thermolysis. Since this bacterium is thermophilic, thermolysis should be performed at high temperatures. During the thermolysis process performed on the bacteria, it was observed that the highest protein content was observed in the temperature range of 120-145 °C in the first 20 minutes, but at lower temperatures (80-100 °C), the maximum cell rupture was observed after about 4-6 hours. However, after 20 minutes, a decrease in protein content was observed at these temperatures, likely due to denaturation of the protein with increased temperature, resulting in its decreased concentration.

96. The effects of light destruction on the antibacterial properties of the combined solution of oxytetracycline and erythrosine-B

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Oxytetracycline (OTC) is a broad-spectrum antimicrobial agent and widely used in human and animal medicine. It is mostly released in its original form after metabolism in the body, with good water solubility and easy accumulation in the environment. Edible dyes such as Erythrosine (ERY) are used in food industry at large scale for coloring of food and in pharmaceuticals. Erythrosine is harmful for living beings, if is used above permissible limit and for long time and it was found to damage DNA structure. These residual OTC and Erythrosine in the environment can enter the food chain through drinking water, livestock and poultry products, leading to the development of corresponding antibiotic resistance in humans. Four Gram-positive and eight Gram-negative strains were used in this study. OTC and ERY were degraded during treatment with a solar-enhanced oxidative system involving ferrous ion (II) and persulfate. *In vitro* antibacterial activities of the control and polluted and photodegraded solutions were determined by paper disc method.

Antibacterial activity were observed in 3 of examined taxa (*Bacillus subtilis*, *Staphylococcus aureus* and *Staphylococcus epidermidis*) and not observed in the rest. The strongest antibacterial activity was seen against *S. epidermidis*. However, the photodegraded solution had no significant antibacterial activity on all of the tested strains.

97. Isolation of microorganisms with the possibility of biological removal of ammonia by simultaneous nitrification and denitrification method

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Ammonia is a significant pollutant in aquatic ecosystems, such as aquaculture systems. Fish waste produces ammonia in these environments, causing organism stress and death. Biological removal of ammonia is an environmentally friendly method. Common biological ammonia removal methods rely on autotrophic nitrification (converting ammonium to nitrate) and heterotrophic denitrification (converting nitrate to nitrogen). However, the low efficiency and high oxygen demand in the autotrophic nitrification process and the necessity to remove oxygen in the heterotrophic denitrification process have limited the application of these methods. Simultaneous Nitrification and Denitrification (SND) is a heterotrophic and aerobic process that converts ammonia to nitrogen without the limitations of previous methods. In this study, water samples obtained from fish farming ponds were inoculated into a liquid medium containing CH₃COONa, (NH₄)₂SO₄, KNO₃, or NaNO₂ and were kept for 7 days in a shaker incubator at 150 rpm and 30°C. By inoculating the samples onto the solid medium and conducting successive cultures, a pure strain named H1 was obtained. The simultaneous nitrification and denitrification capabilities of strain H1 were evaluated using colorimetric methods with indophenol blue, N-(1-Naphthyl)Ethylene Diamine reagent, and absorbance measured at a wavelength of 220 nm for the removal of ammonia, nitrite, and nitrate. Strain H1 removed 77.54% ammonia, 92% nitrite, and 95.39% nitrate in 7 days. The results of this research indicate that SND strains represent new and effective options for removing ammonia pollutants from aquatic environments.

98. Investigating the purification of pre-treated leachate with the help of *Chlorella vulgaris* and *Dunaliella salina* microalgae

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Odorous liquid leachate, with a brown color and a complex composition, which contains about 200 types of dangerous substances; It causes serious pollution in the soil and water tables and humans and it is necessary to make it safe before release in nature. Until now, different chemical and biological purification methods have been used, but they have not been effective alone. In this research, by combining several chemical and biological methods, the level of leachate purification has been investigated. For pre-treatment by "flocculation/sedimentation" method to compare the effect of flocculants in separating pollution; Iron chloride, aluminum sulfate, and polyaluminum chloride were investigated. The resulting leachates were treated with different concentrations of activated carbon by the "absorption" method. To final purification by "biological purification", two microalgae *Chlorella vulgaris* and *Dunaliella salina* were cultured in the pre-treated leachates of the previous stages. Among the three flocculants, aluminum sulfate with a concentration of 3 grams per liter, at 5 pH, and a treatment step with activated carbon with a concentration of 20 grams per liter; He was able to get the best result. The COD reduction rate was 92%, BOD reduction was 97% and turbidity reduction was 99%. Two microalgae that were not able to grow

in the original sap, were able to grow in the pre-treated sap with a one-half dilution. The leachate separated from the mass of microalgae had pH, EC, COD, and BOD within the standard range of release in nature. The reduction of the main pollution index of COD from 13200 to 108 mg/L shows that the combined use of chemical and biological methods can have a complementary effect on the results and turn the toxic leachate into a safe effluent.

99. The effect of a mixture of native Iranian probiotics on memory disorders and expression of tau protein, antioxidant factors in male Alzheimer's rats caused by intrahippocampal beta amyloid injection

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Alzheimer's disease (AD) is one of the most common neurological disorders that affects the elderly worldwide and is associated with the shrinking of the hippocampus of the brain. There is evidence that the composition and function of gut bacteria can influence certain aspects of brain function. Probiotics are food supplements made from living microorganisms, whose purpose is to improve the balance of bacteria in the gut and have beneficial effects on the immune system. This study examines the effects of the mixture of *L.acidophilus*, *L.Paracasei*, *L.Rhamnosus*, *L.Rotheri*, *L.Coagulans* and *Bifidobacterium longum* on the synthesis of tau protein and antioxidant factors (SOD and MDA) in Alzheimer's rats with intrahippocampal beta amyloid injection. Fifteen rats were divided into three groups: treatment, Alzheimer and control. Two groups were subjected to precise surgery and beta-amyloid solution was injected to induce Alzheimer's disease in the CA1 region of the brain. In a period of 21 days, one group was given only distilled water and the other group was given probiotics from Tekgen Company. After that, all groups were subjected to behavioral tests such as shuttle box and EPM. Western blot and ELISA techniques were used for molecular evaluation of tau protein level and antioxidant indices. Pretreatment with native Iranian probiotics in a certain dose increases the level of learning and SOD and simultaneously decreases the expression of tau protein and MDA factor in the treatment group compared to the Alzheimer's group. This conclusion is based on the obtained data and a summary of the behavioral and molecular test results.

100. Investigating the role of button mushroom fermentation residues and probiotic bacteria in increasing the weight of Golpayegani local chickens

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Prebiotic substances and probiotic bacteria often increase the health and growth of animals, birds or humans by changing the intestinal microbial balance. Probiotic supplementation has a significant effect on carcass performance, live weight gain, immune response and prominent cuts of poultry meat. Climate change and the increase in human population have increased the risk of food shortage. Using the waste of garden and agricultural products such as the waste of edible button mushroom (*Agaricus bisporus*) is a useful solution to compensate for the lack of food in the poultry industry. In this research, the waste and waste of Fariba mushroom farm in Shahriar city was selected as a sample. A part of edible mushroom was collected. Waste was crushed after separation. Vinegar was produced by using native *Acetobacter* during the fermentation process. Vinegar waste was used to feed Golpayegani chickens. 6 treatments including treatments with different percentages of scum and scum together with probiotic bacteria (*Lactobacillus*

acidophilus, *Lactobacillus delbrueckii* subspecies *bulgaricus*, *Streptococcus thermophilus*) and yeast (*Kluyveromyces* sp.) were investigated. Probiotic bacteria were prepared from samples used by Iran Milk Industry Company - Pegah - for kefir buttermilk production. The results showed that in the control treatment, the weight of chickens reached 362 grams. While in the treatment of 5% fermented waste and probiotic bacteria, the weight of chickens increased to 397.5 grams, and in the treatment of 5% fermented waste without probiotic bacteria, the weight of chickens increased to 402 grams. This weight change is statistically significant. In the investigation, it was found that the fermented food increased the population of intestinal probiotic bacteria by ten times compared to the control. The use of button mushroom fermentation waste increased productivity and reduced production costs.

101. The effectiveness of disinfection of selected chemical solutions in the control of nosocomial infection caused by *Staphylococcus aureus*

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Human beings have long been aware of the risk of infection caused by the activity of microorganisms and have always sought to combat and destroy them. The use of various chemicals has always been considered as one of the most important tools and strategies to deal with infectious agents. The importance of the use of disinfectants and disinfectants in the control of infections was more understood after the COVID-19 pandemic and the prevalence of secondary infections in patients. A descriptive cross-sectional study investigated the effectiveness of three disinfectants (2.5% chlorine dioxide), 5% hydrogen peroxide and sodium hypochlorite in the destruction of *Staphylococcus aureus* isolated from patients referred to Imam Reza Hospital in Tabriz on steel surfaces. Accordingly, first, the surfaces with an area of 100 cm² (10*10) were investigated. It was prepared and sterilized by Autoclave and Avon. Then, the microbial suspension was prepared and the surface of the steel was contaminated with it and the adequacy of disinfection of all three solutions was studied in the selected time intervals. Based on the laboratory results, 2.5% chlorine dioxide in 5, 10 and 15 minutes' intervals showed the highest bactericidal properties compared to hydrogen peroxide and sodium hypochlorite and caused the complete destruction of all bacteria. Also, sodium hypochlorite and hydrogen peroxide were not able to remove *S. aureus* in the first 5 minutes, but hydrogen peroxide was able to completely destroy the bacteria after 10 minutes.

102. Enhanced viability of encapsulated *Lactobacillus rhamnosus* with chitosan and hyaluronic acid using layer-by-layer technique

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Lactobacilli are widely used as probiotics in food products, dietary supplements, and nutrients due to their health promoting effects. Probiotic bacteria can exert their beneficial effects on human health only if they reach the consumer's large intestine at a minimum concentration of 10⁶ CFU/mL. One of the main concerns is the survival of these bacteria during the shelf life of probiotic products and their viability under gastrointestinal conditions, including exposure to stomach acid and small intestine hydrolytic enzymes. In this study, *Lactobacillus rhamnosus* was encapsulated using the layer-by-layer (LbL) technique with chitosan and hyaluronic acid as wall materials. After digestion in simulated gastric fluid (SGF) for 120 minutes, the encapsulated *Lactobacillus rhamnosus* showed less death compared to non-encapsulated bacteria, with reductions of 2.63 and 7.07 log CFU/mL, respectively. Encapsulated *Lactobacillus rhamnosus*

with chitosan and hyaluronic acid also exhibited higher survival rates compared to free bacteria in thermal tests, especially at 65°C. Consequently, layer-by-layer encapsulation of *Lactobacillus rhamnosus* with chitosan and hyaluronic acid has great potential for protecting these bacteria against simulated gastrointestinal conditions and thermal stability. It is suggested that the survival of encapsulated bacteria in food products and nutrients should also be investigated.

103. Sear for neuroprotective agents with anti-fibrillation activity from marine-derived *Actinobacteria*

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Targeting factors that contribute to the development of the non-hereditary type early on can be a suitable strategy delay the occurrence of neurodegeneration. Inhibiting the formation of amyloid-beta plaques, which are the main biomarkers of this disease, is an effective method of preventing nerve damage. Due to the wide range of bioactivities of Actinobacterial secondary metabolites, this group of bacteria was selected to investigate the production of compounds inhibiting the fibrillation of human lysozyme protein (HL). In this research, the secondary metabolites of six strains of *Streptomyces* sp. isolated from the Persian Gulf and Oman Sea were assessed for their ability to inhibit HL fibrillation. At the studied concentrations, bacterial metabolites were less than 40% toxic to L929 mouse fibroblast cells. The secondary metabolites from *Streptomyces* sp. UTM 2525 and UTM 2533 reduced beta structures in fibrillated HL by 10% in ThT assay and 30% in Congo red assay. The strains reduced surface hydrophobicity in HL protein by over 5% as measured by ANS assay and turbidity by more than 70%. The metabolites of these two strains showed 85% reduction in fibrillated HL particles by DLS measurements. The results of this research could lead to the identification of new microbial sources capable of modulating the activity of molecular targets of neurodegenerative diseases. With purification and identification of the effective substance in the right concentration, it's possible that the compound obtained from this strain can be used as new biological drugs that inhibit protein fibrillation as a preventive treatment for early diagnosed states or individuals with genetic background for Alzheimer.

104. Evaluation of nutritional value of microbial protein produced by *Methylophilus methylotrophus* bacteria

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Microbial protein is used in animal and poultry feed. This protein is produced using microorganisms and different carbon sources such as methanol and methane. In this study, *Methylophilus methylotrophus* bacteria were cultivated in flask and fermentor using methanol as a carbon source. The specific growth rate of bacteria was 0.0312 h⁻¹ in flask and 0.0047 h⁻¹ in fermenter. After cultivation, the biomass was separated at optical density of 3.8 using a centrifuge at 7000 rpm, and qualitative and quantitative tests of microbial protein were performed on pellet. Amino acid profile, fatty acid profile, nitrogen content and crude protein were determined using high performance liquid chromatography, gas chromatography and Kjeldahl method, respectively. The results show that the amount of crude protein was 73.5%. The amount of ash was 29.8% and the total of essential to non-essential amino acids (including lysine, histidine, arginine, valine, leucine, isoleucine, phenylalanine, methionine and threonine) was 37.3% for the produced product. The amount of two non-essential amino acids, cysteine and tyrosine, was higher than the FAO

standard and was 2.38% and 3.21%, respectively. The ratio of palmitic acid to the total fat of the product is 24.6% (w/w) and the ratio of linoleic acid and linolenic acid as unsaturated fatty acids is 9.2 and 2.3% (w/w) to the total fat of the product, respectively. The results obtained from this research showed that the product with a protein content of 73.5% seems an appropriate candidate for animal feed.

105. Evaluation of inexpensive carbon and nitrogen sources for bacterial cellulose production by *Komagataeibacter* sp. MR1

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Bacterial cellulose is one of the most widely used biopolymers. This polysaccharide has become an essential nanomaterial in many industrial processes because it is biocompatible, biodegradable and renewable. Cost-effective production is one of the main goals of research related to bacterial cellulose and the cost of the culture medium accounts for a major part of the total cost of production. The aim of this research was to investigate cheap carbon and nitrogen sources for the production of bacterial cellulose by *Komagataeibacter* sp. MR1. Production of cellulose in Hestrin-Schram culture medium with 1% (v/v) ethanol and replacement of glucose with cheap carbon sources including industrial grade glucose, sucrose and glycerol, beet molasses and acid hydrolyzed molasses, as well as replacement of yeast extract and peptone as a source of nitrogen with corn steep liquor (CSL) or yeast extract under static conditions at 30 °C for 7 days. The cellulose layer was treated with 1N NaOH at 85 °C for 30 minutes and after washing and neutralization, it was dried at 60 °C. Among the carbon sources, the highest cellulose production was obtained using sugar beet molasses with an average amount of 5.6 g/L and the lowest cellulose production was obtained using sucrose with an average amount of 0.6 g/L. Yeast extract with average cellulose production of 3.2 g/L was a more suitable nitrogen source than CSL. Optimization studies based on the obtained results can lead to more cost-effective cellulose production by this strain.

106. Isolation and molecular identification of heat-resistant *Pseudomonas* producing alkaline alpha-amylase from rice mill waste in northern Iran

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Amylase is one of the most important enzymes in industry, with multiple applications including textile, food, and baking industries, paper production, animal and poultry feed, detergents, and fructose syrup production. This study involved the random collection of waste samples from various rice milling, flour, and bread industries. After preparing dilutions, the samples were screened on starch agar plates to evaluate amylase production using the dinitrosalicylic acid (DNS) method. Following the final assessment, amylase-producing bacteria were identified through biochemical methods and subsequently confirmed using molecular methods by amplifying the 16s rDNA gene. Results revealed that of the 55 isolated strains, most belonged to the genus *Pseudomonas*, with one strain exhibiting unique characteristics, including the ability to grow at temperatures above 50 °C and alkaline pH levels of 8, demonstrating an enzymatic activity of 0.21 µmol per minute. The strain isolated from rice milling industries showed a 99.87% similarity to the 16s rDNA gene of *Stutzerimonas stutzeri* strain PSHB1. This bacterium holds high potential for industrial applications. Therefore, further optimization of amylase production conditions using

this strain, or cloning the gene of this enzyme in other strains, could be suggested for additional research towards the industrial production of this enzyme.

107. The evaluation of genetically pattern and efflux pumps role in antibiotic resistance in *Klebsiella pneumonia* isolates

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Klebsiella pneumonia is one of the most important pathogen, causes nosocomial infection. Nowadays distribution of multi drug resistance among pathogenic bacteria is an important threat in the world. This study aimed to determine of antibiotic resistance pattern and frequency of *aceA1*, *acrE1* genes in *Klebsiella pneumonia* isolates. During total of 56 *K. pneumonia* isolates were collected from patients referred to Ilam hospitals. Diagnosis of isolates was carried out by biochemical tests, and antibiogram of isolates was done by Kirby-Bauer method, and the frequency of *acrA1*, and *acrE1* genes was detected by PCR. Totally 56 *K. pneumonia* isolates were diagnosed among clinical samples. Results of antibiogram showed that, highest rate of resistance was related to ciprofloxacin (58%), and the minimum rate of resistance was related to imipenem (19.3%), and PCR results showed that, the frequency of *acrA1*, and *acrE1* among isolates were 47% and 39.2% respectively. The prevalence of the *acrA1*, and *acrE1* efflux pump genes (both chromosomal and plasmid encoded) in *K. pneumoniae* was high in Ilam and represents a potential reservoir for the spread of these genes. High expression of this pump contributes to reduced susceptibility to quinolones in clinical isolates of *K. pneumonia*.

108. Investigating the effect of *Bacillus subtilis* metabolites on mitochondrial function of *Saccharomyces cerevisiae* as a model

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Mitochondria play an important role in cell survival and perform many cellular processes. Accumulation of dysfunctional mitochondria is observed in cell aging and many human diseases such as cancer and various neurological disorders. One of the most important mitochondrial quality control mechanisms is mitophagy, which removes excess and damaged mitochondria, and its proper function is essential for cell homeostasis. In the last few decades, several studies have been conducted on the relation between aging and mitophagy, and the results show that mitophagy decreases with age. In this research, the effect of culture supernatant of *Bacillus subtilis* in two logarithmic and stationary growth phases on the mitophagy activity of *Saccharomyces cerevisiae* was investigated. For this purpose, the bacteria was grown separately in nutrient broth medium and then its supernatant was filtered with a 0.22 micrometer filter. Then this filtered supernatant was provided to the cell model, *S. cerevisiae*, as a culture supernatant, and then the mitochondrial activity was examined by the MTT test with the same number of cells. According to the obtained data, both phases increased the mitochondrial activity, but the intensity of mitochondrial activity was higher in the presence of culture supernatant of stationary phase. While research over the past decades has led to the discovery of key factors involved in mitophagy, the pathway is still not fully understood. Investigating genes and mitophagy regulatory molecules in yeast and recognizing metabolites in culture supernatant can better explain the mechanism.

109. Groundwater microbial consortium for phenol removal in a batch and continuous flow model

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Pollution of groundwater with various contaminants such as phenols is a crucial environmental concern and threatens the health of human society. This study evaluated the microbial consortium through small bioreactor chambers (SBCs) on phenol removal from groundwater in a batch and continuous flow model. For batch experiments, 100 ml sterile glass bottles were used for SBC performance evaluation in phenol bioremediation. The effect of different parameters on DO, pH, phenol concentration, and culture-dependent native microbial population was investigated over 60 days. Four continuous up-flow plexiglas reactors were packed with the phenol-contaminated groundwater passed through the columns. Chemical remediation, natural bioremediation, and bioaugmentation efficiency were examined for 6 months. To investigate the impact of each process on the microbial biodiversity of the columns, next-generation sequencing (NGS) of the 16S rRNA gene was performed. Batch experiment results indicated that the highest biodegradation percentage was achieved during the incubation of SBCs within 25 days of the experiment. Simultaneous use of bioaugmentation and biostimulation eliminated phenol during the first 42 days. In the biostimulation column, 100 % of phenol removal was observed after 22 weeks of the experiment. The dissolved oxygen (DO) in the chemical column (I) effluent increased notably after the first injection and peaked on the 21st day, reaching 14.14 mg/L. Microbial diversity in the bioaugmentation column was shifted to phenol-degrading orders such as *Rhodobacterales* and *Xanthomonadales*. In conclusion, the innovative use of SBCs in stimulated water provides evidence for the successful application of these methods in groundwater treatment processes.

110. Investigation of probiotic potential of lactic acid bacteria isolated from traditional dairy products and their genomic analysis in Northern Iran, Guilan

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The importance of lactic acid bacteria in microbiota balance, immune system function, and prevention of diseases including cancer has been proved. The aim of this study was to isolate, identify, and select the best *Lactobacillus* strain with probiotic activity from indigenous dairy products in Guilan province. A total of 30 varieties of domestic dairy products in the rural area of Guilan were studied by microbiological and biochemical methods. Their probiotic properties were evaluated and then the antagonistic activity of the crude extracts of five pathogenic bacterial strains was tested by the well diffusion method. Their genomes were analyzed for 16srRNA by PCR. Four strains were able to inhibit the growth of clinical isolates of *Staphylococcus aureus*, *Shigella flexneri*, *Pseudomonas aeruginosa* and *Uropathogenic E.coli*, but had no significant inhibitory effect on the growth of *Bacillus cereus*. The strains were resistant to vancomycin and gentamicin and sensitive to ampicillin in the antibiogram test. The two strains showed different bands in the PCR analysis. The recorded species was *Lactobacillus delbrueckii* subsp. *bulgaricus*. The extracts showed better antimicrobial activity under neutral and catalase-free conditions. Based on the results of this study and the properties of the isolated probiotics, these strains can be further investigated for the prevention and treatment of specific clinical conditions.

111. Comparative metagenomic analyses of groundwater prokaryotic communities along phenol pollution

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Groundwater pollution is one of the major environmental concerns. The phenol entrance into the oligotrophic groundwater ecosystems alters native microbial community metabolism. The main aim of this study was to investigate the groundwater microbial potential metabolic capabilities in hydrocarbon degradation. For Comparative metagenomic analyses, sampling of a groundwater well located in Tehran, Iran was performed before and after 6 months of phenol contamination. All trimmed sequences of each dataset were assembled separately using MEGAHIT. MetaBat2 software binned contigs ≥ 1 kb into metagenome-assembled genomes (MAGs) based on their different mapping depth and tetranucleotide frequencies. Putative genes were predicted with Prodigal and annotated using Prokka in the metagenomics mood. A total of 47 MAGs were recovered from two sequenced metagenomes, among which 46 belonged to domain bacteria and one to domain Archaea. Mono/dioxygenases triggering the degradation of alkane, cyclododecane, biphenyl, phenol, toluene, and naphthalene/phenanthrene were detected in 43 recovered MAGs of the groundwater samples. Furthermore, the key enzymes responsible for initiating the degradation of alkane, ethylbenzene, phenol, and toluene exclusively under anaerobic conditions were detected in four reconstructed MAGs. MAGs affiliated with *Rhodoferrax* and *Acidovorax* had the genomic potential to degrade a diverse range of HCs, including phenol, alkane, biphenyl, toluene, ethylbenzene, and xylene under both aerobic and anaerobic conditions. The extensive analysis of groundwater metagenome illustrated that pollutant-degrading microbes became the dominant population in the pollution zone. Higher-resolution analysis of the microbial community of this ecosystem in future studies can reveal critical ecological adaptations to different pollutants.

112. A bioinformatics study of S-type pyocin from *Pseudomonas aeruginosa* and its heterologous expression in *Escherichia coli*

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Pyocins, a class of antimicrobial compounds, are produced by various isolates of *P. aeruginosa*. This research performed an *in silico* study and heterologous expression of the S-type pyocin from *P. aeruginosa*. Using bioinformatics tools, the gene encoding the S-type pyocin sequence from *P. aeruginosa* was evaluated for the protein's biochemical characteristics, secondary structure, and third structure. The pyocin and its immunity protein were co-expressed in *Escherichia coli* BL21DE3 to overcome the potential toxicity of S-type pyocins, enhancing its yield. The S-type pyocin gene and its immunity gene were isolated from the bacterial genome using specific primers and cloned into the pET28a via *EcoRI* and *XhoI*, generating the clone pYYS1. The S-type pyocin gene was induced in *E. coli* BL21DE3 using IPTG. SDS-PAGE analyses confirmed the expression. The heterologous protein was purified using Ni-NTA affinity column chromatography. The S-type pyocin sequence contains 1857 nucleotides and 618 amino acids; with a molecular weight of 65 kD. The high percentage of alpha helices indicates the protein's thermal stability, consistent with the high aliphatic index. The 3D model predicted by AlphaFold2 was selected as the optimum structure. DNA sequencing confirmed the sequence of the pyocin in the clone of pYYS1. SDS-PAGE analysis revealed the expression of a 65 kD protein in weight. Surveying the function of S-type pyocin heterologous protein is under processing.

113. The evaluation of carbapenemase genes in *Citrobacter spp.* Isolated from clinical specimens in Imam Reza Hospital, Kermanshah, Iran

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The growing incidence of carbapenem-resistant bacteria is an emerging challenge in modern medicine. The aim of this study was to detect of carbapenemase producing genes in *Citrobacter spp.*, isolated from clinical specimens from patients referred to Imam Reza hospital in Kermanshah. A total of 430 clinical samples were collected from patient, all isolates were identified by biochemical tests. All *Citrobacter Spp.* were selected for antibiogram by using Kirby-Bauer method, and KPC, IMP, and VIM genes, were detected by polymerase chain reaction (PCR). Among 430 clinical samples, totally 50 *Citrobacter spp.* were diagnosed. Antibiogram results showed that, the highest rate of resistance was related to cefotaxime (69%), and the lowest rate of resistance was related to amikacin (29%), the presence of *blaKPC* gene was detected in 2 isolates (4%), and presence of *blaVIM* gene was detected in 2 isolates (4%), and *blaIMP* was not found in isolates. Our findings showed that, the prevalence of carbapenemase genes in *Citrobacter koseri*, *Citrobacter freundii*, and *Citrobacter braakii* were low in Kermanshah, but other genes for resistance to carbapenems in this area which need further investigations. The results indicate that carbapenems are still effective antibiotics against *Citrobacter* species.

114. Harnessing the power of bacteria: A novel approach to removing sulfur from crude oil

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Crude oil is a vital natural resource that fuels our modern society, but it comes with a dirty secret - large amounts of sulfur. The combustion of sulfur in fossil fuels leads to the production and release of sulfur oxides (SO_x), which can result in acid rain and serious health hazards for humans. To combat these environmental and health risks, removing sulfur from fossil fuels is crucial. One promising solution in this area is biodesulfurization, a process in which specialized bacteria are used to break down sulfur compounds in crude oil. In this study, the performance of bacteria isolated from oil-contaminated areas, specifically K-2-4, PMO7, PMO2, RE1, K-2-b and their ability to remove sulfur were examined. The results were promising. The bacterium named RE1 demonstrated significant potential in reducing dibenzothiophene (DBT), a model compound of cyclic sulfur compounds found in fossil fuels. In just 80 hours, RE1 was able to reduce 99% of the DBT concentration in the basal salt medium. This bacterium consumes DBT as a sulfur source with glycerol as a carbon source, highlighting its efficiency in desulfurization. Furthermore, the study investigated the effect of different DBT concentrations and carbon sources on the growth and desulfurization activity of the bacteria. The best growth was observed at a DBT concentration of 38 ppm and at a temperature of 30 °C, indicating the optimal conditions for desulfurization. Using desulfurizing bacteria in industrial processes is a cost-effective and efficient alternative to traditional methods. By employing genetic engineering and optimizing culture conditions, the performance of these bacteria can be further enhanced. Additionally, identifying and utilizing indigenous bacteria in oil-contaminated areas can improve the efficiency of the biodesulfurization process. In conclusion, the potential of biodesulfurization as a solution for removing sulfur from crude oil is a promising avenue worth exploring. By harnessing the power of bacteria, we can mitigate the environmental and health risks associated with sulfur emissions and pave the way for a cleaner and healthier future.

115. Bioinformatics' evaluation of exotoxin A from *Pseudomonas aeruginosa* and its heterologous expression in *Escherichia coli*

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Exotoxin A is a key virulence factor from *Pseudomonas aeruginosa*. It is an ADP-ribosyl-transferase that inhibits protein synthesis by inactivating the eukaryotic elongation factor 2 (eEF2), leading to apoptosis and cell death. Therefore, exotoxin potentially is a novel treatment approach in cancer therapy. This study evaluated exotoxin A's gene and protein sequence, toxicity, immunogenicity, and epitopes related to B and T lymphocytes using bioinformatics tools. The exotoxin A gene was isolated by PCR using specific primers and inserted into the pET28a, generating *pHB6*. Sequencing and enzymatic digestion confirmed the 1900 bp exotoxin A gene in *pHB6*. Subsequently, the heterologous protein was produced in *Escherichia coli* (BL21DE3). The heterologous exotoxin was purified using a nickel-affinity chromatography column and surveyed on 12% SDS-PAGE. The exotoxin A is found to be a polar molecule with an overall negative hydropathicity of 69 kDa and consists of three domains: binding, translocation to the target cell, and catalytic. Its secondary structure includes 28.21% alpha-helices, contributing to membrane translocation and stability. The results for optimization for heterologous expression of exotoxin A showed the highest expression applying 1 mM IPTG for 4 hours at 37 °C. The study of the heterologous protein function is under processing.

116. Probiotic supplements containing phytase enzyme for animals

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Livestock and aquaculture feed heavily rely on cereals, fish meal, and plant proteins. However, animals do not fully utilize these ingredients, and we need alternative protein sources due to rising demand, unstable resources, and high prices. The problem with plant-based materials is that they contain phytic acid or phytate, which makes phosphorus less available to monogastric animals. Bacterial phytases can effectively release phosphorus from phytate in the digestive system, making them cost-effective and a potential alternative to traditional sources of phosphorus. Probiotics are helpful bacteria that have long been used in food production and health-related products. Bioengineered probiotics are used to express and transmit native or recombinant molecules to the digestive tract's mucosal surface, thereby improving feed efficiency and health. Therefore, this study aimed to address the issue by utilizing a biologically engineered probiotic supplement containing lactic acid bacteria that produce *phytase* enzymes as a feed additive for livestock, poultry, and fish. In this study, *Lactobacillus lactis* bacteria was employed to create PHY protein, which is necessary for animal feeding. For this reason, a primer was constructed to isolate the *phy* gene, and the *phytase* gene was recovered from the *B. subtilis* wB600 strain via PCR cloning and cloned by *T.Vector* in *E. coli*. Following this procedure, the *PUC19* expression vector was digested with the restriction enzymes *Sall* and *BamHI*, and the *phy* gene was cloned into *L. lactis*. SDS-PAGE was then used to assess the target gene's expression and validate the existence of the PHY protein. Finally, the grain was harvested and utilised to feed animals, poultry, and fish. Biologically engineered probiotic supplements with phytase enzymes have the potential to improve the nutritional value and sustainability of animal production. Further research and development in this area could result in more efficient and sustainable animal production methods, providing advantages to producers and consumers of animal products.

117. Structural study and cloning of Hcp protein from *Pseudomonas aeruginosa* Secretion System Type 6

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Multi-drug-resistant *Pseudomonas aeruginosa* is a common cause of nosocomial infections. *Hcp* protein, a part of the secretion system type 6 (T6SS), plays an important role in pathogenesis. Here, the potential of *Hcp* protein as a vaccine against *P.aeruginosa* infections was studied plus, production of *Hcp* protein using cloning strategy was examined. The sequence evaluation, physicochemical properties, secondary and tertiary structure, immunogenicity, and protein antigenicity of Hcp were analyzed using bioinformatics tool. Then, the Hcp gene was isolated using specific primers, and inserted in pET28a. The cloning was assayed by restriction enzyme digestion. The heterologous protein expression was induced by 0.5 mM IPTG, and was purified by gradient nickel column chromatography. The molecular weight 19091/25 kDa, pI=5.41, and a polarity index of -0.449 was obtained in bioinformatics analyses. The secondary structure of Hcp protein includes 51.16% of random coils, 23.84% of alpha helix, and 2.33% of beta sheets. The Vaxijen server predicted the antigenicity of this structure in bacterial models with a threshold limit of 0.4. The 23 kDa band in SDS- PAGE 15% was observed for Hcp protein. Hcp protein could serve as a promising vaccine candidate based on this results.

118. Isolation and identification of bacteria producing hyaluronidase enzyme and optimization of production by Taguchi's statistical method

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Hyaluronidase is a type of glucosidase enzyme and is responsible for breaking hyaluronic acid molecules. One of the sources of the production of this enzyme are bacteria, which were sampled from various sources such as water, soil and air samples in this research. A total of 26 enzyme producing strains were isolated. In order to screen the strains producing this enzyme, BHI agar culture medium was used. After autoclaving, sodium phosphate solution along with hyaluronic acid and bovine serum albumin was added to it and distributed in plates. After quantitative studies, the quality of the enzyme produced by the carbazole method was investigated. In the carbazole method, which is based on the amount of light absorption, two solutions are used, solution number one contains sulfuric acid and sodium tetrahydroborate, and solution number two contains ethanol and carbazole. After going through the stages of qualitative investigations, 2 strains that had the highest amount of enzyme production were selected, and finally, using Taguchi's multi-factorial statistical test, different nitrogen sources and different carbon sources and simultaneously different conditions such as pH and temperature were investigated and the interaction of all said conditions was investigated. Through the software, the software gave us some tests and tests, then by doing the tests and receiving their answers and transferring them to the software environment, the software presented us with graphs, and by checking these graphs, we reached the highest amount of enzyme production.

119. Economic production of pectinase enzyme from apple pomace by *Bacillus wiedmannii*

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Pectinolytic enzymes are one of the important groups of enzymes used in the processing and clarification industry of fruit juices. The applications of pectinases can be mentioned in the textile industry, degumming of fiber products, paper production, coffee and tea fermentation, oil

extraction, and wastewater treatment. The purpose of this research is to isolate native species of *Bacillus* from apple farm soil and investigate the ability to produce pectinase enzyme in it. In this research, 5 soil samples were collected from an apple farm in Damavand city, and separation was done by porplate method and heat treatment. In order to perform the primary screening method, it was cultured on a special pectin agar culture medium as a spot culture. After observing the enzyme halo, the welling method was performed. Gram staining and other biochemical tests were performed. Then, using the selected sample, the quantitative enzyme assay by dinitrosalicylic acid (DNS) method and optimization was performed. In this research, from Among the 61 *Bacillus* species, 6 species had the largest halo diameter in the primary screening stage and 3 species in the secondary stage. *Bacillus* species with a halo diameter of 20 mm was selected as the best enzyme producer. In the optimization, the cheap carbon source of apple pomace with the enzyme production rate of 86.4 IU/ml and the nitrogen source of peptone with the enzyme production rate of 94.5 IU/ml have the highest enzyme production rate. Unknown separation with 100% The similarity is related to *Bacillus wiedmannii*. From the potential of the isolated native bacterial strains of our country to produce industrial enzymes such as pectinase, by using cheap ingredients such as apple pomace, a suitable amount of pectinase enzyme production can be achieved and this study can be an achievement in To replace it with expensive substrates in the industry.

120. Optimization of polyphenol oxidase and peroxidase production using native *Bacillus* spp. isolated from fully fermented Tea

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Tea (*Camellia sinensis*) is a species of evergreen shrub or small tree in the flowering plant family *Theaceae*. One of the major steps in black tea manufacturing is the fermentation process, in which bacteria may be incorporated. This study aimed at using the one-factor-at-a-time (OFAT) and Taguchi methods to optimize the production of polyphenol oxidase (PPO) and peroxidase (POD) by *Bacillus* spp. isolated from fully fermented tea. The results showed that sucrose and glucose exhibited the greatest effects on the production of polyphenol oxidase and peroxidase by the strains *Bacillus* sp. (TB3) and *B. licheniformis* (TB14), respectively. In addition, the results indicated that the best nitrogen sources for the production of PPO by *Bacillus* sp. (TB3) and POD by *B. licheniformis* (TB14) were sodium nitrate and ammonium carbonate, respectively. Based on the obtained results, the medium components for the production of PPO by *Bacillus* sp. (TB3) at a pH of 7 were as follows: 0.5% sucrose, 1.0% peptone, 0.8% yeast extract, 0.2% hydrolyzed casein, 0.02% potassium dihydrogen phosphate, 0.005% magnesium sulfate heptahydrate, and 0.1% sodium nitrate. Moreover, the optimal culture medium for the production of POD by *B. licheniformis* (TB14) at a pH of 7 was as follows: 0.3% of glucose, 1.0% of peptone, 0.8% of yeast extract, 0.2% of hydrolyzed casein, 0.02% of potassium dihydrogen phosphate, and 0.005% of magnesium sulfate heptahydrate. Increased production of PPO and POD enzymes was obtained, about 8- and 6-fold more than in the basal culture media, respectively.

121. Investigating the synergistic effect of medicinal plants hydroalcoholic extract from Fabaceae and Zingiberaceae families on the growth of *Serratia marcescens*

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The use of medicinal plants in various food, cosmetic-health, medicine, treatment, and etc. industries is known. Among the properties of medicinal plants are antibacterial effects, which have been studied a lot, but the synergistic effects of medicinal plants of the same family have received

less attention. In this study, the synergistic effect of extracts of *Glycyrrhiza glabra* and *Alhagi maurorum* from the Fabaceae family and *Zingiber officinale* and *Curcuma longa* from the Zingiberaceae family on inhibiting the growth of *Serratia marcescens* was investigated and compared. Extracts were prepared by hydroalcolic method, and antibiogram test was done through disk diffusion method which the lack of growth of bacteria in the culture medium was checked with at least three repetitions. The results showed that the plants of the Fabaceae family have a stronger inhibitory synergistic effect by creating a area of non-growth with a diameter of 11.33 mm compared to the same created by the plants of the Zingiberaceae family with a diameter of 8.33 mm. Interestingly, the area of non-growth of plants alone was smaller, which indicates the synergy of the inhibitory effect of species of the same family. It seems that plants of the Fabaceae family have a stronger inhibitory effect on the growth of *Serratia marcescens* due to the presence of compounds such as Quercetin, Rutin, Rosmarinic acid, and etc. As a Gram-negative bacterium with high resistance, *Serratia* is in the group of hospital infectious agents, therefore, the results of this study can be effective in identifying and producing plant-based materials that are used to remove this bacterium from high-sensitivity environments.

122. Antibacterial effect of shilajit on bacteria isolated from skin wound infections

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Infection of wounds is a common issue in burn injuries, diabetic ulcers, and trauma. In many cases, bacteria isolated from wounds show resistance to antibiotics, complicating the treatment process. Researchers are seeking natural substances for the treatment of wound infections, especially against antibiotic-resistant bacteria. Shilajit has been used in traditional medicine for centuries to treat various diseases, including wound healing. In this study, for the first time, the therapeutic effect of this substance on bacterial strains isolated from burn wound infections was investigated. A total of 56 positive cultures from patients with infected wounds admitted to Zare Hospital for Burn Injuries in Sari were analyzed. Information regarding the type of bacteria and the antibiotic susceptibility profile was obtained from the mentioned center. A suspension equivalent to a 0.5 McFarland standard was prepared from the targeted bacteria and cultured on Mueller-Hinton agar plates with a diameter of 10 cm using the standard Kirby-Bauer method. Shilajit powder was dissolved in dimethyl sulfoxide (DMSO), and dilutions of 1:1, 1:2, 1:4, 1:8, 1:16, and 1:32 were prepared. Six disks of varying concentrations of Shilajit and one control disk were placed on each plate. The plates were incubated at 37 degrees Celsius for 18-24 hours, and then the diameter of the inhibition zone was measured with a millimeter ruler. The results showed that Shilajit possesses antibacterial properties and inhibits bacterial growth in a dose-dependent manner. The pure concentration of Shilajit exhibited the largest inhibition zone, and a decrease in the concentration of Shilajit led to a smaller inhibition zone. The findings indicated that Shilajit inhibited the growth of both Gram-positive (*coagulase-negative staphylococci*) and Gram-negative (*Citrobacter*, *Proteus*, and *Hafnia*) bacteria, with a greater effect observed on Gram-negative bacteria. Based on the results, it seems that this substance could be utilized as a natural antibiotic; however, further studies are needed to achieve this goal.

123. Investigating the severity of environmental stress conditions on growth, the protein profile, and biochemical characteristics of *Pseudomonas aeruginosa* ATCC 27853

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Pseudomonas aeruginosa is the main cause of nosocomial infections, and is resistant to most antibiotics, this study aimed to evaluate the effects of different stress conditions on growth, the protein profile, and biochemical characteristics of this bacterium. The cells of *P. aeruginosa* ATCC 27853 in the logarithmic phase were exposed to different stress factors such as sucrose concentration, ethanol, acid, osmotic pressure, and CoCl₂. Following each stress condition, the growth and the survival of bacterial cells were determined. Microscopic observation showed morphological changes in different stress conditions. *P. aeruginosa* tolerated up to pH 3, 55% (V/V) ethanol, and CoCl₂ up to 7% (W/V), and beyond these amounts, the bacterium lost its ability to survive. Maximum tolerance to sucrose was about 35% (W/V). The results showed that different stress conditions could not affect the main biochemical characteristics of *P. aeruginosa*. Scanning electron microscopy of the cells exposed to different stress conditions showed wide changes in the morphology of cells. In addition, upon treatment of different stresses significant changes were observed in the protein profile of *P. aeruginosa* ATCC 27853 according to SDS-PAGE analysis. It can be concluded that severe environmental stresses have great effects on the growth pattern, phenotypic characteristics, and protein profile of *P. aeruginosa*. If the stresses induced all at once, they will cause death, but if they are affected slowly and for a longer period, most bacteria will be able to repair the damaged parts, and the growth will resume.

124. Formulation and efficiency evaluation of kit for identifying microbial corrosion bacteria in oil industry

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Microbial corrosion is one of the most harmful mechanisms that destroy steel pipes. It has been estimated that microorganisms are responsible for more than 20% of pipeline system problems. Heterotrophic, acid-producing, sulfate-reducing, and iron-reducing bacteria are the four common groups of microorganisms responsible for microbial corrosion. Sulfate-reducing bacteria to complete respiratory reactions instead of oxygen from sulfate as an electron acceptor and acid-producing bacteria produce all kinds of acids during the natural process of their metabolism. Iron-reducing species, including *Pseudomonas*, by reducing ferric ion to ferrous ion, remove the protective effect of ferric ion on the inner surface of the pipes, and the pipes are exposed to corrosion. Heterotrophs are a large group of bacteria that represent the entire population of microorganisms in the environment. The culture mediums designed in this research include the optimized culture medium of phenol red to search for acid-producing bacteria, saline medium including MnCl₂.4H₂O, NaH₂PO₄.2H₂O, FeC₆H₅O₇.3H₂O, NaCH₂COOH and yeast extract to search for iron-reducing bacteria, salt medium including KH₂PO₄, Lactate, Yeast extract, Ascorbic acid, Fe(SO₄)₂(NH₄)₂.6H₂O and Sodium acetate to detect for sulfate reducing bacteria and Nutrient agar to count heterotrophic bacteria in the environment. Sea water was used to prepare all environments and a microbial consortium prepared from corrosion contaminated areas was used to check the efficiency of the designed kits. These designed kits can detect as few as 10 to 106 bacteria per milliliter of sample and are a quick method for the user to utilize in areas where access to the laboratory for sample transfer is difficult. By identifying the microbial load of contaminated areas, it is possible to determine the appropriate amount of chlorine and biocide injection into the lines and avoid possible damages.

125. Investigating the antimicrobial effects of *Lactobacillus rhamnosus* probiotic bacteria killed by heat

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Probiotic bacteria have beneficial effects such as: intestinal health, strengthening the immune system, antioxidant properties and improving metabolic conditions. The properties of these microorganisms have been proven if they are consumed alive; But the survival of bacteria during the formulation of probiotic products and passing through digestive stresses such as stomach acidity and intestinal antimicrobial compounds is a challenge. On the other hand, the dead residues of these microorganisms also have effects on health. As a result; In this study, the probiotic bacteria *Lactobacillus rhamnosus*, which was killed by the thermal process of tyndallization, was used. At first, *Lactobacillus rhamnosus* probiotic strain was cultured in MRS broth at 37°C and after 48 hours of incubation, it was tyndallized at 90°C for 30 minutes. Then it was centrifuged at 6000 rpm for 25 minutes and the bacterial pellet was isolated. Dilutions of 1%, 5% and 10% of it were evaluated as antimicrobial by disc diffusion method when exposed to enteropathogenic microorganisms such as *Salmonella typhi*, *Escherichia coli* and *Shigella dysenteriae*. The results showed that 5% dilution of tyndallized probiotic has strong antimicrobial effects on *Shigella dysenteriae* and *Salmonella typhi*. Also, this dilution has an intermediate inhibitory effect on *Escherichia coli*. Considering the satisfactory results, it is suggested to evaluate these antimicrobial effects *in vivo*.

126. Expression and purification of TolC as a recombinant protein vaccine against *Shigella flexneri* and evaluation of immunogenic response in mice

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Shigella is one of the major causes of dysenteric diarrhea named shigellosis. Shigellosis infection causes 160,000 deaths annually of diarrheal disease in the global scale especially children less than 5 years old. No licensed vaccine is available against shigellosis. The reverse vaccinology (RV) is a novel strategy that evaluate genome or proteome of the organism to find a new promising vaccine candidate. In this study, immunogenicity of a designed-recombinant antigen is evaluated through the in-silico studies and animal experiments to predict a new immunogenic candidate against *Shigella*. In the first step, proteome of *Shigella flexneri* was obtained from UniProtKB and then the outer membrane and extracellular proteins were predicted. In this study TolC as an outer membrane protein was selected and confirmed among candidates. In next steps, pre-selected protein was evaluated for transmembrane domains, homology, conservation, antigenicity, solubility, and B- and T-cell prediction by different online servers. TolC as a conserved outer membrane protein, using different immune-informatics tools had acceptable scores and was selected as the immunogenic antigen for animal experiment studies. Recombinant TolC protein after expression and purification, was administered to BALB/c mice over three intraperitoneal routes. The sera of mice used to evaluate the IgG1 production assay by indirect-ELISA. The immunized mice depicted effective protection against 2LD50 of *Shigella Flexneri* ATCC12022 (challenge study). Therefore, the reverse vaccinology approach and experimental test results demonstrated that TolC as a novel effective and immunogenic antigen is capable for protection against shigellosis.

127. Inhibitory effects of selected plant compounds on quorum sensing receptors LasR and RhlR in *Pseudomonas aeruginosa*

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Pseudomonas aeruginosa is a gram-negative opportunistic bacterium that is a major cause of nosocomial infections. One of the notable characteristics of *Pseudomonas aeruginosa* is its ability to form biofilms, which play a crucial role in protecting the bacteria against adverse environmental conditions. The quorum sensing system of this bacterium is key to biofilm formation, with the LasR and RhlR receptors being the main components of this system. This study aims to investigate the effects of selected plant compounds on the LasR and RhlR receptors in silico to identify and introduce effective compounds for inhibiting this system. The structures of the two quorum-sensing receptors were obtained from the PDB database in PDB format. Selected phenolic plant compounds were retrieved from the PUB CHEM database in SDF format. The interactions between the selected plant compounds and the two receptors were analyzed using the software MOLEGRO VIRTUAL DOCKER 6 and MOLEGRO MOLECULAR 2.5. The results showed that the plant compounds Naringin and Hesperidin interacted with the RhlR receptor with binding energies of -174.96 and -167.76 respectively, and with the LasR receptor with binding energies of -219.44 and -202.53 respectively. These plant compounds act as effective inhibitors of the LasR and RhlR receptors and can offer new strategies for controlling the pathogenicity of *P. aeruginosa*. The study demonstrated that plant compounds such as *Naringin* and *Hesperidin* have a high potential for inhibiting the quorum-sensing system of *P. aeruginosa*. The use of these compounds could serve as a complementary strategy in the treatment of antibiotic-resistant bacterial infections. Further laboratory and in vivo studies are necessary to confirm the effects of these compounds.

128. Investigating antibacterial resistance of fecal *Escherichia coli* isolated from poultry in Guilan province

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The microflora of food-producing animals has an extraordinary ability to harbor and transfer antibiotic resistance genes and it creates a potential danger by spreading resistance to humans through the food chain. The present study was conducted to determine the prevalence and genetic diversity of antibiotic resistance in poultry-isolated *E. coli* in Guilan province. In this research, 84 cloacal swabs were collected from apparently healthy 20-45-day-old broilers without antibiotics. The antibacterial susceptibility assessment was tested using disc diffusion and MIC for 20 antibiotics and PCRs were performed for investigating the respective antimicrobial resistance genes. Among 84 fecal *E. coli* isolates, quinolones (ciprofloxacin 22.62%, flumequine 90.47%, enrofloxacin 67.86% and danofloxacin 55.95%) and tetracyclines (chlortetracycline 85.71% and doxycycline 59.52%) showed the highest resistance. In accordance with phenotypic assay, tetA (66.66%), tetB (57.14%) encoding for tetracyclines, qnrS (57.15%) and qnrB (48.81%) for quinolones were the most predominant genes. The results of this research show the risk of increasing antibiotic resistance in healthy broilers in Guilan province. Various antibiotic-resistant genes are an important warning for the transmission of pathogenic agents through the food chain to humans.

129. Antibiotic resistance in pharmaceutical wastewater

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Antibiotic resistance is a well-known problem in today's world, and various factors play a role in its occurrence and spread. Microorganisms acquire drug resistance genes through mutation, direct gene transfer, plasmid transfer, etc. The presence of pharmaceutical agents such as antibiotics and active pharmaceutical ingredients (API) in the environment of microorganisms play an important role in the emergence and spread of antibiotic resistance, which have received less attention and investigation. Wastewater from pharmaceutical companies, wastewater from poultry farms and industrial animal husbandry, wastewater from hospitals, and even household wastewater contains antibiotic residues, which are sometimes observed in these wastewaters due to their high solubility in large amounts and in doses similar to the blood of antibiotic patients, which leads to the spread of antibiotic resistance among bacteria in the long term. In this study pharmaceutical factory wastewater was examined for the presence of bacteria using differential cultures, and various bacteria such as *Escherichia coli* and *Pseudomonas aeruginosa* were isolated and identified from the wastewater. The antibiotic resistance of these strains was evaluated using the Kirby-Boer method. The results of this study showed the presence of antibiotic-resistant microorganisms such as *E. coli* and *P. aeruginosa* from pharmaceutical factory effluent. Due to the presence of treatment-resistant microorganisms in the wastewater of these companies and the need to minimize environmental pollution, the wastewater disposal rules should be amended by the relevant organizations and announced to the relevant departments and put on the agenda.

130. Seroepidemiology of Epstein-Barr Virus in patients with Multiple Sclerosis in Mazandaran Province

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Multiple sclerosis (MS) is a chronic inflammatory demyelinating and neurodegenerative disease of the Central Nervous System (CNS) characterized by unpredictable and variable clinical course. Etiology of MS involves both genetic and environmental factors. The environmental factors concerned are likely to be infectious agents, and the involvement of numerous viral agents in the etiology of MS has been postulated. *Epstein-Barr virus* (EBV) has frequently been investigated as a possible candidate. The aim of this study was to determine the prevalence of IgG and IgM antibodies against the EBV capsid antigen in the serum of patients with MS and to compare it with healthy individuals. Blood samples from 60 patients with MS and 60 healthy controls were collected. The blood samples were centrifuged and serum was separated. All samples were tested for anti EBV antibodies using Enzyme Linked Immunosorbent Assay (ELISA). In this study, 100% of samples from patients with MS were IgG positive and 83% of control samples were IgG positive. We found that 11% of MS positive samples were IgM positive but all control samples were IgM negative. According to the obtained results and statistical analyses, the high titer of IgG against the capsid in the patient group compared to the control group supports the association of the EBV with MS. Its role is probably as an initiator of the disease process of MS or as a contributor to its early development, rather than as an activator of latent, existing disease.

131. Construction of the recombinant glycoprotein E2 structure of HCV virus

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Hepatitis C virus has spread globally and is one of the main causes of liver cirrhosis and death worldwide. Currently, there is no suitable vaccine to prevent this virus. Glycoprotein E2 of this virus can stimulate the immune system. The main aim of this study was to construct an expression construct of the hepatitis C virus E2 gene in a bacterial host. In this study, glycoprotein E2 gene from serotype a1 was isolated and identified from patients, E2 gene was isolated by using RT-PCR and amplified Nested-PCR. The gene expression construct was made in pET21 α vector and transferred into competent cells of *E. coli* DH5- α and Colonies containing the desired vector were selected based on ampicillin resistance and using the Colony PCR method. For final analysis of E2 gene cloning, the cloned fragments were sequenced and the sequencing results were blasted in the NCBI database. The results obtained from this study showed the correctness of the testing and cloning of the second protected E2 gene in pET21 α vector and the expression of this gene in *E. coli* DH5 α bacteria. Considering the role of glycoprotein E2 in binding and entering the cell, as well as its ability to stimulate the humoral and cellular immune system, E2 is a good candidate to study for the preparation of a vaccine. The recombinant structure of this study should be studied in the next steps for further investigation and investigation of protein structure and immunogenicity

132. Screening of crude oil-degrading bacteria from the intestine of *Lethrinus crocineus* and *Brachirus orientalis* in the Persian Gulf

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The gut microbiome has a fundamental impact on fish health and is affected by several persistent and harmful organic and inorganic pollutants. Crude oil is one of the destructive factors of the Persian Gulf ecosystem. The best way to clean this ecosystem is the biodegradation method. In this method, microorganisms are used to remove hydrocarbon pollution effectively. In this research, *Lethrinus crocinus* and *Brachirus orientalis* fish samples were collected from the Khark and Lark regions. One square centimeter of the inner part of the fish intestine was removed using a sterile knife and dissolved in 100 ml of phosphate-buffered saline (PBS). An emulsion solution was obtained, and one milliliter of this solution was transferred into test tubes containing 9 milliliters of phosphate buffer. Decomposing and heterotrophic bacteria were counted using MPN and CFU methods. Crude oil-degrading bacteria were screened. Finally, it was identified by molecular method that they belong to the genus *Acinetobacter radioresistens*. The counting of heterotrophic and decomposing bacteria showed that the highest number of decomposing and heterotrophic bacteria is related to *Brachirus orientalis* fish. BJ-4 strain had the highest emulsification activity, growth (OD), and decomposition percentage, which was selected as the superior strain. The results of optimization showed that the best optimal conditions for decomposition are Bushnell-Hass broth medium, 1.5% oil, 1% yeast extract source, 2% glucose, carbon source, and single culture.

133. Cellulose production by a novel bacterial strain isolated from peach

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Bacterial cellulose is a renewable biopolymer that today has wide applications in various fields, including in the medical, food and electronics industries. The aim of this research was to identify a bacterial strain isolated from peach and investigate its ability to produce cellulose. The strain was cultured in Hestrin-Schram (HS) medium under static conditions at 30 °C for 7 days and the produced gelatinous layer was purified by alkaline-heat treatment. The chemical structure of the polymer was investigated by FTIR spectroscopy. Cellulose production was evaluated in HS-based culture media with different carbon and nitrogen sources. Molecular identification of the strain was carried out by amplification and sequence analysis of 16S rRNA gene. The obtained FTIR spectrum confirmed the production of bacterial cellulose. The strain was able to produce cellulose using glucose, fructose, mannitol, glycerol and sucrose as carbon sources and using peptone, tryptone, meat extract, yeast extract and corn steep liquor as nitrogen sources. Among them, sucrose with an average of 0.1 g/L and corn steep liquor with an average of 2.7 g/L led to the highest amount of cellulose production. Cellulose production by the strain was not observed using xylose, lactose and maltose, as well as ammonium and nitrate salts. The 16S rRNA gene sequence of the strain showed 100% similarity to the gene sequence of *Komagataeibacter swingsii* and *K. europaeus* type strains. Further studies on the culture conditions and characteristics of the cellulose produced by this strain can help to evaluate its industrial potential.

134. Antibacterial effect of aqueous and alcoholic extracts of barberry root on *Listeria monocytogenes*, *Vibrio harvey* and *Yersinia rockii*

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Plant extracts are known as natural sources with antibacterial properties. Barberry root (*Berberis vulgaris*) is one of the medicinal plants with a long history in traditional medicine. This research examines the antibacterial effects of aqueous and alcoholic extracts of barberry root on *Vibrio harveyi*, *Yersinia ruckeri* and *Listeria monocytogenes*. Aqueous and alcoholic extracts of barberry root were prepared and their antibacterial potential was evaluated by disk diffusion and minimum inhibitory concentration (MIC) methods. The results showed that both extracts have significant antibacterial properties, so that the alcoholic extract showed more effectiveness in inhibiting the growth of bacteria. Also, barberry root extracts had a positive effect on the differentiation and immune activity of monocytes. This study suggests that barberry root extracts can be useful as a natural resource with potential for developing antibacterial drugs and improving immune response. It is suggested that more research be done to evaluate the effective mechanisms of these effects, as well as clinical studies to confirm the results.

135. Improving growth of yeast *Pichia pastoris* through adaptive laboratory evolution

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Biological processes in industry often face variable environmental conditions, including uncontrolled heating, which can lead to reduced product yields and consequently incur significant costs. Laboratory adaptive evolution methods enable microorganisms to adapt to laboratory

environmental changes, thereby maintaining production and performance even under stress. In this research, the yeast *Pichia pastoris* (X33) was investigated as a laboratory model to examine and validate this process, as well as to gain a better understanding of the adaptation pathways. In this study, laboratory adaptive evolution (ALE) was employed over a period of 80 days to enhance thermal tolerance in *Pichia pastoris* strains. This process involved a gradual increase in temperature by 1°C every 10 days, starting from 28°C in a constant temperature incubator. Selected clones for heat tolerance and salt tolerance were analyzed. At the end of the logarithmic phase at 35°C, the adapted strains demonstrated at least a 20% increase in biomass, which remained stable for over 100 generations beyond the initial 300 generations. Furthermore, the selected strains showed greater growth tolerance compared to the control strain in a 10% sodium chloride concentration.

136. The effect of irrigation intervals on infection of pistachio trees with *Phytophthora* crown and root rot in Semnan province

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Pistachio is one of the most valuable horticultural products of Iran, which plays an important role in non-oil exports. *Phytophthora* crown and root rot (gummosis) of pistachio trees is one of the most important and common diseases in pistachio growing areas of Iran, especially in Semnan province. This disease causes the destruction of fertile and non-fertile trees every year. Crop and irrigation management have a great impact on the incidence and severity of the disease in pistachio orchards. In the present research, the percentage of pistachio trees infected with gummosis disease in the flood irrigation system (with time intervals of 20, 30 and 40 days) was evaluated in a period of 4 years in Damghan city. The experiment was conducted as a factorial in the complete block design in 3 pistachio orchards with loamy-clay soil texture and 3 orchards with clay texture. The orchards were irrigated with 6500 m³/hectare/year as border irrigation in two sides of the canopy trees. Isolation of pathogens was done using CMA+PARP medium. The results showed that in gardens with clay loam texture, the percentage of infected trees in 20, 30 and 40 days irrigation cycles was 3.7, 2.33 and 1.83%, respectively, which showed a significant difference with each other. In gardens with clay texture, 4.87%, 4.07% and 3.17% of trees were infected to gummosis at irrigation intervals of 20, 30 and 40 days, which had a significant difference with each other. Also, the percentage of infected trees was significantly higher in gardens with clay texture than loam-clay texture. In total, the results of this research showed that increasing the irrigation intervals, especially in clay texture soils, can significantly reduce the percentage of infected trees gummosis.

137. Evaluating evolution and quality of ζ -Carbonic anhydrase sequences in environmental microbiomes

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The carbonic anhydrase (CA) enzyme is essential for living cells. This study utilizes bioinformatics methods to evaluate the evolutionary processes and sequence quality of ζ-CAs,

demonstrating the presence of ζ -CA in both eukaryotic and prokaryotic microorganisms. Until now, ζ -CA had only been identified in eukaryotic organisms such as microalgae; however, the results of this study indicate that ζ -CA sequences also exist in certain prokaryotic types (bacteria), such as *Nitrosomonas ureae*. This dual presence and the newly identified amino acid motifs suggest the potential existence of new members of the ζ -CA subfamily that have adapted to zinc deficiency in aquatic ecosystems. The findings of this study reveal that ζ -CA sequences have been identified in both eukaryotic microorganisms, such as microalgae, and various prokaryotic types (bacteria), indicating their widespread distribution across different environments. The co-existence of β - and ζ -CA in some microorganisms suggests a potential evolutionary relationship, particularly in aquatic environments with limited zinc availability. The novel motifs discovered in the amino acid sequences may also represent potential subfamilies of the ζ -CA family. Evolutionary analysis provided important insights into the diversity and adaptability of ζ -CAs. The similarities between β - and ζ -CA indicate an evolutionary link driven by environmental pressures, such as limited access to zinc, given ζ -CA's ability to utilize cadmium or zinc as a cofactor. ζ -CAs play a critical role in CO₂ concentration mechanisms and photosynthesis, especially in phytoplankton, highlighting their ecological significance. This study offers a comprehensive evolutionary analysis and quality assessment of ζ -CA sequences from environmental microbiomes, emphasizing their evolutionary importance and functional diversity.

138. Evaluation of the prophage typing of methicillin- resistance staphylococcus aureus isolated from Ilam hospital

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Staphylococcus aureus bacteria are one of the main causes of nosocomial and acquired infections. Resistance of this bacterium to antibiotics, especially methicillin, can cause many problems in patients. Methicillin resistance in *Staphylococcus aureus* strain may be due to the presence of the *mecA* gene. These genes and encoding genes and regulating resistance to antibacterial agents are placed on the SCCmec gene cassette. This study aimed to investigate the spread of methicillin-resistant *Staphylococcus aureus* strain isolated from Ilam hospitals. In this study, 100 samples from Ilam hospitals were randomly obtained from prepared from different levels. And were examined while maintaining standard conditions. The laboratory was transferred. Phenotypic and genotypic studies were performed to detect *Staphylococcus aureus*. Isolation of strain to 6 antibiotics was evaluated by disk diffusion method in agar. The highest degree of resistance to penicillin was 100% and respectively resistance included oxacillin (95.83%), cefotaxime (66.66%), amoxicillin (12.5%), imipenem (4.16%) and the antibiotic natyl mycin did not show any resistance. In genotypic studies using PCR, 54% of the samples contain the *femA* gene and 46% did not contain the *femA* gene, and all strain also had methicillin resistance (*mecA*) gene. To investigate the presence of different prophages among methicillin-resistant strain, PCR test with specific primers of three prophage classes (SGB, SGFa, SGFb) has been used. SGFa and SGFb were identified as the dominant prophase at 100% and SGB at 83.33% among the isolates.

139. Investigation of the Degradation Capability of Polyethylene Terephthalate Microplastics by a Fungi Strain

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Plastic pollution is a major environmental issue that has gained significant attention in international programs. Approximately 6300 million tons of plastic waste, including polyethylene terephthalate

(PET), have been produced. Of this amount, only about 9% has been recycled, 12% has been incinerated, and the remaining 79% has stayed in the environment. This study aims to investigate the potential of a fungi isolate to degrade polyethylene terephthalate. Various methodologies show that this strain can degrade approximately 20% of PET at a concentration of 10 g/L in a liquid carbon-free base medium (LCFBM) within 30 days. FTIR results showed significant changes in the functional groups of carbonyl ($1600-1800\text{ cm}^{-1}$) and groups like C-O and C-N ($1500-1000\text{ cm}^{-1}$) in the spectra obtained from PET particles treated with the mold strain compared to the control, indicating hydrolysis of PET. Furthermore, SEM results confirmed the formation of cavities due to the strain's activity on microplastics. Additionally, EDS analysis indicated an increase in oxygen and a decrease in carbon, demonstrating chemical changes and potential degradation of these harmful materials. Finally, TGA results showed that microplastics treated with the strain decomposed at lower temperatures compared to the control, suggesting that the strain treatment reduces the polymer's structural stability. These findings demonstrate that the fungi strain under study has the ability to degrade polyethylene terephthalate as the sole carbon source. For further research, this strain has been sent to relevant centers for molecular identification. It is recommended to investigate the performance of other fungal and bacterial strains and to optimize the culture conditions.

140. Investigating microbial contamination of the water surface and depth of indoor swimming pools in Ilam city

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In this descriptive study, two indoor swimming pools in Ilam city were investigated in terms of bacterial contamination during the spring. Sampling method with sterile carpet and filtration method were used to determine contamination. Several samples from different surfaces of each pool (shower, floor, bathroom, platforms, changing room) were tested for bacteria isolation on holidays that have the most visitors. It was tested to isolate bacteria on holidays that have the most visitors. The samples were transferred to the microbiology laboratory of the para-veterinary Faculty of Ilam University. After purifying the samples, specific and differential biochemical tests were used to identify the phenotypic and isolated bacteria. In the conducted research, the types of gram-negative and gram-positive bacteria present in swimming pools were examined, which is important because of the importance of swimming pool health and important diseases caused by gram-negative and positive bacteria. Gram-negative bacteria identified in the pools of Ilam city were coliforms and *Morganella*, whose percentages are (*Morganella* 15%, *Enterobacter cloacae* 20%, *Citrobacter freundii* 15%, *Klebsiella* 25% and *Escherichia coli* 25%). In this study, the relationship between bacterial population and water turbidity was direct. The population of Gram positive bacteria identified in this research was (*Streptococcus* 21/43, *Staphylococcus epidermis* 14/57, *Staphylococcus aureus* 21/43). In the next stage of this project, it was decided that the samples should be examined for final confirmation by conducting molecular tests and determining the sequence of nucleotide acids.

141. Inhibition of bacterial biofilm growth using chamomile essential oil

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Antibiotic resistance is one of the problems in the world. The use of plants for treatment has been considered. One of these plants is chamomile which is consumed as tea all over the world. In this study, the essential oil of the *chamomile Matricaria* collected from around Khorramabad city was prepared using clovenger and hydroalcoholic extract by maceration method. Antibacterial

properties of this plant were investigated on microorganisms isolated from diabetic wounds including *Escherichia coli*, *Staphylococcus aureus* and *Klebsiella pneumoniae*. For this purpose, (MIC) and (MBC) of essential oil and extract were obtained using the Kirby-Boer method using 96-well plates. Bacteria that had the ability to confirm biofilms were identified and cultured in TSI medium with 2% glucose, and the essential oil and extracts were added to the wells at the inhibitory concentrations obtained in the previous step and analyzed in 2, 6, 12, and 24 hours. The results obtained from this study showed that the inhibitory effect of chamomile essential oil in very low concentrations inhibited the growth of these bacteria. Chamomile essential oil also inhibited the formation of biofilm by these bacteria. Also, the extract inhibited the growth of bacteria at a concentration of 200 µg/ml and inhibited the growth of biofilm at a concentration of 400 µg/ml. According to the obtained results, it seems that chamomile essential oil and extract can be a suitable option for conducting further studies in order to prepare an ointment or cream for the treatment of infection caused by diabetic wounds.

142. Characterization and isolation of *Salmonella* and *Shigella* from carp fish

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Seafoods are a popular and crucial protein source, although they can cause bacterial foodborne diseases. Pathogens including *Salmonella* and *Shigella*, can be associated with acute diarrhea, posing a serious threat to public health. The fisheries organizations play a critical role in regulating hygiene throughout the seafood supply chain management. Therefore, the present study aimed to compare the safety and quality of fish caught by local anglers and fishery markets. A total of 30 random samples of raw carp fish (*Cyprinus Carpio*), 15 from the anglers' hands and 15 from fishery markets were collected for screening the existence of *Salmonella* and *Shigella*. First, comprehensive health assessments were conducted for texture, smell, and color. Precisely 10 g of each sample was homogenized by a blender in 90 ml of normal saline. They were serially diluted from the initial concentration (10^{-1}) to 10^{-6} and inoculated on MacConkey agar and Blood Agar mediums. Finally, biochemical identification of the isolates was performed with lactose fermentation and IMViC tests. This study aimed to isolate and identify *Salmonella* and *Shigella* bacteria. Among all isolated colonies, there were no *Salmonella* and *Shigella* in fish of the fishery market, while 2 *Salmonella* and 1 *Shigella* cases were found in samples obtained from the local anglers. We concluded that inadequate ice and poor handling may be some of the causes of postharvest local market fish losses. Fisheries organizations have to consider preventing the transfer of contamination to the food chain by providing technical and specialized knowledge.

143. Isolation and identification of nicotine-degrading bacterium from tobacco wastes

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Tobacco waste, as a type of agricultural waste, comes from harvesting of tobacco leaves. This crop contains many chemical compounds, such as nicotine, which have been shown to have harmful effects on the environment. It is important to study the biodegradation of nicotine. The aim of this research was to isolate and identify a native nicotine-degrading bacterium from tobacco waste. The tobacco waste was collected from the Soltanieh tobacco company in Zanjan. The samples were diluted with physiological saline and then added to a basic inorganic salt medium (BSM) supplemented with nicotine and then incubated at 30°C. The bacterium was identified through microbial morphology and biochemical tests. The isolated bacterium was identified as

Brevibacillus laterosporus, which was able to use nicotine as its sole source of carbon and nitrogen. The tobacco waste on the floor of the free stall barn is used as an organic compound for cows. *B. laterosporus* is known to have probiotic, insecticidal, antibacterial, anti-tumour, and biodegradation properties.

144. Design and development of immunosensor to diagnosis *Candida albicans* using microfluidic chip

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Candida albicans is one of the main causes of death in hospitalized patients. The purpose of this research is to develop a fast and efficient approach for the timely diagnosis of patients suffering from candidiasis. In this study, 200 samples were collected from both healthy individuals and those who were sick, and *Candida* species were then identified using morphological and biochemical techniques. The data were statistically analyzed using the chi-square test. The target microfluidic chip was fabricated using the photolithography method. The chip was made of PDMS. The PDMS surface was modified by using a GPTMS linker to immobilize the primary antibody against *C. albicans*. The chip detected *C. albicans* by using a sandwich immunoassay with a secondary antibody conjugated with FITC. The study found that *C. albicans* was the most prevalent species (58%). The study also found that *Candida* infection was more common among women, young adults, elderly people, and patients with gastrointestinal diseases. The study also found that the microfluidic chip was able to detect *C. albicans* in clinical samples in a period of 2 hours with a low detection limit of 10 CFU/mL.

145. Screening, purification, and molecular identification of indigenous Iranian bacteria producing naringinase

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Enzymes, recognized as valuable biocatalysts, have found broad applications in various industries due to their unique properties. Naringinase, in particular, is a crucial enzyme with extensive utility in pharmaceutical and food industries. The primary objective of this research was to isolate, purify, and molecularly identify indigenous Iranian bacterial strains capable of producing naringinase enzyme. In this study, diverse soil and citrus samples were collected from various regions of Iran following standard microbiological procedures. Subsequently, indigenous bacteria were isolated, purified, and subjected to qualitative and quantitative assays for enzyme activity. Finally, high-potential enzyme-producing strains were characterized based on their morphological, biochemical properties, and 16S rDNA-based ribotyping. The findings of this study revealed that indigenous *Bacillus* strains exhibited a high potential for naringinase production, suggesting the feasibility of microbial fermentation for enzyme production. The maximum enzyme production in the index strain was determined to be 80ul/ml. Given the significance of this enzyme in various industries, the results of this research can be a pivotal step towards advancing biotechnology in Iran and producing higher value-added and diversified food products.

146. Investigating the prevalence of *Cryptosporidium* infection in horses in Urmia city, Iran

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Cryptosporidium spp. are apicomplexan parasites that are considered the primary causes of intestinal diseases in humans and animals today and have a worldwide spread. In immunocompromised animals, *Cryptosporidium* as a pathogenic microorganism causes watery diarrhea, poor absorption, and weight loss. This study aims to determine the frequency of *Cryptosporidium* infection in horses in Urmia, Iran. In this study, 612 stool samples were collected from 417 stallions and 195 mares. we prepared a stool smear. After drying, the slides were stained using the modified Ziehl-Neelsen staining method. The results showed that the *Cryptosporidium* infection rate in the studied horses was 14.37% (88 positive cases. According to the results, among club and local horse populations, the *Cryptosporidium* infection rate is different in different age groups. Although the statistical results do not show a significant relationship between the age of horses and infection with *Cryptosporidium*, the statistics indicate that the infection is high among the age group under 2 years old ($P>0.05$). In various research, the rate of infection with this parasite is very different and has been reported from zero to 60%. Based on the results of this study, it appears that the level of *Cryptosporidium* infection in the horses examined is similar to that reported in other published studies.

147. Quantitative assessment of indole acetic acid production by actinomycetes isolated from the rhizospheric soil in Alborz province

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Phytohormones are essential regulators of physiological activities in plants. Indole-3-acetic acid (IAA) is one of the most important phytohormones that can be synthesized by microorganisms. IAA-producing bacteria can be a potential tool to increase nutrient uptake and reduce chemical fertilizer use. The purpose of this study was to screen IAA-producing actinomycetes isolated from the rhizospheric soil. In a previous work, thirty actinomycetes were isolated from rhizospheric soil in Alborz province and approved in the qualitative assessment of IAA production. The isolates were cultured in a nitrogen-free liquid medium containing tryptophan as the sole carbon and nitrogen sources. After incubation for 7 days, the culture was centrifuged, and the supernatant was treated with the Salkowski reagent. The samples were then incubated in the dark at room temperature to complete the reaction. The absorbance of the samples was measured at 530 nm using a spectrophotometer and the quantity of IAA was calculated based on the equation obtained from the standard curve. The data were analyzed by one-way analysis of variance and Tukey test with 95% confidence level using Minitab software. The amounts of IAA production by the strains was in the range of 98.5 to 401.3 mg/l and showed statistically significant differences. Three strains showed the highest capability for IAA synthesis. The results demonstrated a high potential for IAA production among the actinomycete strains, which can be further investigated to develop efficient products that align industrial microbiology with agricultural demands.

148. Optimization of the cell disruption method and protein pigments extraction from *Porphyridium purpureum*

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Porphyridium purpureum is a single-celled and marine red microalga rich in valuable bioactive compounds such as phycobiliproteins, with potential applications in the food, health, and medical industries. This study aimed to evaluate the best method for extracting phycobiliproteins, including phycoerythrin, phycocyanin, and allophycocyanin, using various solvents: NaCl solution (at 0.1%, 0.5%, and 1%); phosphate buffer (at 25, 50, 75, and 100 mM (pH 6.5)); distilled water; and 10% glycerol. Physical methods such as freeze-thawing at -20°C and liquid nitrogen (to 7 times), sonication (1, 5, 7, and 10 minutes), and varying the volume ratio of solvent to algae were also assessed. Results indicated that 1% NaCl and 10% glycerol were more efficient in extracting protein pigments. The highest content of phycoerythrin (0.226 mg/ml) was obtained with 1% NaCl using freeze-thawing at -20°C, while the highest amounts of phycocyanin (0.0501 mg/ml) and allophycocyanin (0.0189 mg/ml) were extracted with 10% glycerol. The highest purity levels of phycoerythrin (2.786), phycocyanin (0.326), and allophycocyanin (0.185) were achieved using 1% NaCl with freeze-thawing at -20°C, three cycles of freeze-thawing in liquid nitrogen, and two cycles of freeze-thawing in liquid nitrogen, respectively. Additionally, increasing the cell concentration relative to the solvent volume (10, 25, 50, and 100 mg/ml) led to higher protein pigment concentrations. Phycoerythrin (pink pigment) showed the highest quantity and purity among the phycobiliproteins. Considering the commercial importance of phycoerythrin, the findings of this research provide an efficient method for extracting this metabolite with high quality at 300L scale.

149. Investigating the presence of *Fusobacterium nucleatum* in the biopsy of clinical samples of colorectal cancer tissue and adjacent healthy tissue

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Colorectal cancer is a common malignancy worldwide and an important obstacle in increasing life expectancy. During the formation and progression of this complication, in addition to specific somatic mutations in various genes, other important factors such as changes in the microbiome of the gastrointestinal tract play a role, among which the importance of *Fusobacterium nucleatum* can be mentioned. In this study, first, a number of colorectal cancer tissue with their adjacent healthy tissue samples were collected and their DNA content was extracted. To molecularly detect *Fusobacterium nucleatum* in the samples, a pair of widely used oligonucleotide primers based on other studies were synthesized. After examining and optimizing primer binding conditions to the target area, temperature cycles were applied using the PCR method, and the gene amplification product was observed on the Agarose gel. Between the two types of studied samples, no obvious difference was observed regarding the target amplified fragment with a length of 112 bp. Therefore, the presence of the bacterium and the amplicon band was confirmed both in the cancerous and the adjacent healthy tissue, and the amplified fragments had a relatively similar pattern in both types of samples. This can indicate that there is no difference in the presence of this bacterium in the cancerous and the healthy tissue adjacent to it, and it is suggested that a similar study with quantitative methods including the population of healthy people and a larger number of samples is done to determine the difference in the presence of this bacteria.

150. In Vitro evaluation of antimicrobial activity of native probiotic bacteria against some common aquatic pathogens

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Probiotics are live microorganisms, which when administered in adequate amounts, confer a health benefit on the host. Probiotics typically produce a wide range of antimicrobial substances that inhibit and control microbial pathogens. This study was conducted to evaluate antimicrobial activity of our native probiotic bacteria isolated from Persian Gulf fish. A total of 83 Gram-positive isolates have been cultured from intestine and rectum of shrimp, crab, sole fish, flounder fish, goby fish and eel fish. These strains were initially characterized by phenotypic methods and survey for probiotic activity according to Iran National standard No. 19459. Among all, only 33 isolates passed all criteria and introduced as probiotic candidates which characterized by 16S rRNA gene sequencing. Antimicrobial activity of selected strains against fish pathogens include *Lactococcus garvieae* (IBRC-M 11508), *Yersinia ruckeri* (IBRC-M 11507) and *Streptococcus iniae* (IBRC-M 11513) was carried out according to well diffusion method on Muller-Hinton agar. At first, cell-free supernatant of strains (CFS) were obtained by centrifugation of liquid probiotic culture and filtered through cellulose nitrate filter of 0.45 μ m. The CFS was then freeze-dried and used as source for antimicrobial compounds in the process. As a result, two probiotic strains by the name of Dash I (5) and LP7 (18) demonstrated significant efficacy against pathogens which characterized as *Levilactobacillus brevis* and *Pediococcus acidilactici*, respectively. Studies to evaluate the effects of these selected strains in amelioration disease symptoms in fish farm is ongoing.

151. Investigating the effect of different concentrations of elements and vitamin B on chromium accumulation in *Spirulina platensis*

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This research aims to investigate the balance of bioaccumulation of chromium (III) ions with the growth of blue-green algae *Spirulina* sp. in single-component and multi-component systems. In the process of bioaccumulation to investigate its potential application in the production of biological mineral feed supplements. For this purpose, *Spirulina platensis* was prepared from the algae collection of the Department of Marine Biology, TMU. 4 treatments were selected for cultivation including 4 treatments. It was done at a temperature of 28 ± 2 C° with a light/dark cycle of 9-15 hours in a cultivation period of 14 days. The amount of elements and vitamins in the treatments was done as follows. Treatment 1 was the control, in treatment 2 chromium oxide, and in treatments (3&4) chromium oxide in 2 amounts and Fe₂O₃ and pyridoxine were added to the culture medium. At the end of the cultivation, it was done with the standard absorption spectrometer method. The results were analyzed using SPSS. The results showed that it is 0.06, 11.8, 14.2&87.4(mg/kg), respectively. In bioaccumulation tests in single-component systems, the absorption efficiency is 24.3% and the multi-component absorption efficiency is 57.9%. According to the obtained results, $p > 0.05$, the data distribution is normal and the average bioaccumulation of chromium element in the treatments has a significant difference, the result of the variance test is equal to $f(4,10) = 17345.23$, $p = 0.00$. Elements can bioaccumulate in spirulina without disrupting the growth of cyanobacteria, and interestingly, if elements are used together with vitamin B, the absorption percentage increases significantly compared to the control.

152. Effect of sequential acclimation to different carbon sources on the resistant of *Acetobacter senegalensis* during acetous fermentation

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Acetobacter senegalensis is generally used in the production of acetic acid and vinegar at high temperature. Acetous fermentation is usually done at low pH and in the presence of high concentrations of organic acids and ethanol. The main idea of the current study was to evaluate the effects of sequential acclimation to different carbon sources on the ability of *A. senegalensis* to withstand stressors during acetous fermentation. To achieve this aim, the bacterial strain was cultivated successively in the presence of three different carbon sources including acetic acid, glycerol, and ethanol. Then, changes in the viability of the target strain were investigated through colony counting method. In addition, flow cytometry was applied to evaluate the alterations in the respiratory capacity of the acclimated bacteria. The amount of changes in product production efficiency was assessed by measuring the amount of acetic acid produced. Additionally, using gas chromatography, the amount of changes in the fatty acid content of the cell membrane was measured. Our results showed that *A. senegalensis* was able to grow in the presence of glycerol, acetic acid, and ethanol. However, its growth in the presence of glycerol ($OD_{600}=2.8$) was twice higher than ethanol. Additionally, flow cytometry results showed that 37% of the adapted bacterial cells in the presence of the glycerol were able to tolerate harsh condition caused by the presence of ethanol, acetic acid and lower pH. Cell viability of *A. senegalensis* at 15 °C was 37%. However, just around 1% of cells were viable at 30 °C. These findings suggest that lower temperature plays a key role in the adaptation to extreme conditions during acetous fermentation. The highest biomass amount and acetic acid titer was produced by the strains adapted in the presence of glycerol at 15 °C. Also, significant changes in the ratio of saturated fatty acids to unsaturated fatty acids were observed in the bacterial population acclimated to extreme environmental conditions including higher temperatures and lower pH which is a general response among bacterial strains to tolerate acidic conditions. It can be concluded that by the method of sequential acclimation under sub-lethal stresses, it is possible both to increase the tolerance of *A. senegalensis* cells to environmental stresses and improve the fermentation parameters.

153. Improving Bacterial cellulose production

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Cellulose, one of the most abundant natural polymers on earth, has gained researchers' attention due to its various applications in pharmaceuticals, the food industry, and other fields. Bacterial cellulose is a new source and substitute for plant-derived cellulose, unlike plant cellulose, it lacks compounds like lignocellulose and hemicellulose, has a high Crystallinity index, and exhibits high purity. Additionally, it requires no post-chemical and physical treatments, making it more sustainable and also eco-friendly. Bacterial cellulose can be obtained from different microorganisms, such as bacteria. In this study, *Komagataeibacter xylinus* was selected for cellulose production. Due to the low productivity of microorganisms in producing various metabolites, the effects of different carbon sources and pH were assayed to increase production yield. All samples were incubated statically at 30°C for 9 days. In this study, Hestrin-Schramm (HS) medium was used for pre-culture, while different carbon sources and pH levels were applied for the main culture. According to related articles, glycerol, mannitol, and glucose are the three main sources for cellulose production aimed at improving the production yield. Glycerol achieved

a yield of 14% and Glucose achieved a yield of 7%. Additionally, among different pH ranges from 2 to 9, a pH of 8 was considered the best for cellulose production.

154. Molecular cloning, expression, and purification of the *Klebsiella* phage endolysin KP27 gene in the *pET28a* vector

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Endolysins, powerful enzymes from bacteriophages, degrade bacterial cell walls and are promising antimicrobial agents due to their high specificity. They selectively target pathogens without harming beneficial microflora and are effective against both Gram-positive and Gram-negative bacteria. The KP27 endolysin, a heat-stable protein from bacteriophage KP27, shows potential against multidrug-resistant *Klebsiella pneumoniae*. This study focuses on cloning, over-expressing, and purifying KP27 endolysin. KP27 gene, specific primers, PCR reagents (Taq polymerase, dNTPs, MgCl₂, buffer), and a pET28a plasmid vector were employed. Restriction enzymes (NcoI and XhoI), T4 DNA ligase, and competent *E. coli* cells (e.g., DH5 α) are used, with LB agar plates containing kanamycin for selection. Primers with restriction sites are designed, and the KP27 gene is amplified by PCR. For cloning, once the PCR product was confirmed by gel electrophoresis, it was purified and then digested along with the vector. Next, the gene ligated into the vector with T4 DNA ligase and transformed into *E. coli* DH5 α cells. Afterward, colonies were screened by PCR, then plasmid miniprep, and eventually verified by sequencing. For protein expression, the first plasmid is transformed into *E. coli* BL21(DE3) cells, and later protein expression is induced by 0.1 mM IPTG at 37°C for 8 hours. After that, cells were harvested, lysed, and analyzed by SDS-PAGE 15% to confirm overexpression. Finally, lysate was loaded on a Ni²⁺-NTA column, and purified KP27 obtained at the concentration of 1.5mg/ml. The KP27 endolysin was successfully cloned, expressed, and purified, providing a viable alternative to traditional antibiotics and suitable for further studies.

155. Preliminary investigation on the antibacterial activity of natural honey samples from Iran

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The increasing resistance of microbial pathogens to antibiotics and the side effects caused by their use have increased the desire to use natural antimicrobial compounds. Honey exhibits broad-spectrum antimicrobial activity, and its activity depends on factors such as botanical origin climate, and environmental conditions. Considering the diversity of climate and vegetation in Iran, this study aimed to compare the antibacterial activity of honey samples from different regions of Iran. Sixteen honey samples were collected from Khuzestan, Hamadan, Kermanshah, Khorasan, Fars and Lorestan provinces. Some physicochemical characteristics of honey such as moisture content, pH, electrical conductivity and ash content were determined and the results confirmed the acceptable quality and authenticity of honeys. Antimicrobial effect of pure honey samples was investigated by agar well diffusion method against four reference bacteria including *Staphylococcus aureus*, *Escherichia coli*, *Bacillus cereus* and *Pseudomonas aeruginosa*. A total of 8 samples, including *Ziziphus*, *Glycyrrhiza*, *Citrus*, *Astragalus*, *Fraxinus*, *Astragalus-Euphorbia* and multifloral honeys had more antimicrobial effect than other samples. Based on the average diameter of growth inhibition halo, in most cases *S. aureus* and *E. coli* were more sensitive to honey samples compared to *P. aeruginosa* and *B. cereus*. The results of this study showed that some types of honey can be used as antimicrobial agents in medical and food fields. However,

more studies are needed to understand the mechanism of action and the medicinal aspects of these honeys.

156. Impact of unnecessary traffic on air microbial population in hospitals

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The prevalence of hospital-acquired infections due to bio-aerosols in medical facilities poses a serious threat to the health of patients and healthcare workers, leading to significant economic losses. In this study, we conducted a microbial population assessment in the air of main hospital corridors during pre-coronavirus, pandemic, and post-coronavirus periods. These corridors connect various hospital departments and are heavily trafficked by patients, visitors, and staff. Air samples were collected using a sampling pump at a standard flow rate (14.1 l/min) at breathing height in the morning and evening. The microbial population was determined using laboratory cultures on Nutrient Agar and Sabarod Dextrose Agar to count bacteria and fungi, respectively. In normal conditions (pre-COVID), the population of bacteria and fungi was 591 and 118 CFU/m³, respectively. During the pandemic and quarantine, the bacterial population decreased by 50% and the fungi population by 60%. Post-coronavirus normalization resulted in a significant increase in the microbial population. Comparison of microbial populations before and during visiting hours revealed a fourfold increase in bacterial population during visiting hours, with no significant change observed in the fungi population. This study demonstrates the significant impact of patient companions, visitors, and outpatients on the microbial population in medical facilities.

157. The effect of chronic injection of zinc oxide nanoparticles synthesized by the green method from eucalyptus leaves (*Eucalyptus camaldulensis*) on some intestinal flora bacteria isolated from the feces of mice

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We aimed to investigate the effect of chronic receiving of zinc oxide nanoparticles (ZnO NPs) on cultivable microbiome of NMRI mouse. ZnO NPs were synthesized by the green method from eucalyptus leaves (*Eucalyptus camaldulensis*) and then injected (1 mg/kg, i.p.) into 6 mice as intraperitoneal for 21 days. Feces samples of mice were collected on days 0, 1, 7, 14 and 21 after injections. One hundred mg of each feces sample was dissolved in 1 mL of sterile physiological serum. Then, the number of cultivable bacteria was counted by colony count method. Five different bacteria (3 Gram positive and 2 Gram negative) were detected and counted in different days after stating the experiment. The number of all detected bacteria decreased significantly 24 h after first injection of ZnO NPs. The culture of feces microbiome showed the elimination of Gram-positive bacteria and appearance of other type of Gram-positive and Gram-negative bacteria on the 14 day. Among the 5 different colonies detected, two Gram-negative rod bacteria belonged to *Enterobacteriaceae*, while one of Gram-positive bacteria was cocci and belonged to *Streptococcaceae*. Two other Gram-positive bacteria were spore-forming rod-shaped and placed in *Bacillaceae*. The long using of ZnO NPs effect on the intestinal microbiota; therefore, there is a need to investigate changes in the microbiome and its effects on people's health.

158. Comparative Study of antimicrobial effects of silver/chitosan and silver/chitosan/ceftazidime magnetic nanocomposite against *Escherichia coli* bacteria

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Today, the presence of various antibiotics in human life is undeniable. Indiscriminate use of antibiotics has caused the emergence of drug resistance in infectious agents and the positive effects of antibiotics have faced serious problems. One of the suitable methods to deal with this problem is to increase the antimicrobial activity of antibiotics by combining them with metal nanoparticles. In this research, silver nanoparticles have been used to investigate desired antibacterial activity. The standard strain of *Escherichia coli* on the standard culture medium and their drug sensitivity pattern against silver magnetic nanocomposite compounds was determined using the standard method of disc diffusion in agar. Then, different ratios of silver magnetic nanocomposite compounds were determined according to their MIC and antimicrobial activity was also investigated. Magnetic silver nanocomposite compounds showed good effects against *E. coli* bacteria and there was halo formation around the nanoparticle used in synthesis. In the MIC and MBC test, the absence of bacteria was clearly detectable in the high amount of nanoparticles in the well with the transparency of the environment, and by culturing 5 microliters of the desired solution in the plate with the absence of bacteria, the antibacterial property was determined. Synthetic silver magnetic nanocomposite by co-precipitation method has good antibacterial performance against the standard strain of *E. coli*. Nanoparticles can make a significant contribution to the effect of antibiotics on bacteria. It is suggested that this research be done for different strains of bacteria.

159. Innovative approaches to combat multidrug resistance: the efficacy of Iranian honeys in inhibiting *Klebsiella pneumoniae*

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Multidrug resistance is a global health problem. With the recent increase in drug resistance to currently used antibiotics, researchers should look for alternative treatments. *Klebsiella pneumoniae* is one of the main causes of nosocomial infection worldwide and managing antimicrobial resistance in this bacterium is a big challenge for physicians. Honey is considered as one of the most important natural compounds to replace antibiotics. This substance has therapeutic potential and antimicrobial activity that has nutritional and therapeutic applications. The purpose of this study is to investigate the bactericidal and growth inhibitory effects of monofloral Iranian honeys, including Somr, Somagh, Baharnarenj, Gavangaz, Avishan, Namdar and Konar on multi-drug resistant *Klebsiella pneumoniae*. Multi drug-resistant strains of *Klebsiella pneumoniae* which were isolated from patients referred to Imam Reza Hospital was used in this study. Disk diffusion method showed resistance of these bacteria against eight commonly used antibiotics. Primary screening of Iranian honeys was performed by well diffusion method. In the next step, various concentrations (100 -50% % v/v) of effective honey samples were prepared and tested against bacterial isolates. The minimum inhibitory concentration (MIC) and the minimum bactericidal concentration (MBC) of honeys were determined using microdilution method. Among the tested honeys, Somr, Konar and Namdar honeys exerted the most significant inhibitory effect on *Klebsiella pneumoniae*. MIC and MBC of these three honey samples showed variation and were determined between 70% to 75% v/v. This study demonstrates that native Iranian honeys,

particularly Somr, Namdar, and Konar, exhibit significant bactericidal and growth-inhibiting effects against multidrug-resistant *Klebsiella pneumoniae*. The findings suggest that these honeys could serve as promising natural therapeutic agents in the fight against antibiotic-resistant infections, warranting further pharmaceutical standardization and clinical trials to confirm their efficacy in medical applications.

160. Investigating Ubiquinone Q₁₀ Production in *Tabrizicola aquatica*

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Coenzyme Q₁₀ is vital for generating ATP, a key energy molecule, in the respiratory chain. Its importance has led to growing demand in the medical, pharmaceutical, and health industries worldwide. The halotolerant bacterium *Tabrizicola aquaticus*, capable of tolerating salinity levels up to 3% (w/v), has been found to produce coenzyme Q₁₀. This study investigated the coenzyme Q₁₀ production of *T. aquaticus* by inoculating the bacteria in Marine broth culture medium (pH 7.4, 3% NaCl) and incubating at 40°C for 48 hours with adequate aeration. Cell lysis was conducted using two distinct methods: The Cell Lytic B method and a solvent method involving chloroform and methanol. Following the extraction process, the resulting samples were analyzed to quantify the amount of CoQ₁₀ produced using HPLC, an analytical technique for precise quantification of coenzyme content. The research compared the amounts generated through two different extraction methods. By evaluating the results, the study aimed to determine which method yielded a higher concentration of coenzyme Q₁₀, contributing to the understanding of optimal extraction techniques for this compound. The findings revealed that *T. aquaticus* produced 10.33 mg/L of coenzyme Q₁₀ using the Cell Lytic B method, while the solvent method yielded 5.53 mg/L. The Cell Lytic B method demonstrated better efficiency in extracting coenzyme Q₁₀. This suggests that the Cell Lytic B method has significant potential for larger-scale production of this important compound. The results indicated that the bacterium has significant potential for Q₁₀ production, and further optimization could boost yields.

161. Antimicrobial activity of Green Tea on *Staphylococcus aureus* and *Pseudomonas aeruginosa*

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Staphylococcus aureus is often responsible for skin infections, but it can cause pneumonia, heart valve infections, and bone infections, too. The Green Tea plant (*Camellia sinensis*) is a vast flower that has evergreen leaves and it is native to China. *Pseudomonas* is a group of bacteria commonly found in the environment, like in soil and water. *P. aeruginosa* can cause infections in the blood, lungs (pneumonia), urinary tract or other parts of the body after surgery. In this research, *C. sinensis* plant was prepared. We dried it and then ground it. Then we added Acetone and Ethanol solvents to them and extracted by Maceration method. We kept it in the refrigerator for 24 to 72 hours. Then we separated in a plate and dried at 25 °. After that, according to the Macro dilution method in a 24-w plate, we adulterate 1000µl of Mueller Hinton Broth and 500 µl of plant stock that contains Dimethyl sulfoxide and plant extract. Then we add 500µl of bacteria to each well. We checked the Minimum Inhibitory Concentration (MIC) and Minimum Bactericidal Concentration (MBC) after 24 hours. According to the experiments, we know that the ethanolic extract had 31.2mg/ml on *Pseudomonas aeruginosa* and 7.8mg/ml on *S. aureus*. Acetonic extract

had 7.8 mg/ml on *P. aeruginosa* and 7.8mg/ml on *S. aureus*. The results show that acetonc extract was more effective than ethanolic extract. It had the same effect on *S. aureus* and *P. aeruginosa*. In addition, ethanolic extract was so effective on *S. aureus*.

162. Surveying probiotic characteristics of the isolates from *Oniscidea* intestine

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Probiotics are microorganisms that have beneficial effects on human health. They produce bio-molecules with antimicrobial properties. In this study, seven *Oniscidea* were collected from the mountainous around Mahdishahr (Semnan, Iran). The samples were immediately taken to the laboratory. The intestines were removed, and homogenized in physiological serum. A serial dilution of 1:3 to 1:3000 was prepared. The nutrient agar medium was inoculated with 100μl of 1:96 And 1:300, followed by incubation at 37 °C for 18 hours. Twenty isolates were purified and their morphology, microscopic characteristics using gram staining, and biochemical characteristics such as catalase, oxidase, and motility were studied. Out of 20 isolates, 12 isolates (ID; DDBCC) were gram-negative and 8 isolates were gram-positive. Motility were detected in 5 isolates. Four isolates showed weak catalase activity, while two isolates were positive catalase. Additionally, 3 isolates were positive oxidase, while 3 others were negative. Probiotic properties of the isolates were surveyed by hemolysis, gelatinase, resistance to acidic conditions, and bile salts tests. On 5% human blood agar, 8 isolates exhibited gamma hemolysis, 2 isolates showed beta hemolysis, and one isolate did alpha hemolysis. None of the isolates exhibited gelatinase activity. Moreover, two isolates that previously demonstrated gamma hemolysis and negative gelatinase, were tested for their resistance to acidic conditions and bile salt at concentrations of 0.3% and 0.6%. The results indicated that two isolates are resistant to acidic conditions and bile salt.

163. Screening of microorganisms isolated from honey for the production of biosurfactant and antimicrobial compounds

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The emergence of microbial resistance to antibiotics and preservatives has created an increasing demand for new natural antimicrobials. Some microbial metabolites such as biosurfactants are promising candidates for the development of next-generation antimicrobial and anti-biofilm agents. The aim of this research was to screen microbial isolates from Iranian honeys for production of biosurfactant and antimicrobial compounds. At first, 387 isolates were cultured in tryptic culture medium for 48 hours at 30°C. The screening was performed using the cell-free culture supernatant by the qualitative drop-collapse test for biosurfactant production and by the agar well diffusion test for antimicrobial activity against the reference strains. Then, biosurfactant production in the isolates that simultaneously showed surfactant and antimicrobial activities was assessed by the semi-quantitative oil-spreading method, and the selected strain was identified using 16S rRNA gene amplification and sequence analysis. Overall, 35% of the isolates were able to produce biosurfactant and 13% of the isolates showed antimicrobial activity. The 16S rRNA gene sequence of the selected strain showed 99.86% similarity to the gene sequence of the type strain of *Bacillus sonorensis*. Further studies on the characteristics of the metabolites produced by this strain can help to evaluate its potential applications. The results of this research showed that

different types of honey can be a good source for microorganisms that produce biosurfactant and antimicrobial metabolites.

164. Screening and purification of Iranian highbomi mushroom strain producing naringinase enzyme

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Naringinase enzyme has a great effect in the processing of fruit juices such as orange juice and grapefruit juice, and it is used to improve pulp washing, increase yield, debitter and clarify fruit juice. Therefore, it can improve commercialization. Fruit juices play a significant role. Naringin is hydrolyzed step by step by naringinase. Naringinase enzyme is a type of hydrolytic enzyme that includes alpha-rhamnosidase and beta-glucosidase activity. During the studies conducted, mushrooms are the best microorganisms producing naringinase enzyme. During this study, 40 native mold and yeast strains were isolated from different regions of Iran and after cultivation and purification, they were subjected to quantitative and qualitative measurement of enzyme production, and the changes in the strains producing naringinase enzyme were observed and analyzed. Finally, after performing ribotyping and sequencing procedures on the productive indicator fungi, it was found that the yeast *Meyerozyma guilliermondii* strain MA04 produces naringenin in the amount of 60 micrograms per milliliter of substrate, as well as the mold *Aspergillus luchuensis* strain MA04 in the amount of 62 micrograms of the enzyme in submerged fermentation conditions.

165. Can the toxicity of encapsulated sulfur on the growth of *Saccharomyces cerevisiae* compete with elemental sulfur?

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Elemental sulfur exists mainly as octa-sulfur. S₈ has low solubility in water (~19nM) and has biologically accessible oxidation states from -2 to +6. Elemental sulfur is widely used as a fungicide to treat plant diseases, and entering the fungal mycelium directly inhibits the electron transport chain for respiration by modifying thiol groups of important proteins. In the present study, the effect of different concentrations of encapsulated sulfur on the growth of *Saccharomyces cerevisiae* was investigated by solid culture method and growth inhibition area measurement with at least three repetitions. Different amounts of sulfur were complexed with 2HP β CD in aqueous solution to obtain concentrations of 0 M, 0.00001 M, 0.00003 M, 0.00007 M of dissolved sulfur. The results showed that the toxic effect of encapsulated sulfur is greater than that of elemental sulfur, so that in lower concentrations it creates a lack of growth area comparable to higher concentrations of elemental sulfur. In addition, the toxicity effect of encapsulated sulfur is concentration-dependent, and increasing the concentration leads to an increase in the diameter of the area of growth inhibition. It seems that sulfur particles with a very small size in the angstrom range (~149 Å³) are complexed, which causes more dissolution in the aqueous environment, more effectiveness and increased degradation rate in yeast.

166. Comparison of different culture media for storage of methanotrophic isolates

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Our knowledge about the long-term preservation of environmental microorganisms is limited. This area requires more extensive research due to its crucial role in maintaining microbial biodiversity and advancing biotechnological innovations. Long-term preservation of organisms such as methanotrophic bacteria is challenging, and researchers have managed to preserve some methanotrophs for short periods under freezing conditions. The aim of this study was to evaluate and compare different media for storage of methanotrophs, which were isolated from Bandar Abbas soil. Two mineral media containing potassium nitrate and ammonium chloride salts, along with 20% glycerol in both liquid and solid forms, and two Tryptic Soy Broth media, one containing 20% glycerol and the other containing 20% glycerol and sucrose, were used. These media were stored at -16°C and -20°C. Additionally, mineral medium without glycerol were used to store bacterial suspensions. After three months of storing at -16°C and -20°C, all methanotroph isolates except two were culturable in Tryptic Soy Broth media. The isolates showed better viability in Tryptic Soy Broth medium containing 20% glycerol, and sucrose at -20°C. Considering the diversity of microorganisms, it is essential to evaluate various methods and media for their preservation for medium term and long time.

167. Comparison of the bactericidal efficacy of selected chemical solutions on staphylococcal infection in hospital environments

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With the increase in the phenomenon of drug resistance of bacteria in recent decades, the strategy of selecting the type of disinfectant or disinfectant chemical to fight, control bacterial infection has always been a controversial and important challenge for humans. Undoubtedly, the selection of the type of disinfectant has an effective role in the control of nosocomial infections, especially infection caused by the activity of *Staphylococcus aureus*. In the present study, which is a descriptive cross-sectional study, the microbiocidal effect of chemical solutions Chlorine dioxide, hydrogen peroxide and joule water were studied on *S. aureus*. Samples were collected from different wards of the hospital including men's, women's, ICU, laboratory stations, and nursing station table surfaces. Selection of wards was selected based on the specialized texture of the hospital and its importance in terms of the type of hospitalized patients. Sampling was done with a sterile swab that was pre-impregnated with physiological serum. The glass of the reception area and the metal surfaces of the nursing station staff seats were sampled. In total, 3 samples were collected from 5 abiotic levels and 3 samples from each level and a total of 15 samples per month. The sampling process was carried out with the aim of finding out the changes in nosocomial infections from September to December 2023 for 4 months and a total of 60 samples were prepared. Accordingly, first, the desired surfaces with an area of 100 cm² (10 x 10) were prepared and sterilized by autoclave and oven. Then, the microbial suspension was prepared and the glass and steel surfaces were contaminated with it and the adequacy of disinfection of all three solutions was studied in 5, 10 and 15 minutes. Analysis of the results of laboratory data showed that the germicidal effectiveness of chlorine dioxide disinfectant solution was higher compared to hydrogen peroxide and joule water in all three intervals of 5, 10 and 15 minutes. Therefore, it can be concluded that the use of chlorine dioxide disinfectant solution is more reliable for disinfecting hospital environments.

168. Inhibition of competitive pathways to increase butanetriol production in the *Escherichia coli* through metabolic network simulation

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Supplying clean, renewable, and abundant energy is one of the main concerns of today's human civilization. Fossil fuels are limited and expensive, and damages caused by their use have made people turn to biofuels which are part of renewable energy. One of these valuable substances is 1,2,4-butanetriol, an unnatural chemical substance with high value, and its properties are similar to glycerol. This chemical has essential applications as a precursor in manufacturing 1,2,4-butanediol trinitrate as a product in the military industry, polymers, and medicines. In this study, the genome-scale metabolic network reconstruction of *Escherichia coli* (iML1515) was modeled for butanetriol production from the cheap carbon source, xylose. For this purpose, we applied the "Constraint-Based Reconstruction and Analysis" (COBRA) method by using the COBRA toolbox, an extension implemented in MATLAB software. The pathway for butanetriol production from xylose was optimized, and competing pathways that consumed xylose were blocked. The result of the FBA analysis showed that the reconstructed network for butanetriol production has flux. Hence, its output in the metabolic network of *E. coli* was possible in silico. Finally, an attempt was made to determine the necessary and unnecessary reactions for improving butanetriol production by applying additional constraints and making some transcriptomics analysis. Considering that the complete deletion of competitive genes decreased the amount of biomass production by increasing the time required for proliferation; so by reducing the expression of competitive genes and not deletion, the amount of the butanetriol production reached 20mMol/gDW/hr, which is a significant increment compared to the time of complete genes deletion.

169. Study of a compound with antibacterial activity produced from a bacillus isolated from the Dasht desert

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Today, the identification of secondary metabolites is an interest to overcome antibiotic resistance. This study aims to produce bio- molecules with antibacterial properties from an isolate from Semnan Dasht desert. The isolate was investigated in terms of morphology, biochemical characteristics, starch, and gelatin hydrolyses. The supernatant from culture media was evaluated for haemolytic activity and stability at temperatures of 4, 60, 80, 100, 37, and -20 °C, pH ranges from 4 to 10, and against 5 mM sodium dodecyl sulfate. The antibacterial activity was tested using diffusion agar in Luria-Bertani broth against the indicators bacteria *Bacillus subtilis*, *Escherichia coli*, *Staphylococcus aureus*, *Salmonella typhimurium* and *Pseudomonas aeruginosa*. The isolate was identified as a gram-positive spore-forming bacillus, and its supernatant generate a halo zone of 14 mm against *B. subtilis*. Biochemical results characterized the isolate as a catalase-positive, indole-negative bacterium with hydrolysis activity for starch. It showed more than 98% similarity to *Bacillus weizmannii* in molecular identification. The highest activity of the concentrated supernatant at 4 and 37 °C is 148.19 AU/ml; at other temperatures, it is 101.026 AU/ml. The pH range is comparable to 148.19 AU/ml. Beta-haemolysis in agar containing 5% human blood was detected. Its activity was 101.026 AU/ml in the presence of SDS. Therefore, the bio-molecule is a lipopeptide based on haemolytic activity and can be used in the food, pharmaceutical, and agriculture industries.

170. Investigating the physicochemical and biological properties of raw and treated wastewater in sewage treatment plants

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Given human increasing reliance on treated wastewater for agriculture and industry usages, a comprehensive assessment of its physicochemical and biological properties is essential to mitigate environmental and health risks. Furthermore, assessing these characteristics within wastewater treatment plants is an important indicator to evaluate the treatment efficiency. This research aimed to measure physicochemical parameters and assess microbial contamination of wastewater samples collected from the inlet and outlet of South Tehran and Firuz Bahram sewage treatment plants during December 2023 and June 2024. The parameters analyzed included temperature, pH, biochemical oxygen demand (BOD), chemical oxygen demand (COD), total phosphorus (TP), total nitrogen (TN), ammonia, nitrate, and nitrite, total suspended solids (TSS) and most probable number of thermos-tolerant coliforms (MPN). The results indicated that significant variations were in some parameters. While some parameters such as pH, phosphorus and COD exhibited relatively minor changes, others including MPN of coliforms with differences from less than 1.8 to 79 in 100 ml and nitrate with differences between 7 to 15 mg per liter in the outlet wastewater and ammonia with differences of 37.7 to 90 mg per liter in the inlet wastewater, displayed substantial differences. These findings underscore the importance of rigorous monitoring to ensure the safety of the treated wastewater for the mentioned usages. This study also provides valuable insights into the potential impacts of the treated wastewater on health of agricultural products, which highlights attending the appropriate measures to safeguard public health and the environment.

171. Isolation of phages from Tenebrionidae microbiome against *Salmonella typhimurium*

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Salmonella typhimurium is a pathogenic bacterium, with increasing antibiotic resistance. It is necessary to develop alternative treatments, such as phage therapy to overcome *S. typhimurium* antibiotic resistance. Here, lytic phages from the digestive tract of the desert weevil (Tenebrionidae) with impact on *S. typhimurium* were isolated. Phages were purified using the double-layer agar method, followed by their enrichment and concentration. Then, the titer of phages and their absorption rate were calculated by counting the plaques. For evaluation of the optimal "Multiplicity of infection" of phage, the turbidity of the suspension was measured at a wavelength of 600 nm for 12 hours. The stability of phages was investigated under UV wavelengths, a range of temperatures, and pH. The specificity and host range of phages were assessed. The phage showed an absorption rate of more than 5 minutes. The stability phage showed that it is resistant to a wide range of temperatures (-70°C to 55°C) and pH values (5 to 11), but it is not stable under UV wavelengths. The optimal control of the bacterial population was observed when the Multiplicity of infection was equal to one. The lytic effect of the phage was tested for seven indicator bacteria. Plaque formation was observed only for *Klebsiella pneumoniae*. Therefore, the phage can be a candidate for control of *S. typhimurium* infection. The isolated phage is predicted to be a jumbo phage because it can form plaques only in cultures containing a minimal amount of 0.3% agar.

172. Utilizing marine bacterial exopolysaccharides for efficient heavy metal removal in aqueous systems: An eco-friendly approach

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The application of biosorbents as an eco-friendly strategy to address heavy metal accumulation in aqueous systems is of significant interest. This study investigates the efficacy of exopolysaccharide (EPS) derived from the marine bacterial strain *Vibrio alginolyticus* ATCC 17749 as a biosorbent for removing heavy metals. The research evaluates the sorption efficiency of cadmium (Cd) and nickel (Ni) by EPS, focusing on the effects of pH levels (3.5, 5.5, and 6.5) and biosorbent concentrations (65-300 mg/L) on the maximum sorption time. Field Emission Scanning Electron Microscopy (FESEM) analysis revealed a disruptive effect on EPS after Cd sorption, attributed to the bonding mechanism. Atomic absorption spectroscopy measured cation concentrations post-sorption, showing over 80% removal efficiency for Cd and 50% for Ni. The sorption mechanism involves functional groups on the surface of bioadsorbent, facilitating the formation of EPS-heavy metal complexes and metal deposition. These findings highlight the potential of utilizing EPS of *Vibrio* species as an effective biosorbent for heavy metal removal, offering a sustainable approach to water bioremediation.

173. Investigating the effect of reducing oral *Streptococcus mutans* population by the first Iranian herbal toothpaste containing *Salvadora persica* extract, honey and some herbal essential oils compared to a chemical toothpaste

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Streptococcus mutans is one of the biggest cause of dental plaque. Some of the factors that reduce dental plaque is the extract of the *Salvadora persica* and honey. In this study, the effect of two types of Iranian toothpaste, one completely herbal and the second completely chemical, was investigated. This research was conducted on 70 patients of Qom Faculty of Dentistry, in two groups of 35 people. Sampling was done in 4 steps. Stage 1, before use. Stage 2, two weeks after daily use, stage 3 was three months and the fourth one was six months after of the starting the test were performed on the saliva of people by sterilized swab. All the saliva samples were cultured on the Blood Agar then in the modified specialized Mitis salivarius-bacitracin 10% Agar, *S.mutans* by other microbial method was determined. The number of colonies was checked during four stages. The first stage, microbial counts of both groups were the same, the second stage, 45% reduction compared to the initial state in both groups, in the third stage, 62% reduction in the colonies by herbal toothpaste and 48% reduction by chemical toothpaste compared to the initial state was observed. In the last stage, the amount of bacteria reduction with herbal toothpaste was 71% and by chemical toothpaste was still 48% after six months. According to the results, the presence of *S. persica* extract, honey, as well as plant essential oils containing carvacrol, cinnamaldehyde, eucalyptol and menthol in the herbal toothpaste sample has made it more effective than the chemical one.

174. Investigating ultrasonic method to disrupt yeast cell wall

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Yeast extract contains the soluble components inside yeast cells, which is obtained by removing the cell wall, extracting and concentrating the cell contents soluble in water. To obtain yeast

extract, various cell wall destruction methods are used, including enzymatic method, autolysis, plasmolysis, and mechanical destruction. One of the methods used in mechanical destruction is the use of ultrasonic methods. When using ultrasonic, the power of the device, time, cycle and temperature should be considered. For this purpose, the Z index can be used to measure the amount of cell destruction. The Z index has a number between 0 and 1, where 0 indicates no destruction and 1 indicates the highest degree of cell destruction, usually a value of 1 cause damage to cell molecules. To measure Z, two values of σ_i and σ_{max} are necessary which can be measured using an electrical conductivity meter. Biomass of *saccharomyces cerevisiae* was subjected to ultrasonic treatment using 400 watts. The results showed a correlation between the amount of biomass and the σ curve. The change in amount of biomass is proportional to the change in the σ curve. This change enables the determination of the value of σ from the line curve, which in turn can be used to estimate the time required to achieve the desired Z value. In current study, the Z value was 0.8 which indicates complete disruption of the yeast cell wall.

175. Investigating the antioxidant effect of jujube plant aqueous-alcoholic extract of with Ames test

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Cancer is one of the main causes of death in the world, and mutagens are the cause of death of millions of cancer patients. According to the side effects of chemical drugs in cancer treatment, this study, with the aim of evaluating the anti-mutagenic effect of aqueous-alcoholic jujube leaf extract in Against the mutagenic substance sodium azide, it was performed under the Ames test in the absence and presence of mouse liver microsomes (S9). In this experimental study, after preparing an aqueous-alcoholic extract of jujube leaves, the anti-mutagenic effect of the extract was investigated by the Ames test, in which there were three negative control groups (only containing the culture medium without receiving the mutagenic substance and the extract) (positive control). The intake of the mutagenic substance without the research extract) and the experimental group (containing the mutagenic substance and one microliter of the plant extract) were evaluated. In all three groups, the mutated strain of *Salmonella typhimurium* was cultured on the medium with minimum mutagen, and after 48 hours, the number of returning colonies in each plate was counted. Only the bacteria with reverse mutation formed a colony. The difference between the average number of returning colonies in each plate in relation to the mutagen was analyzed by SPSS software and one-way analysis of variance test. The antimutagenic agent (aqueous-alcoholic extract of jujube leaves) reduced the number of revertant colonies. Aqueous alcoholic extract of jujube plant showed 55% anti-mutagenic effect. This inhibitory effect was calculated according to the Ames formula. In this research, the anti-mutagenic effects of the aqueous-alcoholic jujube leaf extract were revealed, which could be due to the presence of antioxidant compounds such as flavonoids and vitamins C and A.

176. Evaluating the impact of native Iranian probiotics on cognitive function and neuronal health in a male rat model of Alzheimer's disease

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Alzheimer's disease is a chronic neurological disorder that leads to the accumulation of beta-amyloid plaques and the formation of tau fibrils in various regions of the brain, including the CA1 region of the hippocampus. Recent studies have shown that probiotics can play a significant role in improving brain function and reducing neurodegenerative damage. This study aimed to

investigate the effect of native Iranian probiotics on the development of Alzheimer's disease in a male rat model. In this research, 15 male rats were divided into three groups: a healthy group as a control, an Alzheimer's group that underwent surgery, and an Alzheimer's group that received probiotics. Treatment with probiotics was administered daily via gavage for 21 days. Alzheimer's was induced by injecting beta-amyloid into the CA1 region of the hippocampus. After the treatment, the shuttle box behavioral test was conducted to assess the effects of probiotics on the cognitive function of the rats. Subsequently, hippocampal samples were extracted and examined using hematoxylin and eosin staining and cresyl violet staining. The results showed that native Iranian probiotics positively affected neuronal cell health, and cognitive performance improved in the probiotic-receiving group. Additionally, the number of healthy neurons in the CA1 region of the hippocampus was higher in the treated rats than in the untreated Alzheimer's group. The use of probiotics led to significant changes in the CA1 hippocampal tissue and improved cognitive function.

177. Isolation and Identification of fungal agents of dieback of pistachio trees in Southern Khorasan province

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Pistachio is one of the important garden products with high economic value in the country. Iran's agriculture is known in the world for pistachios and this product is one of the most important non-oil exports of the country. Iran is one of the largest producers of this product in the world with about 560 thousand hectares of pistachio cultivation. Dieback is one of the most important diseases of pistachio trees in Iran, which causes a lot of damage to pistachio trees in some years. So far, several pathogenic agents have been isolated and identified from pistachio trees affected by dieback, among which *Paecilomyces variotii*, *Cytospora* sp., *Natrassia* sp., *Paecilomyces formosus*, *Phaeoacremonium cinereum*, *Verticillium dahliae*, *Botryosphaeria dothidea* can be mentioned. In this research, an attempt was made to isolate and identify the fungal agents that cause dieback by sampling from the main pistachio growing areas of South Khorasan province. The experiment was carried out for one year and the samples of the branches affected by dieback were cultured on culture media such as PDA and MEA after being transferred to the laboratory and surface disinfection. After growing the isolates and purifying them using well known keys, identification was done to species level. During this research, fungal isolates of *Paecilomyces* spp., *Diplodia* spp., *Stemphylium* spp. *Verticillium dahliae* was isolated from pistachio trees with signs of dieback. To prove the pathogenicity of fungal isolates, the cut branches of Akbari pistachio variety and four-month-old seedlings of Sarakhs variety pistachio were used. Investigations showed that different isolates of three fungi *Paecilomyces variotii*, *Stemphylium* spp. and *Verticillium dahliae* are the cause of dieback of pistachio tree in South Khorasan province

178. Investigation of the antibiotic resistance pattern of *Pseudomonas aeruginosa* isolated from various hospital environmental samples

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Pseudomonas aeruginosa has been among the most important opportunist pathogens causing nosocomial infections. Therefore, it produces critical challenges for treatment of hospital acquired infections, due to wide spectrum of antibiotic resistance. The aim of present project was to test the

non-clinical samples of hospitals for *P. aeruginosa* contaminations, and investigation of antibiotic resistance patterns of isolates, and also detect the presence of *aac(6)*, *AmpC* and *IMP*. Physico-chemical specifications *P.aeruginosa* of water samples (51) were determined first, then the total samples (131) of hospital environment were bacteriologically cultured on standard bacteriology media for *Pseudomonas* isolation. isolates were confirmed by standard confirmation tests. Finally, the antibiotic resistance patterns of isolates were investigated using Kirby-Bauer manual and the latest version of NCLSI tables. Multiplex PCR method were used gene detection within isolates. The contamination of more than 10% of samples with *P. aeruginosa* were bacteriologically confirmed. Nearly, 72% of isolates showed antibiotic resistance against all tested antibiotics. Furthermore, 14% were sensitive to Piperacillin and Tazobactam-piperacillin only. *aac(6)*, *AmpC*, and *IMP* were detected within nearly 43%, 29%, and 93% of isolates orderly. We concluded that contaminations of hospital environments with opportunists such as *P. aeruginosa* could mention as the major reason behind increasing of hospital acquired infections rate.

179. Investigating the level of antioxidant factors in Alzheimer's model rats treated with native Iranian probiotics

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Alzheimer's disease is a neurological disorder characterized by memory loss and cognitive dysfunction. The pathobiological features of this disease include the accumulation of beta-amyloid plaques. The aim of this study is to investigate the expression of antioxidant factors in Alzheimer's model rats treated with native Iranian probiotics. In this experimental study, 28 Wistar rats were divided into four positive control groups, Alzheimer's and Alzheimer's groups receiving probiotics. Alzheimer's model was created by stereotaxic method and beta amyloid injection. The behavioral test was evaluated using the shuttle box test. The activities of antioxidant enzymes superoxide dismutase (SOD) and malondialdehyde (MDA) were evaluated by western blot and ELISA reader tests, respectively. The results showed that the combination of probiotics has a significant improvement effect on the memory of Alzheimer's model rat compared to other compounds. On the other hand, the levels of superoxide dismutase and malondialdehyde showed the highest increase with the consumption of the probiotic combination, respectively. The present study showed that the consumption of a plant compound such as probiotic can create a significant difference between rats with Alzheimer's disease and the control group in terms of increasing antioxidant enzymes. Likewise, it improves behavioral memory in a rat model of Alzheimer's.

180. Investigation of *Bacillus cereus* contamination in rice flour samples distributed in Alborz province

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Bacillus cereus is a gram-positive, facultatively anaerobic, spore-forming foodborne bacterial pathogen that causes two common types of poisoning: vomiting and diarrhea. Diarrheal diseases are caused by hemolysin HBL, non-hemolytic NHE and cytotoxin K enterotoxins. Spores of this bacterium are common in the soil and can enter agricultural products. This report was conducted with the aim of searching for *B. cereus* in rice flour samples of Alborz province. ۲۵ samples of rice flour were evaluated for the presence of *B. cereus* according to the Iranian national standard number 2324. One tenth milliliter of the primary and secondary dilutions of each sample was placed in plates containing MYP agar culture medium and the plates were incubated at 30 degrees Celsius for 24 hours. Then the suspected colonies selected for confirmatory test were cultured on

blood agar medium and incubated at 30 degrees Celsius for 24 hours and finally the beta hemolysis reaction was checked on each plate. Among 25 samples of rice flour, 10 samples had more than 100 CFU/g of *B. cereus* colonies, which is the limit of this bacteria mentioned in the standard. Since *B. cereus* spores have the ability to stick to the stainless steel surfaces of industrial equipment and considering the 40% contamination observed in the tested samples, the use of sodium hypochlorite and weak acids on the production line surfaces is recommended. It is also suggested that the storage temperature of raw materials for the production of this product should be less than 4 degrees Celsius and their water activity should be less than 0.93.

181. Identification and introduction of endophytic *Pseudomonas kilonensis* KSHA11 as an effective bacterial strain in biological control of tomato bacterial canker disease

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Due to the dangers of chemical pesticides, it is necessary to find safe methods to control plant diseases, including using endophytic bacteria that directly or indirectly improve plant growth and limit or suppress plant pathogens. Tomato bacterial canker disease caused by *Clavibacter michiganensis* subsp. *michiganensis* (Cmm) is one of the most important tomato diseases in the world, and it causes damage in some tomato growing areas of Iran. In this research, after isolating several endophytic bacteria from plants of the Solanaceae family in Ilam province, in the first stage, the effect of different strains in inhibiting bacterial canker disease and also their effect on the germination and growth of tomato seeds in laboratory conditions was investigated. In the second stage, the ability of these strains to improve the growth indices of tomato seedlings and also to reduce the severity of bacterial canker disease in greenhouse conditions was measured. In the laboratory and in the method of mixing the pathogen with the culture medium, it was found that the KSHA11 strain (isolated from *Physalis alkekengi* L. plant) with an average halo diameter of 2.1 cm compared to other strains has the highest inhibitory power against the growth of bacterial canker disease. Investigating the effect of isolated bacteria on the germination of tomato seeds (4129 variety) showed better performance related to strain KSHA11. Disease severity assessments revealed that this strain exhibited highly effective activity against Cmm under greenhouse conditions, reducing disease incidence to less than 50%. Concurrently, growth parameters such as fresh and dry weight, and root and shoot length were significantly enhanced in plants inoculated with this bacterium compared to the control. DNA sequencing of the selected bacterium using 16S rRNA primers and subsequent alignment of the sequence in the EzBioCloud database identified it as *Pseudomonas kilonensis*. Consequently, this strain was introduced as an antagonistic agent and biological fertilizer for tomato cultivation.

182. Investigating the effect of chlorination and use of ultraviolet rays in removing *Toxoplasma gondii* oocysts from municipal wastewater

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Toxoplasma gondii is one of the most common protozoan parasites found in the environment. This parasite has the ability to form resistant oocysts and survive in harsh environmental conditions. With the increasing desire to keep cats as pets, which are the definitive hosts of this parasite, concerns about the prevalence of toxoplasmosis and its consequences have grown. Furthermore, wastewater is one of the suitable habitats for this parasite. Therefore, attention to wastewater

treatment methods, especially its disinfection in the treatment process is of particular importance. Since in some reports were described oocysts of this parasite have shown resistance to chlorination, studying alternative methods such as using ultraviolet radiation has been a focus of this study. Samples in volumes of 2 to 4 liters were collected from the inlet and outlet of Firuz Bahram and South Tehran wastewater treatment plants. Next, filtration, centrifugation and light microscopy observation was conducted. After the disinfection process, no *Toxoplasma gondii* was observed in any of the 50 ml Falcon tubes containing wastewater samples. The findings suggest that both chlorination and use of ultraviolet radiation are effective methods in eliminating *Toxoplasma gondii* oocysts from treated wastewater at these plants.

183. Increased xylanase production in *Pichia pastoris* using various nitrogen sources

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The composition of the culture medium for recombinant xylanase production in biotechnological processes is crucial, as it accounts for 30% to 50% of production costs. Replacing expensive nitrogen sources such as peptone and yeast extract with cheaper alternatives in these processes can significantly reduce production costs and make the final product more affordable. Xylanases are enzymes that hydrolyze xylan, the second most abundant polysaccharide in the plant cell wall. In this study, we replaced peptone and yeast extract with 30 g/L of various nitrogen sources, including $(\text{NH}_4)_2\text{SO}_4$, $(\text{NH}_4)_2\text{HPO}_4$, NH_4NO_3 , urea, chicken feathers, whey, wheat gluten, flaxseed, and chia seeds, to enhance heterologous protein production in *Pichia pastoris*. The results show that using $(\text{NH}_4)_2\text{SO}_4$, $(\text{NH}_4)_2\text{HPO}_4$, NH_4NO_3 , whey, and chicken feathers alone was insufficient to meet the cells' nutritional needs and did not lead to xylanase production. In contrast, sources such as urea, wheat gluten, flaxseed, and chia seeds, which offer a more complex and diverse combination of amino acids, fatty acids, and minerals, were able to maintain or even enhance xylanase production. Specifically, xylanase production increased by 14.37% and 16.79% in media containing flaxseed and chia seed, respectively. For the first time, utilizing cheaper and diverse nitrogen sources such as flaxseed and chia seed could emerge as a new area for research and improvement in fermentation processes, offering significant economic and environmental benefits.

184. Antimicrobial effect of *Taraxacum officinalis* root extract on some food spoilage bacteria *Staphylococcus aureus* and *salmonella typhi*

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The aim of this study was to investigate the antimicrobial effect of hydroethanolic extract of *Taraxacum officinalis* on some food spoilage bacteria. In this study, after extraction using percolation method, the antimicrobial activity of dandelion root extract on *Staphylococcus aureus*, *Salmonella typhi* was compared with gentamicin antibiotic using Kirby-Bauer disk diffusion test. The minimum inhibitory concentration and the minimum lethal concentration were determined using the tube dilution method. Statistical analysis was performed using SPSS V.25 software at the probability level ($p \leq 0.05$). The results of this study showed that *T. officinalis* L. root extract has more effective antimicrobial activity against *S. aureus* strains with a MIC and MBC of 50 and 100 $\mu\text{g/ml}$, while it has the least effect against *S. typhi* gram-negative bacteria with minimum inhibitory and Bactericidal concentrations of 200 and 400 $\mu\text{g/ml}$. Therefore, it can be concluded that the hydroethanolic extract of *T. officinalis* root can be suggested as a suitable alternative to

synthetic antibiotics to prevent the growth of some bacteria in the pharmaceutical and food industries.

185. Comparison of long-term preservation methods of microalgae

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Microalgae are a diverse group of photosynthetic and single-celled microorganisms that have diverse morphological, biochemical, and physiological characteristics and have diverse industrial applications. Comparing microalgae preservation methods and choosing the best method among several preservation methods or creating a new path in this direction can help researchers and collectors of microorganisms to preserve them unchanged and more economically. For this purpose, from each of the three important branches of these microorganisms, one strain that is used commercially and in biotechnology was selected. These strains include *Arthrospira platensis* from the Cyanophyta branch, *Haematococcus lacustris* from the Chlorophyta branch, and *Navicula salinicola* from the Bacillariophyta branch. Different methods of keeping microorganisms in the cold include lyophilization and cryopreservation. In the cryopreservation method, a cold protective agent including dimethylsulfoxide was used, and in the lyophilization method, three different protective agents were used: dimethylsulfoxide, sodium sucrose glutamate and skim milk and sucrose in specific concentrations. The strains were stored in a nitrogen tank with a temperature of -196. Quality control was done 6 months after the storage process, and the viability of the strains was checked. It was concluded that cryopreservation of microalgae preserved all three strains, but only *H.lacustris* strain was preserved in the lyophilization method, which could be the reason for the formation of resistant cysts in this strain. It is suggested to use the cryopreservation method to maintain a wide range of strains.

186. Role of recombinant expression of aspartate semialdehyde dehydrogenase in threonine production

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Threonine is one of the essential amino acids in mammals, playing a pivotal role in biotechnology, particularly in pharmaceutical, food, and poultry nutrition. Nowadays, engineered strains of *Escherichia coli* are utilized in the industry to produce this important amino acid. The biosynthetic pathway of threonine from aspartate consists of five enzymatic steps, one of the key enzymes being *aspartate semialdehyde dehydrogenase*. In this study, specific primers for the *asd* gene were designed along with the restriction sites using bioinformatics tools and ordered. Subsequently, the enzyme gene was amplified via PCR and, after enzymatic digestion and ligation, introduced into the expression vector pET-21a. Thereafter, competent *Escherichia coli* cells were transformed with the recombinant plasmid. Finally, the threonine content in the minimal medium was measured using the ninhydrin method, and the produced threonine levels were compared with those of plasmid-free cells. The results indicate that among the selected LB, M9, and 2X media, the expression of the corresponding protein showed the best performance after 12 hours at 37°C in the 2X medium. Moreover, the results of the ninhydrin test indicate that the concentration of threonine has increased from 0.2 to 2.35 mg/ml. In this context, the obtained results were compared with

previous studies, and it is suggested that other genes in the biosynthetic pathway be investigated using the same methodology. Furthermore, protein engineering of each enzyme in the pathway and modification of culture medium components could enhance activity.

187. Isolation of *Enterobacter* strains from *Elaeagnus angustifolia* root nodules in Iran

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Elaeagnus angustifolia L., also known as Russian live or Oleaster, is a species with multiple traits of economic, ornamental, and high ecological value. It is native to central and eastern Asia, southern Europe and can also be found in Canada and the western part of the United States. During the summer of 2020, naturally occurring nodules on the roots of Russian Olive trees were collected in Rafsanjan county (Kerman province, southeast of Iran) and directly used for bacterial isolation. Briefly, samples were carefully rinsed to eliminate any possibly trapped pockets of soil. The nodules were surface disinfected by immersion in 1% (v/v) sodium hypochlorite for 4 min and rinsed several times with sterile distilled water (SDW). Nodules were then individually crushed in drops of SDW and the resulting suspension was streaked on nutrient agar containing 1% sucrose (SNA) and Yeast mannitol agar (YMA) in Petri dishes. Colonies appeared after 4-5 days of incubation at 25-28°C. They were checked for purity by repeated streaking on SNA medium. All the bacterial isolates were Gram negative and grew only at 35°C. Genomic DNA was extracted from representative isolate and used for PCR amplification of a fragment of the 16S rRNA, using primers FD1/RD1. The amplicons were sequenced by Macrogen Company in South Korea. The sequence (GenBank accession number: OR672976) were compared with those present in GenBank using the BLAST algorithm. The isolated strain showed the highest similarity (100%) with *Enterobacter*. This is the first report on isolation of *Enterobacter* from Russian Olive root nodules in Iran.

188. Bacterial species as biomarkers for the prognosis of gastrointestinal cancer

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Apart from genetic, environmental, and other factors, infectious agents such as bacteria play an important role in causing gastrointestinal cancers. The research purpose was to review the studies that introduced effective bacteria in this regard by searching for articles in PubMed, Scopus, Science Direct, and Google Scholar databases that were published up to June 2024. *Fusobacterium nucleatum* has been shown to be one of the most important bacteria that can initiate and develop colorectal cancer (CRC) by increasing the expression of miR21, activating YAP signalling, producing *Fusobacterium* adhesion A, and inhibiting CD8+ T-cell mediated immune responses. *Pks⁺ Escherichia coli* can contribute to CRC by producing genotoxins such as colibactin and cyclomodulins that lead to DNA damage and cell cycle disruption. Enterotoxigenic *Bacteroides fragilis* have been shown to produce toxin that contributes to colon carcinogenesis by stimulating colonocyte proliferation, inhibiting apoptosis, activating Th17, and promoting pro-inflammatory signaling. Although *Helicobacter pylori* is one of the most important bacteria in causing gastric cancer, the infection caused by it can also lead to CRC. Virulence factors CagA and VacA secreted by this bacterium can play an important role in the development of colorectal and gastric cancers. Other bacteria such as *Porphyromonas gingivalis*, *Enterococcus faecalis*, *Streptococcus gallolyticus*, and *Peptostreptococcus anaerobius* may also play a role in the development of

gastrointestinal cancers, which have been studied in less detail. Caring about gut microbiota balance and the predominance of potentially cancer-causing bacteria can be useful in the diagnosis, prognosis, and treatment of gastrointestinal cancers.

189. Biosynthesis of carbon quantum dots using *Vibrio* genus

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Carbon quantum dots (CQDs) are carbon nanoparticles with dimensions between 1 and 10 nm that can be synthesized using several methods. One of these methods is the hydrothermal method, in which the various sources such as chemicals, plant biomass (such as leaves and juice), and biological waste are used for CQD production. In this research, CQDs were prepared using the green method and these CQDs were obtained for the first time by hydrothermal method using *Vibrio* biomass. Biosynthesized CQDs possessed a negative surface charge (zeta potential) of -18 mV and the average size of 2.5 nm. FT-IR analysis revealed the functional groups and surface chemistry characteristics, confirming the hydrophilicity of CQDs using specific bacteria. All the performed analyses confirmed the correct production of bacterially synthesized CQDs indicating their promising application for different purposes such as pollutant remediation, pollutant detection, biological imaging, and etc.

190. Introduction of *Aureobasidium pullulans* UTM 5060 as a safe and fat-rich and promising strain for preparing animal feed

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Unsaturated fatty acids find extensive applications across various sectors, including pharmaceuticals, food, cosmetics, and health products. Given the environmental concerns associated with sourcing fats from plant and animal origins, yeasts rich in fat content emerge as a viable alternative. This study explores the potential of such yeasts by examining 15 samples derived from soil, flowers, and food items. These samples were cultivated on a medium enriched with carbon but deficient in nitrogen, fostering conditions conducive to fat production. To identify yeast strains capable of producing oil, the isolates obtained were cultured in a medium supplemented with Rhodamine B, a fat production indicator. Strains exhibiting a stronger pink coloration, indicative of higher fat accumulation, were subsequently grown in Erlenmeyer flasks containing a carbon-rich, nitrogen-deficient medium for a period of five days. Following this, strains demonstrating exceptional fat production were selected for further analysis. Identification of these promising strains was achieved through molecular techniques, specifically by determining their Internal Transcribed Spacer (ITS) sequences. For the selected strain, parameters such as growth kinetics, lipid production, and residual substrate utilization were meticulously assessed. Out of the 150 isolates initially obtained, 12 showed significant fat accumulation capabilities. After further screening based on biomass and pigment production, two strains were excluded, leaving two others that were identified as *Aureobasidium pullulans* with 100% similarity. Among these, the F5-4 strain stood out by producing 26 grams of fat per 100 grams of dry biomass under standard conditions. When cultured in an optimized environment characterized by a pH of 5.5 and a carbon-to-nitrogen ratio of 154.22%, this strain achieved an impressive fat accumulation of 46.5 grams per 100 grams of dry biomass. Given its classification in risk group 1, coupled with its high fat

content and rapid growth rate, the F5-4 strain presents itself as a promising candidate for future research aimed at harnessing yeasts for fat production

191. Biosynthesis of carbon quantum dots from *Pseudomonas aeruginosa* with synchronous chemical synthesis of Zif-8 to be used as composite for dye decolorization

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Carbon quantum dots (CQDs) are small carbon nanoparticles with dimensions ranging from 1 to 10 nanometers. Due to their small size and unique structure, they exhibit very high fluorescent properties. These particles have high biocompatibility, high stability, and low toxicity, and can be synthesized from various sources. Recently, their biosynthesis has attracted significant attention. One of the sources that can be used is bacteria, which are suitable candidates for synthesis due to their rapid growth. In this study, nitrogen-doped carbon quantum dots were prepared hydrothermally from the bacterial biomass of *Pseudomonas aeruginosa* ATTC 27853. The carbon nanoparticles were characterized using DLS and FT-IR analysis. The results showed that carbon nanoparticles have dimensions of 6.025 nanometers. Despite the advantages of these particles, their use is limited due to surface limitations. Zif-8 is a type of metal-organic framework, and it has been shown that its use with carbon quantum dots enhances the optical properties of these particles. The Zif-8 in this study was prepared hydrothermally and chemically. The particles were characterized using DLS, FT-IR, and XRD, and their zeta potential was measured, revealing that the particles have dimensions of 750 nanometers. In future studies, the simultaneous use of Zif-8 metal organic frameworks with bacteriogenic carbon quantum dots as CQDs@Zif-8 composite will be conducted to evaluate the potential of these materials in dye decolorization.

192. Irradiation-tolerant *Methylobacterium* sp. UTM 4561 isolated from Hormoz Island

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The *Methylobacterium* genus is known to be a facultative methylotroph. They often produce pink pigmentation due to the presence of carotenoid pigments that enable them to tolerate ultraviolet (UV) radiation. The samples were collected from sites in the Hormuz Island Red Beach in the Persian Gulf, which has a high amount of Fe_3^+ (N56°27'54.4, E27°02'02.1). The culture media composition applied in this study was modified MLM with minimal composition, 0.5 g peptone casein. The isolated strain UTM 4561 was a Gram-negative spirillum and belonged to the *Methylobacterium* genus. After preparation of bacterial suspensions in PBS buffer with 0.1 OD₆₀₀ and serial dilution, 100 μl was added and spread on plates that were irradiated before the incubation in 0.5 mJ/cm^2 which was assayed with UV-Radiometer (UV- LIGHT METER, Lutron, UVC-254) at 50, 100, 150, 200, 250, 300 J/m^2 total energy in 254 nm for 1 min & 40 sec-10 min. Results showed that it continued normal growth without any change in UVC irradiation (254nm) in 50 J/m^2 , and a 4-log decrease occurred in 300 J/m^2 . Gram-negative had resistance rang into UV irradiation (LD_{99.99} 35–150 J/m^2). Fitriyanto & et al. found that *Methylobacterium* methanol dehydrogenase activity increased when lanthanide elements were added to culture media. Hence this strain can probably be applied to eliminate heavy metals in wastewater. As carotenoids in these bacteria protect them from UV, the assessment of the existence and identification of specific carotenoids for antioxidant application, particularly in UV-resistant lotions, is proposed.

193. Lead ion adsorption by sodium alginate-nitrogen doped carbon quantum dot composite

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Heavy metals play a critical role in human health and ecosystems due to their toxicity and potential risks. Therefore, it is imperative to eliminate them from the environment. Surface adsorption has proven to be an effective method for removing heavy metals and hazardous substances from wastewater. In this study, a cost-effective and environmentally friendly composite of sodium alginate-nitrogen doped carbon quantum dots was utilized to adsorb heavy metals. The carbon quantum dots were derived from a sustainable method involving bacterial biomass. Subsequently, the sodium alginate-carbon quantum dot composite was synthesized and its impact on the absorption of Pb²⁺ ions at varying durations, pH levels, and adsorbent quantities was examined. The results showed that the maximum lead absorption occurred at pH 4, with 100 mg of adsorbent, for time duration of 180 minutes. The initial Pb concentration of 17.48 ppm decreased to 1.21 ppm after 180 minutes, indicating a 93% absorption of Pb from the aqueous environment. The novel adsorbent containing carbon quantum dots with a biological origin demonstrates promising potential for effectively eliminating heavy metals from polluted environments.

194. Isolation of lactic acid bacteria from the digestive tract of honey bees and evaluation of their antimicrobial effect against *Escherichia coli*

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The microbiota of digestive system of honeybee has an important group of beneficial microorganisms called lactic acid bacteria. This study aims to isolate lactic acid bacteria from the digestive tract of honeybee (*Apis mellifera*) and to evaluate the antimicrobial effect of their metabolites against *Escherichia coli* IBRC-M 11018. Twenty male worker bees were randomly collected from hives in Vardij, a village in Tehran province, in the spring of 2024. The bees were dissected to isolate the whole digestive tract. The samples were enriched in MRS broth medium at 35 °C and 5% CO₂ for 48 h and then the bacteria were isolated on MRS agar. After growing the isolates in MRS broth for 120 h, the metabolites were extracted with ethyl acetate and concentrated by a rotary evaporator. Antimicrobial activity against *E. coli* was evaluated using the disk diffusion method. 29 isolates, including 19 gram-positive catalase-negative bacteria, were obtained from the honey bees. The metabolites extracted from five isolates were able to inhibit the growth of *E. coli*. Molecular identification of the selected strain based on 16S rRNA gene sequence analysis is underway. The results of this research show that the honey bee's digestive system can be a source for identifying beneficial bacteria and antimicrobial compounds. Further studies may lead to the use of these strains in the food industry.

195. Investigation of the biodegradation ability of crude oil by some indigenous microorganisms isolated from contaminated soils of oil reservoirs in Birjand County

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Crude oil spills pose a serious environmental threat that can directly impact the ecosystem and human health, requiring immediate attention and action. Various methods have been proposed to remove these pollutants, categorized into physical, chemical, and biological groups. Bioremediation is of particular interest due to its cost-effective and environmentally friendly solutions. In this study, samples were collected from crude oil-contaminated soils. The

contaminated soil sample was then inoculated into a carbon-free saline medium containing 1% v/v sterile crude oil. After incubation, strains capable of growth in the oil medium were isolated based on biomass production yield after spectrophotometry at 620 nm and stereomicroscopic observations. After cell removal by centrifugation, the oil content of the suspension was extracted with dichloromethane solvent, and the absorbance of each sample was measured separately at 420 nm to compare the oil degradation ability of the strains. Evidence indicates 95% and 86% oil degradation efficiency in N₃ and N₄ isolates, respectively, and 75% and 60% removal in N₁ and N₂ isolates, respectively. The strains were identified after microscopic observations, Gram staining, and catalase-oxidase tests. Bacterial isolate N1 was recognized as a Gram-positive coccobacillus, oxidase-negative, and catalase-positive, while N₂ was a Gram-negative coccus, oxidase-negative, and catalase-positive. Strain N₃ was identified as a green fungus of the *Penicillium* spp. and N₄ was a dark brown fungus belongs to the genus *Aspergillus*. The significant oil compound degradation efficiency of the fungal strains indicates their potential for removal, which requires further investigation in future studies.

196. Increasing biogas production in the anaerobic digester of the treatment plant by adding rumen waste

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Biogas is a mixture of three main gases methane, carbon dioxide and hydrogen sulfide, which is obtained from anaerobic fermentation of biomass by methanogenic bacteria. The flammable part of biogas is methane, which includes about 60 to 70 percent of it. In this research, in order to optimize the production of digester biogas in the treatment plant, the use of rumen waste to increasing the gasification of the digester was investigated. Total solid content (TS) and volatile solid content (VS) of the samples were analyzed. 118 ml tubes were used to measure the accumulation of biogas and a certain amount of degradable raw material plus a certain amount of anaerobic inoculation liquid was entered into a special container. Then nitrogen gas was added into the upper space until the remaining oxygen was removed from the container. Analysis of produced biogas and determination of methane and carbon dioxide percentage was done using a gas chromatograph equipped with TCD detector during 40 days at certain times. The amount of biogas production in the control vessel, because the microbial population was less, from the 31st day onwards, an almost constant rate of biogas production was obtained, While the production of biogas from sludge containing rumen wastes was almost fixed after 14 days due to the higher microbial population, and the use of these wastes can help in increasing the efficiency of the system.

197. Evaluation of the frequency of abortions caused by *Leptospira* spp. in sheep farms located on the suburb of Tabriz by the MAT and PCR tests

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Sheep abortion is a significant challenge in the global sheep farming industry, posing substantial problems for veterinarians and farmers alike. A key aspiration for veterinarians is to identify and manage the factors causing abortions, with *Leptospira* species, particularly *Leptospira interrogans*, being prominent contributors to this issue in our country's sheep and goat herds. This disease is highly contagious, spreading quickly among the herd through contact with excreted

substances from the uterus, such as the fetus, placenta, uterine secretions, and urine, resulting in widespread abortions. The consequences are twofold: substantial economic losses and the potential spread of the disease among humans. This study aimed to accurately estimate the incidence of leptospiral abortions in sheep flocks around Tabriz. At the end of the autumn season, after the sheep had become pregnant, we visited various livestock farms. We instructed the farmers to report any cases of abortion. Concurrently, samples were taken from the placenta, fetuses (including breast contents, liver, kidneys, spleen, lungs, and brain), and blood samples were collected from the aborted mothers, yielding about 70 fetal samples in total. In the laboratory, we utilized the PCR protocol to detect the presence of *L. interrogans* and conducted the Microscopic Agglutination Test (MAT) for *Leptospira* serological species. The results indicated that 7 out of 70 samples (10%) tested positive in the MAT test, while 6 out of 70 samples (8.57%) were positive in the PCR test. This research represents the first comparative study of leptospirosis in Iran.

198. The relationship between soil pH and the distribution of ectomycorrhizal fungi in a natural beech stand in the forests of Farim

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Ectomycorrhizal fungi play a significant role in the forest ecosystem and are crucial for forest health by expanding their networks among the roots of forest trees, facilitating the transport of nutrients. Meanwhile, some chemical properties of soil such as pH play a significant role in the distribution of ectomycorrhizal fungal communities. In the altitudinal range of 1200 to 2100 meters above sea level (m.a.s.l), 15 beech (*Fagus orientalis*) trees were selected in each elevation class and soil samples were taken at a depth of 10 cm. The results of the analysis of variance showed that soil acidity had a significant difference among the elevation classes above sea level. In fact, acidity was higher in the first elevation class (1800 to 2100 m.a.s.l) compared to the second (1800 to 1500 meters) and third (1500 to 1200 meters) classes. This is probably due to the presence of a pure beech stand in the first elevation class as well as a greater amount of mixed plant litter in this class compared to the other classes. Average soil pH was 5.9, 5.4, and 5.5 in the first, second, and third elevation class, respectively. This pH difference had an impact on the distribution of ectomycorrhizal species. Among the identified genera, *Helvella* was found in the soil with the lowest pH (4.18) while *Boletus* was found in the soil with the highest pH (6.18). Moreover, the genera *Thelephora*, *Clavulicium Lactarius*, *Inocybe*, *Clavulina*, *Cortinarius*, *Hebeloma*, *Tomentella* and *Russula* were identified at pH values between 5.22 and 5.98, while the genera *Cantharellus*, *Amanita* and *Boletus* were identified at pH values above 6.

199. Investigating the effect of vitreousella hemoglobin (VHb) gene expression on Deferoxamine B production efficiency by *Streptomyces pilosus*

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Desferrioxamine-B (DFB) has been studied for its ability to bind iron (III) and many other metal ions. One of the most famous uses of this metal chelator is in the treatment of patients with conditions such as thalassemia, who suffer from accumulation of iron ions. *Streptomyces pilosus* is one of the common microbial species used in the production of DFB. Due to its high sensitivity to oxygen, its growth and production efficiency are strongly influenced by dissolved oxygen. Vitreous hemoglobin (VHb) is an oxygen-binding protein that can facilitate intracellular oxygen

transport, improve oxygen utilization efficiency, and ultimately increase the production of the target metabolite. For the first time in this research, the effect of the presence of the hemoglobin gene fragment in *Streptomyces pilosus* on bacterial growth efficiency and DFB production, compared to the wild strain, in the MYB modified culture medium (malt, yeast extract, and dextrose 10 g/L) at pH 7.3, 29°C, and 150 rpm was studied. The yield of DFB production in the presence of the VHb gene increased more than five times compared to the wild strain. Thus, the presence of the VHb gene increased the production of DFB from 0.7 g/L in 72 hours in the original strain to 1.25 g/L in 24 hours in the recombinant strain. It is expected that by cultivating the process in the bioreactor and controlling the pH and dissolved oxygen concentration, the growth efficiency of the bacteria and the production of DFB will increase greatly compared to the wild strain.

200. Isolation and identification of a native strain of *Fusarium* sp. from the Caspian Sea: a case study

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Fusarium is a large group of filamentous fungi, known as hyphomycetes that are commonly found in soil and are associated with plants. Some of these fungi are important plant pathogens. Caspian Sea sediments were collected from 3 meters deep. Samples were suspended using physiological saline, and suspensions of all soil samples were prepared. The spread plate technique on Potato Dextrose Agar (PDA) plates was employed to isolate microorganisms. In order to purify the fungal isolate, single-spore method was used on water-agar (WA) medium. The investigation of the morphological characteristics of the fungal isolate was carried out using slide culture method and incubation at 30 °C for 5 to 7 days. Molecular identification of fungal isolate was conducted by DNA sequencing by PCR assay using *ITS1* and *ITS4* primers. A sequence alignment of various fungal ITS regions was constructed using the Basic Local Alignment Search Tool (BLAST) algorithm in the National Center for Biotechnology Information (NCBI) database. Analysis of the amplified ribosomal *ITS* region sequence of the fungal isolate in the NCBI database and comparison with similar sequences via BLAST software showed that this isolate was more than 99% identical to the family *Nectariaceae* and genus *Fusarium*.

201. Investigating the amount of iron absorption of *Spirulina* enriched with iron induction in rats

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Iron deficiency and iron deficiency anemia (IDA) are common nutritional problems worldwide. The current study is dedicated to evaluating the bioavailability of iron in *spirulina* microalgae enriched through iron induction methods, focusing on its absorption in rat model. Microalgae *Spirulina platensis* was obtained from the algal collection of the Department of Marine Biology, Tarbiat Modares University. Then it was cultured at a temperature of 28±1 degrees Celsius and a light intensity of 100 µmol/m² s. Enriched *spirulina* 10, 20, 30 mg/g and control were obtained. Then 6 groups of rats: control, anemia, normal and iron enriched *spirulina* were fed. Blood indices and iron status were measured. Tissue samples were analyzed to identify histopathological changes. The control group had a ferritin level of 1.8 µg/l, which is expected for healthy rats with adequate iron levels. The anemic group showed a significantly lower ferritin level (0.87 µg/l), confirming iron deficiency in anemic conditions. The *spirulina*-treated group showed a ferritin level of 2.15 µg/L, which was higher than both the control and anemia groups. The highest level

of ferritin was observed in the iron supplement group (10 mg/g), which showed a value of 3.1 µg/l. The conclusion emphasizes that iron-enriched *spirulina* not only proves to be an effective source of dietary iron, but also highlights the need for further studies to investigate long-term effects and potential applications in the human diet.

202. Evaluating the effectiveness of adding some probiotic strains to the diet on growth, immunological, and physiological parameters of broiler chickens

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The use of antibiotics to promote growth in broiler chickens is controversial and banning their use in diets is essential due to their accumulation in tissues and the emergence of antibiotic-resistant strains. Probiotics provide a sustainable alternative by modulating gut microbiota to enhance poultry efficiency. In this study, 360 broilers were treated for 40 days with a diet containing freeze-dried powder from two *Bacillus* strains (1020G and 1630F) and a probiotic yeast strain ME1, isolated from fermented foods at a concentration of 10⁸ CFU/kg. Growth, immune, and physiological parameters were assessed. No significant differences in growth parameters were found between the experimental and control groups. However, the highest counts of red and white blood cells, hemoglobin, hematocrit, and monocytes were observed in the ME1 strain, while the highest lymphocyte count was in the 1020G strain. The lowest heterophil-to-lymphocyte ratio (an inflammation index) and the highest Newcastle disease antibody titers were recorded in the 1630F strain, with the highest serum interleukin 10 levels (an anti-inflammatory factor) in the 1020G treatment. Regarding physiological parameters, the greatest weights of the spleen and bursa (lymphoid organs) were found in the 1020G treatment, while the highest height and width of the jejunal villi were noted in the ME1 treatment. The effects of these strains were primarily related to immunological factors, indicating their potential as substitutes for antibiotics. The lack of significant effects on growth may be due to the absence of pathogenic challenges that could have influenced the production capacity through immune response and inflammation.

203. Recombinant expression of homoserine dehydrogenase enzyme in *Escherichia coli* for Extracellular production of threonine

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Among essential amino acids, L-threonine is recognized as a bioactive molecule that enhances immune function and intestinal morphology, with significant applications in various industries, particularly in poultry feed industry. Consequently, the efficient production of L-threonine is of considerable interest, hinging on an understanding of its metabolic pathway, which encompasses five enzymatic steps. Homoserine dehydrogenase (EC:1.1.1.3) serves as the first key enzyme in the specific biosynthetic pathway for threonine. This study investigates the impact of enhancing the recombinant expression of this enzyme on L-threonine production. So, specific primers for the *thrA* gene were designed through bioinformatics analyses. Following polymerase chain reaction amplification and enzymatic digestion of the resulting product and the pET-21b (+) plasmid, a recombinant plasmid containing the *thrA* gene was introduced into the competent cells of the DH5α strain and subsequently into BL21 (DE3) cells. The recombinant and control cells were cultured in M9 minimal medium supplemented with glucose or glycerol as carbon sources. The

concentration of threonine in the culture medium was quantified post-cell separation using ninhydrin assay and compared across samples. Results indicated an increase in threonine production, evidenced by a rise in concentration from 0.22 to 1.47 mg/ ml after 12 hours which was compared to the control group, resulting in an increase of 1.25 mg/ml. According to prior research, employing combinatorial cloning and developing hybrid models through deep learning has been shown to enhance threonine titers. Furthermore, genetic engineering of genes encoding additional pathway enzymes or protein engineering of these enzymes is recommended to augment their activity.

204. Determination of some biochemical properties of an alkaline keratinase from a native bacterium isolated from poultry waste soil

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Keratinases are specialized enzymes capable of breaking down disulfide-rich and hydrophobic proteins, leading to an increased commercial demand for their use in various industrial applications. Bacterial species have been extensively studied for keratinase production and the characteristics of these enzymes. This study isolated three bacterial strains capable of growing on a minimal medium with feathers from soil contaminated by feather waste near Gonbad Kavus city. Halo diameter to colony diameter ratios were calculated in skim milk agar, along with feather decomposition percentages, to screen and select the bacteria with the highest feather decomposition rates. The desired bacteria were identified and recorded in the gene bank by sequencing the 16S rRNA gene. Enzyme activity was measured using casein as a substrate, with one unit defined as the enzyme amount required to raise absorbance by 0.1 at 280 nm in one minute. The enzyme's biochemical characteristics, including its activity at various temperatures and pH levels, were assessed. The bacterium with a 99.65% nucleotide sequence similarity is classified in the genus *Stenotrophomonas* and is deposited in GenBank under accession number PP411011. The enzyme activity was maximized at a temperature of 50°C and a pH of 10. The results indicate that the extracted keratinase is a viable option for the detergent industry and feather recycling.

205. Study the secretory expression of an industrial lipase in *Escherichia coli*

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Lipase enzymes enhance the efficacy of detergents in fat removal, improve food processing, and catalyze biodiesel production, offering safer, environmentally-friendly alternatives to current methods of industrial enzyme production. The aim of this research is to engineer *E. coli* as a new host for the secretory production of fungal alkaline lipase using a novel signal peptide. The *OsmY* signal peptide was selected for the secretory expression of *Candida antarctica* lipase B, which was cloned into the *pET22b* (+) vector. Initial expression was conducted in LB medium, followed by enhanced secretory expression in M9 minimal medium. Lactose and IPTG were used as inducers to optimize protein expression. After the target enzyme was secreted, the culture medium containing the protein was dialyzed in the alkaline buffer (pH = 8), followed by lyophilization for enzyme activity analysis. As a result, 113 U/ml of lipase *CalB* with a specific activity of 226 U/mg was obtained. Based on previous studies on the expression of recombinant proteins, it is suggested

that optimizing expression at 20-25°C can improve protein folding and overall enzyme activity, leading to increased expression yield.

206. Investigating the expression pattern of *crtYB* gene in *Xanthophyllomyces dendrorus* yeast in the presence and absence of rose bengal

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Free radicals in the peripheral environment of eukaryotic and prokaryotic cells are among the stress factors on living organisms which causes the malfunction of cellular components and sometimes death. Singlet oxygen is one of the free radicals that causes oxidative stress and can lead to cell death like eukaryotic yeast cells. In this research, rose bengal with the ability to produce singlet oxygen was used in light during the growth of *Xanthophyllomyces dendrorus* yeast, and its effect on the expression pattern of some genes involved in the synthesis of the carotenoid astaxanthin was investigated. At first, the appropriate concentration of rose bengal was evaluated in the culture medium of *Xanthophyllomyces dendrorus* yeast in the presence and absence of light with different intensities and the conditions with a higher increase in carotenoid astaxanthin production were used to continue the research. The protein encoded by the *crtYB* gene plays a role in the monocyclic and bicyclic pathway of carotenoid synthesis and has two functions including lycopene cyclase and phytoene synthase. The gene expression pattern was investigated in the sample treated with and without rose bengal as a control. By extracting RNA and cDNA synthesizing and amplifying the *crtYB* gene using its specific primers, it was determined that the activity and expression of the *crtYB* gene increased under the influence of rose bengal and light, leading to higher production of the carotenoid astaxanthin. The results can be exploited in the investigation of the expression pattern of astaxanthin carotenoid pathway for more comprehensive study of the candidate genes.

207. Overproduction of Astaxanthin by the yeast *Xanthophyllomyces dendrorus* using Titanium dioxide

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Carotenoids, as one of the important natural pigments, are produced by plants and some microorganisms, including yeasts, and have multiple biological functions, including combating oxidative effects in living organisms. More than a thousand different carotenoid structures reported, the carotenoid astaxanthin has been recorded as one of the strong antioxidants with a high ability to quench free radicals in the surrounding environment. In this research, the compound of titanium dioxide was used as a compound that creates oxidative stress conditions through the production of free radicals and was investigated its effect on the production of total cell biomass and astaxanthin of the yeast *Xanthophyllomyces dendrorus*. First, the effect amount of titanium dioxide concentration on the survival of yeast was determined and then its optimal concentration in the production of carotenoid astaxanthin was studied. For this purpose, two treated and untreated yeast cultures were examined and used as controls in three replicates. The obtained results showed a significant effect of titanium dioxide on increasing the production of astaxanthin without a significant effect on the amount of cell biomass. The obtained findings indicate that the combination of titanium dioxide as a stimulant in the synthesis of carotenoid astaxanthin is a suitable compound for use in the production of yeast astaxanthin, and also, to be used to investigate the expression pattern of genes involved in astaxanthin production and more detailed studies of the its synthetic pathway of this valuable pigment.

208. Evaluation of low temperature cultivation as an efficient method in isolation of yeast strains from environmental samples of Alpine region of Tochal

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Depending on the type of substrate and environmental parameters, yeasts occupy diverse habitats on the earth so the types of established yeast strains can be different as autochthonous or allochthonous form and sometimes dominant yeast population. Various methods have been reported for the isolation of yeasts, including the use of antibacterial and antifungal antibiotics. In addition to preventing and inhibiting the growth of bacterial and mold populations, it is important to make the method more efficient in isolating the majority of cultivable strains. In this research, low temperature cultivation method was used and compared with the usual method at 20 degrees Celsius to recover yeast isolates. First, the environmental samples of alpine Tochal were crushed by sterile plastic cylinders in microtubes, and after serial dilutions were prepared in the same conditions in several replicates spread with a glass rod on solid yeast culture at temperatures 10 and 20 degrees Celsius cultivation. The results showed significant and higher species diversity recovery of the isolates at lower temperature, which was confirmed by using genomic DNA extraction and ribosomal gene amplification and sequencing. This increase in the recovery of yeast isolates is mainly due to the more controlled growth of mold filaments in the culture medium with reducing negative covering or inhibitory effect on the yeast strains present in the environmental sample.

209. Keratinase enzyme production by microorganisms isolated from poultry soil samples

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Today, in the world, a large amount of keratin-containing wastes such as feathers and wool are produced as by-products. For better recycling of keratin and keratin wastes, keratinase enzyme can be used. A group of microorganisms such as bacteria, fungi are able to produce keratinase enzyme and destroy keratin waste. This enzyme has wide applications in various industries, including leather, textile, detergents, cosmetics, fertilizer and pharmaceutical industries. In the current research, soil samples were collected from poultry farms, then the bacteria present in the soil were isolated by dilution and spread plate methods and were screened using Skim milk agar culture medium containing powder full of keratinase positive bacteria and for identification by biochemical methods and Molecular methods were investigated and researched. Also, enzyme optimization was done by different substrates including different sources of kereatine, different nitrogen sources, different temperature and pH, as a result of which maximum enzyme production in the presence of feather powder, yeast extract, temperature of 37C and pH = 7.5 and enzyme activity obtained 0.32 micromol/min.

210. Evaluation of antioxidant activity of different concentrations of exopolysaccharides isolated from two strains of lactic acid bacteria

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Exopolysaccharides (EPS), which are compounds produced by the metabolism of probiotic bacteria, play an important role in regulating the body's immune system. The production of EPS by native probiotic strains is significantly higher than that of commercial strains in all culture media. This difference may be due to various enzymatic mechanisms in the cell walls of *Lactobacillus fermentum* and *Lactobacillus plantarum* involved in carbohydrate breakdown.

Recently, the antioxidant properties of EPS derived from lactic acid bacteria (LAB) have also gained attention. These compounds may enhance the quality of food products as well. In this regard, the LAB strains were cultured under controlled conditions in MRS medium, followed by a heated acid extraction method that involved treating the bacterial biomass with HCl at 90°C and ethanol precipitation for EPS isolation. Various concentrations of EPS were prepared, and their antioxidant activity was assessed using the ABTS assay. The results revealed that the statistical analysis indicated no significant differences in antioxidant activity between the two strains at the same concentration (p-value < 0.05). Consequently, it was concluded that there is no superiority in antioxidant activity among the various LAB-derived EPSs. However, the findings demonstrated that with an increase in concentration, the antioxidant properties of the EPS also increased, establishing a direct relationship between EPS concentration and antioxidant activity. This suggests that while relative activity may not differ significantly among certain concentration pairs of two strains, higher concentrations consistently enhance antioxidant effectiveness.

211. High cell density cultivation of *Lactococcus lactis* and increasing nisin production by hollow fiber membrane filtration

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Nisin is a natural peptide preservative produced by *Lactococcus lacis* and used in the food industry. Due to the inhibitory effect of lactic acid produced, several methods have been used to remove lactic acid and achieve high cell density. The use of membrane filtration is a low-cost and widely used method for this purpose. In this study, *Lactococcus lactis* UTMC 106 was cultured in a 2-liter bioreactor containing MRS broth basal medium supplemented by whey and incubated at 28 °C with shaking at 120 rpm. Every 12 hours, the liquid content of the bioreactor was passed through a 0.22 µm polypropylene hollow fiber membrane filter, and the concentrations of cells and nisin produced in the fermentation broth were measured and compared before and after filtration. The recovery of cells was done by backwashing the retentate portion of the filter. This section was inoculated into MRS broth and incubated under the same conditions. This work was repeated 5 times. The results indicated that the yield of nisin produced to the consumed substrate in the repeated batch fermentation of lactic acid bacteria has increased by 10% compared to batch culture. The finding of this research approved the viability and activity of the cells isolated through filtration and the potential of multiple cell recycling. Additionally, the results suggest the possibility of using polypropylene hollow membrane filtration systems to achieve high cell density of *L. lactis*, enhance the rate of mass transfer across limiting layers, separate toxic substances that inhibit growth and production, and ultimately increase productivity.

The Second Biology Teaching Conference

Oral Presentations

1. Biology Education at 25:00

Karamudini M. *Biology Educator*

In this session, we will explore the current state of biology education worldwide and discuss its future developments. We will examine how biology education in schools is expected to evolve on a global scale. In summary, secondary biology education in the coming decades will become more interactive, interdisciplinary, data-driven, personalized, and inquiry-based. Advanced technologies such as artificial intelligence, interactive simulations, virtual laboratories, virtual reality, and augmented reality will play a significant role, with a strong emphasis on ethics. Future biology curricula will address topics such as gene editing, the promises and challenges of biotechnology, environmental sustainability, global collaborations, and online learning in flexible environments with advanced teaching resources. This approach will ensure that students not only understand biological concepts but also know how to apply them in a rapidly changing world.

2. Biology teachers: Leader of future economy and critical Thinking

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Biology, as a rapidly advancing field, is poised to play a transformative role in shaping the future economy. Innovations in biotechnology, genomics, and synthetic biology are creating new industries and revolutionizing existing ones, from healthcare and agriculture to energy and environmental management. These advances have the potential to enhance productivity, create sustainable solutions, and address global challenges such as food security, disease control, and climate change. The integration of biological sciences with digital technologies is driving a bioeconomy that could redefine economic growth, labor markets, and global trade. However, this shift also raises ethical, regulatory, and socioeconomic considerations that must be addressed to ensure equitable and sustainable development. As biology increasingly intertwines with the economy, it will influence economic policies, business strategies, and global competitiveness, making it a critical factor in the future economic landscape. With increasing critical role of bioeconomy in the world, biology teachers play a crucial role in shaping the future economy by preparing the next generation for careers in the rapidly evolving bioeconomy. As biotechnology, genomics, and environmental sciences become increasingly integral to economic growth, biology educators are tasked with equipping students with the knowledge and skills needed to thrive in these fields. By fostering critical thinking, scientific literacy, and an understanding of complex biological systems, biology teachers help students become innovators and problem-solvers who can drive advancements in healthcare, agriculture, and environmental sustainability. Moreover, they play a key role in promoting awareness of ethical, ecological, and societal implications of biological research, ensuring that future economic development is both sustainable and socially responsible. As the economy becomes more reliant on biological sciences, the influence of biology teachers in shaping a skilled and informed workforce will be essential to fostering innovation, competitiveness, and sustainable growth in the global economy.

3. Evolution of the scientific research methodology in biology

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The scientific research methodology (SRM) is a complex process and has evolved under the influence of historical, philosophical and cultural developments. SRM is an important tool for understanding of the universe. It was originated in the cradles of ancient civilizations, including

Iran, India, Rome and Greece, and has developed during the Islamic era, reaching its current form in the West. This process is dynamic, constantly changing, and evolving. By studying and applying the results of this evolution, we can enhance education and research in biology, thereby improving the current SRM. The questions that arise are: What research methods were used by each civilization at the height of its prosperity? Can changing research methods lead to the advancement of science in society? What research methods can be employed to increase productivity and foster innovation in biology education and research? Can the use of certain SRMs lead to the loss or stagnation of ideas among biologists? Is the classification of high school students into "experimental sciences", "mathematics and physics", "art" and "humanities" aligned with modern scientific research methods and the needs of today's society? Given these categories, can our high schools adequately train students to become suitable biologists for entry into the country's universities or society? Do the existing categories in academic fields promote the flourishing of modern biology ideas among students? Are biology textbooks written according to contemporary SRMs in biology? The purpose of this article is to study the development and evolution of the SRM and the differing perspectives of scientists from ancient Iran, the period of Islamic civilization and beyond. We hope to think and conduct research that surpasses that of great scientists like Aristotle, Ibn Sina, Al-Khwarizmi, Newton, Pasteur, Darwin, Linnaeus, and Einstein. If not, we aim to create a favorable environment for the development of standard SRM in biology, enabling us to witness the flourishing of modern biological ideas.

4. Examining and analyzing the questions of the national entrance exam and the final exam: improving the learning and selection process with the approach of deep understanding of the subjects

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Conceptual and deep learning of scientific subjects is one of the most important factors that should be considered in the learning process. Since 2018, with the change in the country's educational approach to the new system, there was a change in education that was positive in many ways and improved the quality of education in the country. In addition to these positive developments, the design of questions for the final exam and national entrance examination has always had negative aspects. In this research, the questions of the final exam and entrance exam and its effect on students' learning are evaluated and its strengths and weaknesses are investigated using quantitative and qualitative methods. Also, solutions to improve the quality of question design and suggestions to prevent weaknesses from entering the country's exam questions are provided. The results show that when the questions are designed in a purposeful way and based on scientific standards and criteria, while improving the quality of learning, it causes a deeper understanding of scientific issues by students and also causes a better and fairer screening of students to enter educational centers of the country.

5. Ideas for a desirable "laboratory" class in virtual conditions (A narrative of a lived experience)

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The purpose of this study is to express and analyze the author's experiences of holding a laboratory course, for the first time virtually, at Farhangian University. The research method is qualitative and thematic analysis. Themes or axes derived from the author's lived experience were extracted and categorized by narrative self-examination. The case study is a narration of the experience of

holding the course "Plant Physiology Laboratory" in the field of biology education at Farhangian University, which was held and taught virtually by the author in the first semester of the academic year 2021-2022. Findings show that the topics and contents of the author's narrative are organized in the form of 4 main themes, which include the teacher's interest and teaching concerns, choosing the appropriate method of class management and evaluation, communication based on student respect and understanding, and finally the teacher's scientific and professional ability. It seems that the teachers of laboratory courses can provide the ground for students promoting learning and education in laboratory courses in a virtual education by considering the mentioned cases.

6. Enhancing Biology Learning with Virtual Reality: A Novel Approach Based on the ADDIE Educational Model

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This paper examines the impact of virtual reality (VR) on the development of biology learning using the ADDIE instructional model. Nowadays, modern technologies are recognized as effective tools in the teaching-learning process. Given the challenges of traditional education, this research aims to analyze how VR can be utilized in biology education and its impact on improving learning quality, understanding complex scientific concepts, and increasing student motivation and participation. The study is designed based on the ADDIE model, one of the most effective and widely used instructional design frameworks, consisting of five stages: analysis, design, development, implementation, and evaluation. This model helps instructional designers enhance the teaching-learning process and meet learners' needs. The research method is quasi-experimental, conducted on two groups: an experimental group receiving VR-based instruction and a control group receiving traditional instruction. The study sample includes 80 female middle school students. Research tools consist of VR educational content and questionnaires for evaluating learning progress. The findings show a significant improvement in the test results of the experimental group compared to the control group, as well as increased student motivation and participation and a deeper understanding of scientific concepts. The results demonstrate the effectiveness of modern teaching approaches in improving the teaching-learning process.

7. Content Analysis of the Transcription Termination Topic in the 12th Grade Biology Textbook

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Genetic information is organized in units called genes and is transferred to RNA molecules through the process of transcription. Transcription is divided into three stages: initiation, elongation, and termination. The aim of this study is to analyze the topic of transcription termination in the 12th-grade biology textbook using reputable academic sources and recent scientific articles, as well as to resolve certain ambiguities in the textbook. One such ambiguity is the sequence of events in transcription termination and whether or not transcription occurs from termination sequences, which has been a point of debate among biology teachers' groups. A review of various scientific sources shows a wide diversity of viewpoints regarding transcription termination in eukaryotes and prokaryotes, and unfortunately, the textbook is neither clear nor precise on this matter. Thus, based on the results from scientific articles and reference textbooks, it is crucial that the 12th-grade biology textbook clearly specifies whether the transcription process in prokaryotes or eukaryotes is being referred to, and the content should be simplified for better student comprehension, using illustrations that do not contradict other figures in the textbook.

Posters

8. Examination of Modern Assessment Methods in Biology

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Assessment is a process used to obtain information about the quality or quantity of change (acquisition of competencies) in a learner or a group of learners. Nowadays, assessment for learning has replaced assessment of learning. Although various studies have been conducted on assessment and evaluation, research on modern assessment methods in biology is limited. Given the subject's contextual and applied nature and its impact on national exams and final examinations, biology requires specific assessments. This study examined various tests from colleagues, student responses, and questionnaires from both statistical and qualitative perspectives. Interviews and questionnaires were used as tools. Students prefer performance and formative assessments to replace summative assessments. Teachers also believe that summative assessments cannot measure the level of learning in biology. Formative and performance assessments, in addition to being authentic assessments, help students engage actively in learning and address various misconceptions. Initial assessments in biology are used before new instruction to evaluate prior knowledge and skills, potential misconceptions, and student interests. It is suggested that biology textbooks include assessment appendices. Developing guidelines for designing biology questions based on educational objectives can prevent deviations in question design.

9. The Effect of Role-Playing Method on Learning the Calvin Cycle in the 12th Grade Biology Textbook

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One of the issues and challenges faced by 12th-grade students in biology is learning biological cycles, including the Calvin cycle. The aim of this research is to assess the effectiveness of the role-playing method compared to the lecture method in learning this important topic. The study employed a pre-test and post-test approach, randomly selecting two groups, one as the control group and the other as the experimental group, from 12th-grade students at Forough Danesh high School in the 2023-2024 academic year. Monthly test scores were used as pre-test scores, and after the study, the scores of both groups were considered as post-test scores and analyzed using SPSS software. The results showed a significant difference in the group that experienced the role-playing method compared to the group taught through lectures. It can be concluded that this method can significantly improve students' understanding and learning of this topic. This method can be effectively applied in teaching various biology topics.

10. Increasing the preparation of experimental 10th grade students for the final biology exam by simulating the exam

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This research is an action research method and the statistical population is the 10th grade students of Shahed Girls' High School, district 1 of Shahrekord. According to the results of the final exams of the past years, one of the reasons for the drop in students' grades is the lack of familiarity with how to hold and correct the final exam. To solve this problem, an exam similar to the final exam was held. Question and key design, answer sheet design, numbering and separation of the headers were done and exam papers along with keys were provided to the students. The first and second corrections were made by the students of the upper class in the presence of the teacher. The third

correction was done by the teacher if needed. All the steps were explained to the students before the exam. The result of this research had a positive effect on study methods of students. Knowing about the type of correction of the final exam, the students modified their study method in order to get more prepared. According to the favorable results of the final exam of June 1403 for the biology course of the above class, it is suggested that schools conduct this type of exam for the 10th grade students.

11. Virtual Laboratories for Enhancing the Quality of Biology Education

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This article examines virtual laboratories in biology education. Given the rapid advancements in technology and the need for continual updates to teaching methods, virtual laboratories are introduced as an effective tool for improving educational quality. These laboratories simulate real laboratory environments, allowing students to interactively and practically experience complex biological concepts. This research, based on library and documentary methods, reviews the impact of virtual laboratories on biology education. Virtual laboratories such as Azto, Gizmos, Java Lab, PHET, etc., provide engaging and effective learning experiences, contributing significantly to the enhancement of biology education quality. This technology, by reducing time and space limitations and increasing student interaction with course materials, has become an essential tool in modern education. Based on these findings, it is crucial to focus more on developing educational packages for teachers and students and providing in-service training for teachers.

12. Innovative Approaches in Biology Education: From Storytelling to Interactive Learning

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University-level biology education requires innovative approaches to enhance student learning and increase engagement. This article explores the use of storytelling and global narratives as effective tools in teaching biology. The use of stories, particularly when linked to real-life situations and infused with humor or captivating elements, can play a significant role in teaching introductory biology courses. Additionally, research has shown that modern educational methods, such as independent learning and multimedia programs, can enhance the quality of student learning. The application of educational games in biotechnology improves students' biological content knowledge, although it has limited impact on their interest in science. Innovative teaching techniques create positive biological changes in the brain, which may explain their effectiveness in promoting learning. This article also provides practical strategies and experiences for biology educators, offering valuable insights for improving teaching methods. Sharing successful stories and experiences online offers an excellent opportunity to disseminate best teaching practices among educators. Moreover, cyclic learning methods and participatory educational programs strengthen the understanding of biological concepts and aid in developing effective reasoning skills. These findings highlight that the use of storytelling and other innovative approaches can significantly contribute to the improving of biology education.

13. Applications of Artificial Intelligence in Biology Education

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Artificial Intelligence (AI) has advanced various aspects of human life, driving the world towards a digital transformation previously unimaginable. One such advancement is the application of AI in the fields of biology education and biological sciences through development of science. This study aims to identify the applications of AI in biology and biology learning. A literature review

method was used for this study. The analysis of various articles on AI applications in biology education revealed that AI is used for analyzing biological data, genetic data, studying complex biological phenomena (synthetic biology and systems biology), bioinformatics, tracking and diagnosing diseases. AI has been utilized in various biological sciences like medicine, agriculture, animal husbandry, and in industry for product development and manufacturing processes through the Internet of Things. There are 24 types of AI applications in education, particularly in biology learning, which can be categorized into six groups: personalized learning and tutoring (teaching assistance/tutoring), assessment and evaluation, educational media, enriching learning, virtual classrooms, and teaching aids. Using AI in biology education helps teachers continuously upgrade their knowledge and create content suitable for students. Given the increasing investment in AI applications in education, it is expected that its various technologies will soon be utilized across all educational sectors.

14. From Artificial Intelligence to Effective Learning: Challenges and Opportunities in Biology Education

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Artificial Intelligence has evolved in various aspects of human life, leading the world towards a digital transformation that was previously unimaginable. This novel technology is recognized as an effective tool for improving the learning and teaching process, especially in the field of biology education. This study aims to identify the opportunities and challenges in applying AI to biology education. This review article uses library research methods, utilizing both domestic databases such as Magiran, Noormags, SID, and external databases like Google Scholar. Based on the review, 24 types of AI applications in education, particularly in biology learning, were identified and categorized into six groups: personalized learning and teaching (educational assistance/tutoring), assessment and evaluation, educational media, enriching learning, virtual classrooms, and learning tools. Results show that AI can enhance student motivation and interest by creating engaging and personalized learning environments and provide a deeper understanding of scientific concepts. However, there are challenges such as ethical issues, data security, and the need for teacher training. This article addresses these challenges and offers solutions, emphasizing the importance of integrating AI into the educational system for a more innovative and effective future in biology education.

15. Analysis the content of the 11th grade biology textbook (based on the William L Romey technique)

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One of the most important educational media is the textbook, which as an effective educational media can create a learning environment for learners. Considering the importance of this topic, a research was conducted with the aim of analyzing the content of the 11th grade biology book and to answer the question: "Does the 11th grade biology book actively involve the audience in learning?" The method of content analysis is based on William Rumi 's technique. The statistical population was randomly selected from the 11th grade biology book and after coding and defining the categories, tables were filled and based on the results, the student's engagement rate was calculated in the text, figures and questions sections. The results were recorded in the form of graphs using Microsoft Office Excel 2010 software. By comparing the tables and graphs in the three sections of the categories related to the content analysis of the texts, figures and questions, I concluded that in the 11th grade biology book, the categories of the texts and the figures have a

low engagement coefficient of 0.17 and 0.18, respectively, and according to the William L Romey index, they are considered inactive categories, but the engagement coefficient of the question category is 1.5, which indicates that the student is active in answering the questions. Therefore, by making changes in the figures and adding figures that require the student's participation to complete them, as well as revising some of the text section can include the biology book among the active books so that the student can learn the lesson with more motivation.

16. Comparative content analysis of plant chapters of the 10th and 11th biology books based on William L Romey's method

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The present research was conducted with the aim of comparative analysis of content of the plant biology chapters of the 10th and 11th grade biology books of the upper secondary education year 1402-1403 from the perspective of being active and inactive based on William Rumi's method. The statistical population of the research was the entire content of the plant biology chapters of the 10th and 11th grade biology books, including text, figures and questions. In this research, sampling was not used, so all the pages of these two books in the plant biology chapters were examined. Research method is descriptive and the method of the study is quantitative content analysis and appropriate methods of descriptive statistics (frequency, frequency percentage and average) and calculation of conflict coefficient based on William L Romey's formula were used to check the data and information. In these books, course exercises, quizzes and end-of-chapter questions are not included. Therefore, the questions inside the text were examined in the content section. According to the research findings, conflict coefficient for plant biology chapters is 0.28 for the 10th grade and 0.12 for the 11th grade. It shows that both the text and the design of its figures are passive in both grades and, the plant biology chapters of the 11th grade biology book have been more inactive than the 10th grade.

17. The relationship between biology topics in the experimental science books of elementary and lower secondary school to biology books of the upper secondary school

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The science of biology is more important than other phenomena in the present age. Because this science deals directly with the bodies of living organisms, both in relation to genetic issues and developments and in environmental studies. Biology, as one of the important branches of basic sciences and disciplines of experimental sciences, should be given special attention in determining the chosen teaching method in order to achieve the goals stated in the national curriculum of the education system. The thematic connection of the experimental science textbooks of the elementary school and biology textbooks of the upper secondary school period is in the form that in the science books of the six grades of the elementary school, respectively, 4, 8, 6, 5, 1 and 4 chapters are fully related to the topics and concepts of biology of the upper secondary school period. Topics such as animal biology, plant biology, physiology and ecology can be seen in this connection. The continuity of the topics mentioned in the experimental science books of the elementary school from the first grade to the sixth grade has been systematically maintained. On the other hand, according to the reviews in the experimental science books of the lower secondary school, the continuity of biology topics can be seen in all three grades. For example, chapters 11 to 15 in the seventh grade experimental science book, chapters 4 to 8 in the eighth grade experimental science book, and chapters 11 to 15 in the ninth grade experimental science book are

related to various topics in biology, such as cell studies, biotechnology and plant and animal biology.

18. Computational Thinking and Artificial Intelligence in Biology Education

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The use of computational thinking and artificial intelligence provides a suitable platform for investigating complex biological systems and developing innovative ideas. This approach allows us to examine phenomena and biological systems at different scales and analyze their mutual effects. The use of computational thinking, which includes the stages of abstraction, analysis, pattern recognition, algorithm, modeling, and debugging, can help to investigate, solve problems, and teach biological problems in a systematic and accurate way. Each of these steps plays an important role in better understanding of biological problems and in providing effective solutions. Artificial intelligence, using the steps mentioned in computational thinking and computers, allows us to discover new patterns in large scale biological data at high speed. In this presentation, we point out the different stages of computational thinking and the use of artificial intelligence in the form of several examples, including modeling of endocrine glands, cancer and the simultaneous examination of signaling pathways and their role in regulating and changing gene expression. The importance of different stages of computational thinking in biology education and the use of artificial intelligence tools lies in their capacity to foster structured and logical thinking in order to increase the understanding of biological systems. With analytical thinking and the possibility of analyzing hypotheses, students' creativity increases and they get equipped with the necessary skills to face complex biological challenges.

19. The role of new educational technologies focused on online tests in learning biology concepts

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In recent decades, the use of new educational technologies such as online tests, has expanded as an effective tool in learning scientific concepts, especially in biology. The purpose of this review article is to investigate the effects of these technologies on learning biology concepts and to evaluate the effectiveness and capabilities of online tests in improving the learning process. For this purpose, the articles and studies conducted using online tests and other digital tools in biology education have been analyzed and reviewed. The results show that online tests not only allow students to learn complex concepts in an interactive and active way but also allow teachers to be aware of students' academic progress in a more accurate and personalized way. However, challenges such as the need for appropriate technological infrastructure and ensuring the accuracy of assessments have also been discussed. Finally, this article examines ways to improve the use of online tests in biology education and offers suggestions for future research.

20. Increasing the academic motivation of students by the lesson study activity of science teachers

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Lesson study is a group activity of teachers and a method to improve teaching and increase students' learning. The aim of this research is to investigate the effect of this teaching method on the level of students' motivation in acquiring biology topics in the course of experimental sciences.

The research method is semi-experimental and the statistical population was eighth grade students in District 5 of Tehran. The statistical sample includes 128 female students who were studying and were distributed in two experimental and control groups. The instrument used was Harter's motivational questionnaire. Data analysis was done using descriptive and inferential statistical methods using SPSS software. The results showed that the students of the experimental group had more motivation to learn than the students of the control group. It seems that the diversity in teaching by the lesson study, which takes place due to the synergism of the teachers' teaching skills and qualifications, provides the basis for increasing the students' desire for education and, as a result, improving learning.

21. Teaching Molecular Genetics Concepts to Students Using Educational Animations

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Educational animations of molecular genetics provide animated 3D computer images of molecular and cellular structures and processes designed to teach concepts. Teaching and learning molecular genetics concepts can be challenging due to their complexity, small scale, and the technical terminology used. This study aimed to determine whether using computer animations and visualization activities in high school could help improve students' understanding of molecular genetics. DNA replication was taught to two twelfth-grade classes: one class received traditional lecture-based instruction with molecular DNA models, while the other class learned through various animations. A questionnaire and a common classroom test were used to measure the level of concept understanding in both groups. Analysis of questionnaire data and test scores revealed that students taught with animations demonstrated a significantly better understanding of DNA replication concepts. The results of this study showed that using computer animations in teaching molecular genetics could enhance students' learning.

22. Investigating Ways to Increase Students' Interest in Biology Laboratory Experiments

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This study explores methods to increase students' interest in biology laboratory experiments, focusing on making experiments more applicable and familiarizing students with laboratory tools and equipment. The study addressed issues of disinterest, lack of motivation, and sometimes anxiety among tenth-grade students during laboratory sessions. It was hypothesized that the lack of relevance of courses and lack of familiarity with equipment contributed to these problems. The study used qualitative and case study methods, including observations, data collection, reviewing past experiences, and classroom status analysis. Strategies employed included using encouragement methods, explaining the impact of practical work on future academic and daily life, conducting engaging and result-oriented experiments, encouraging students to write practical reports, and holding craft exhibitions. The results indicated that these methods increased students' interest and enthusiasm in class, leading to higher engagement in class projects.

23. Assessment Based on Student Drawings as an Innovative Evaluation Approach in Biology Education

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Drawing has long been regarded as a powerful tool in science education, particularly in biology where visual comprehension plays a significant role. This abstract, prepared as a review with consideration of lived experiences, explains the importance of incorporating drawing questions not only as a teaching method but also as an innovative approach to assess biology courses.

Traditional assessment methods often prioritize textual or numerical responses, which may not fully reflect students' understanding of complex biological concepts and structures. In contrast, drawing encourages students to visually demonstrate their comprehension, leading to more deep cognitive engagement and enhanced observational and spatial reasoning skills. Moreover, assessments based on drawing offer a more inclusive evaluation approach; students who are more talented in visual or spatial areas may find drawing-based assessments more intuitive and rewarding than traditional methods, thus improving their overall learning experience. The implementation of this assessment method in both oral and written evaluations in biology classes has allowed students to identify their learning gaps and enhance their comprehensive study efforts. This research, while providing several examples and strategies, is an attempt to elucidate the importance of designing questions that ask students to draw biological figures and how to effectively integrate this into the assessment and evaluation system of biology education in the country.

24. The application of digital laboratories in biology education: A critical evaluation of the effectiveness and outcomes of HHMI BioInteractive

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Biology education encompasses various methods, including traditional and blended learning. Virtual laboratories, as online platforms, facilitate the teaching of science through simulations and animations and are beneficial in teaching abstract concepts in biology, biotechnology, and chemistry. HHMI BioInteractive, an initiative from the Howard Hughes Medical Institute, plays a role in promoting the use of digital laboratories in biology education by integrating new technologies such as the Internet of Things (IoT) and offering diverse educational content. This review study utilized multiple articles from databases such as Google Scholar, PubMed, and ScienceDirect, extracting and rewriting important information. Virtual laboratories are promising educational tools that, with continuous development and integration, can significantly contribute to biology education. HHMI BioInteractive, by providing engaging educational materials, is effective in this area. However, the impact on student learning outcomes is not uniform and may depend on various factors, and they can be used as alternatives to traditional experiments, especially in situations where physical laboratories are not feasible. Virtual laboratories are valuable educational tools that can support and enhance the learning of biology. They are particularly useful for abstract and complex topics. HHMI BioInteractive is recognized as a valuable resource for biology teachers and emphasizing the importance of tutoring and mentoring programs shows that educational initiatives contribute to students' learning experiences.

25. Improvement of students' attitude towards biology lesson by "Brain-Based" Learning education

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The aim of this study was to investigate the effect of the "Brain-Based Learning" teaching method on improving attitude of student towards the biology course. "Brain-Based" learning is a new theory of learning based on the structure and function of the brain. In this educational method, an attempt is made to involve both hemispheres of the brain in learning; also, by activating the limbic part, learning becomes more attractive for students and students enjoy learning more, while in normal methods, only the left hemisphere of the brain is involved. The method of this research is quasi-experimental with two groups of control and experimental. The statistical population

includes 11th-grade female students in District 13 of Tehran in the 2019-2020 academic year. A total of 52 individuals from the statistical population were selected by the purposive sampling method and randomly assigned to two groups. The instrument for measuring the variable was the researcher-made attitude questionnaire. The validity of the researcher-made questionnaire was determined using the opinions of expert teachers and their reliability was determined by retesting. Statistical tests (Kolmogorov-Smirnov test and Chi-square index) were performed using SPSS26 to evaluate and analyze the hypothesis. The results showed that teaching in a "brain - based learning" method compared to the usual method improved the students' attitude towards the biology lesson at a statistical level of 5% ($P < 0.05$). These results demonstrate the role and importance of brain-based learning methods in learning.

26. The integration of physical and biological learning in teaching the subject of eye lens accommodation and related diseases

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Conceptual education of biology, as one of the foundations of experimental sciences, requires new and creative teaching methods to help students understand concepts in a practical and tangible way. This article examines a lived experience in teaching the topic of lens accommodation and eye diseases in the 11th grade biology book. The teaching method is an interdisciplinary method that is based on the use of physical concepts related to the formation of images in convex lenses that students have previously learned in physics course. First, we draw how the image is formed by a convex lens, and we ask the learner to show the characteristics of the new image by moving the object forward and backward and redraw the rays, and by posing the question, how can we get a clear image now? The learner finds out what happens in the accommodation process in the lens of the eye by trial and error or problem solving or presenting creative hypotheses. The purpose of this method is to strengthen students' understanding of biological concepts through interdisciplinary links and increase their ability to apply theoretical concepts in life. Studies show that active and interdisciplinary learning can lead to an increase in students' performance in science courses. As a result, the students achieved a deeper and more stable understanding and gained some kind of insight about the connection between basic science courses and the need to use each in understanding the other. It is suggested to use this approach in teaching other biology topics.

27. Revolutionizing Biology Laboratory Education with Simulators: Opportunities and Challenges

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The integration of new technologies into education has brought about a paradigm shift in teaching methods. In biology, these technologies offer immense potential to enhance attractiveness, and interaction, and facilitate a profound understanding of complex concepts. Biology Laboratory Education (BLE), is fraught with challenges such as high costs, temporal and spatial limitations, restricted access to specimens and apparatus, and potential hazards. In recent years, computer simulators have emerged as powerful educational tools that can overcome many of these limitations and significantly improve the quality of learning. In this study, a systematic review of scientific literature and reliable sources has been conducted to investigate the use of simulators in the biology laboratory education, the advantages and disadvantages of this method, the different types of simulators and their applications in teaching different concepts of biology and the challenges in the implementation of simulators in education and overcoming them. Results indicate that computer simulators can provide a variety of educational opportunities, including conducting

hazardous and costly experiments in a safe environment, observing biological processes at various time and spatial scales, repeating experiments as desired, and personalizing education based on individual needs. To improve the quality of BLE using this technology, it is recommended to promote the use of simulators, develop indigenous simulators tailored to the educational and cultural needs of the country, integrate simulators with traditional practical training and other teaching methods, and evaluate the effectiveness of simulators.

28. Lived Experience of Game-Based Teaching of the Translation Stages in Protein Synthesis in 12th Grade Biology Class

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Using innovative and engaging teaching methods is essential for effective teaching and learning. This study describes the lived experience of a biology teacher using a game-based teaching method for a significant topic in the biology curriculum: translation. Translation is the process that leads to the formation of polypeptide chains based on mRNA molecule information. The translation stages are complex in the textbook, making them difficult and dull for 12th-grade students to learn. The research first outlines traditional and modern teaching methods, especially game-based learning, and their effects on learning. It then describes the teacher's experience in using this method to enhance students' understanding of translation and discusses its impact on student learning. Data were collected from reliable sources, including books and scientific articles. The study focused on 12th-grade students from Fatimieh and Narges high schools in Siyahkal County during the 2022-2023 academic years. Observations of student reactions and feedback during and after the game were used as tools. The results indicate that the teacher successfully increased student participation and engagement in this challenging topic through a practical and creative game-based approach. Suggestions for future research using statistical methods to more accurately measure the effects of this teaching method are provided.

29. The role of functional assessment in simulated conditions in improving the teaching of course of biology

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Functional assessment is used in simulated conditions to evaluate abilities and skills in the learning process. Functional assessment in simulated conditions causes the learner's performance to be evaluated in a simulated situation similar to the real situation. The present research method is descriptive-analytical. In this research, the method of library and documentary studies has been used to collect information, and printed and electronic sources have been examined, and the search was based on research keywords. In the biology course, to improve the quality of education, simulated environments such as simulated experiments, mouldages, and etc are used. By using a simulation in an artificial situation, the real effects of some possible conditions can be recreated. Functional assessment in the simulated conditions in the course of biology allows the students to connect between the real world and the information obtained from the simulated situation, and their creativity and problem solving skills are strengthened and they are prevented from harm caused by harmful substances and overcomes equipment shortages.

30. The effect of holding a scientific field trip in the garden of the schoolyard in motivating learning and making the topics of plant biology chapters of biology course (2) more attractive and useful for students in the academic year of 1401-1402

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The purpose of this research was to investigate the scientific tour in the schoolyard to study the structure of plants in order to increase learning and make the plant material of biology course (2) more practical (2). Scientific trip is one of the active methods of teaching and a suitable method for learning and teaching that sometimes are designed outside the classroom, laboratory and library and adjusted according to certain educational goals by the teacher and the student. Teaching the plant biology chapters of biology course (2) and facing the reluctance of the students led to the use of a scientific trip this year in order to investigate its effect on further learning and applicability of the plant biology topics of biology course (2) for the students. The research method was action research with questionnaire and functional assessment. This trip was held in May in the garden of the schoolyard without cost and without disturbing the classes of other subjects. To conduct this research, 35 female students of a class, 11th grade, Prof. Hessabi High School, District 5 of Tehran, academic year 1401 -1402 were used. Before and after the field trip, a functional assessment of plant subjects was carried out. Plant subjects was taught to the students, both in terms of structure and function, according to the plants in the garden of the schoolyard. After conducting a survey with researcher-made questions and functional assessment, the importance of scientific trip in the interest and learning of plant topics by students was determined. The students' learning increased from the level of knowledge. The scientific trip brought freshness and diversity in the classroom and created excitement and enthusiasm in learning. It is nature that attracts the attention of students and makes them wonder, excites curiosity and causes to explore.

31. New technologies in training the concepts of biology course

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New technologies are all the tools that the teacher uses to teach students more effectively; so that education goes beyond the mere lecture of the teacher and provokes the expected behaviors in the students. The nature of science, teaching methods, the compactness and brevity of the biology course, the interdisciplinary nature of biology, and the problems of the biology course are the reasons for the limitations of biology learning. This study method is analytical-descriptive. To obtain information, we used books, magazines, electronic documents, and articles related to the title, and we searched for keywords in the databases of Google Scholar, Maghiran, Scientific Information Database (SID), etc. With new technologies, it is possible to improve the level of students' learning in biology and improve the teaching-learning process. It is suggested that new technologies such as augmented reality, virtual reality, artificial intelligence, educational simulators, and other tools be included in the agenda of education officials and experts and used in practical and laboratory courses to increase educational quality in schools.

32. The Effectiveness of Multimedia and Student-Oriented Teaching Methods in Biology Education

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This research introduces an innovative approach for improving the quality of biology education by utilizing modern technologies. Given the complexity of biological concepts and the need for deep understanding, active and engaging teaching methods are increasingly important. Previous research showed that multimedia methods and active student participation can improve student attitudes and learning outcomes. However, comprehensive and in-depth studies regarding the

combination of these two approaches in biology education, especially in the educational context of Iran, have been limited. This study fills the gap by proposing an effective educational model in the context of Iran. Students worked in groups using various multimedia tools such as educational videos, games, podcasts, and group presentations to explore and analyze biological concepts. Results indicated that this approach created an active and interactive learning environment, enhancing students' understanding, motivation, critical thinking skills, problem-solving abilities, and overall engagement. It is recommended that biology teachers incorporate multimedia and student-oriented methods in their classrooms and develop localized multimedia tools to further improve biology education.

33. The effect of reflective narrative writing in removing the learning barriers of virtual teaching of biology in the Shad program of the 11th experimental students of the academic year 1400-1401

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Narrative research and anecdotal writing emphasize the thought and reflection of what is happening in the classroom now, and make teachers identify and fix obstacles and shortcomings in education with greater ease and precision. The lack of learning in virtual teaching in the Shad program and the decreasing of the grades led to the use of the method of action research and reflective narrative writing to solve this challenge. 35 female students of a class, 11th grade, Prof. Hessabi High School, District 5 of Tehran, were selected in the academic year of 1400-1401. First, the problem was written and the students were asked to tell the reason for not learning the material. The interview was conducted through the preparation of a questionnaire with questions made by the researcher. With the survey method designed in Google Forms and the results of graphs and qualitative and quantitative analysis, it was found that the highest percentage for better learning was teaching in the form of live broadcast with animation and the lowest percentage was related to reverse teaching. After doing the teaching that the students suggested, the evaluation was done and the number of students' correct answers to the questions increased and the learning in the selected subject taught increased. Creating relaxation during teaching for the teacher, reducing stress in students, increasing learning and reducing cheating, creating creativity were other results. It may seem difficult and time-consuming to use this method at first, while gaining experience in this field and having more practice leads to its simplicity and at the same time deep impact and can help to strengthen and deepen teachers' thinking and reflection.

34. The Impact of Performance Assessment on Identifying Flowering Plants in Real Environments by 9th Grade Students in Izeh County

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Performance assessment emphasizes learning processes and enhances students' ability to apply their knowledge. This study examines the effect of performance assessments in real environments on identifying flowering plants among 9th grade students in Izeh County. The research utilized a quasi-experimental design with pre-tests and post-tests in control and experimental groups. The sample included female 9th-grade students from Izeh County in the 2023-2024 academic year, selected using a multi-stage cluster sampling method. A researcher-designed achievement test was used to measure learning outcomes. Data were analyzed using ANCOVA. Performance assessments were conducted in a natural setting near the school. Performance pre-test questions whose validity has been confirmed and were based on students' previous learning have been provided to the experimental group and they were given the necessary training on how to perform

the performance test. The experimental groups collected and identified the desired samples. At the end, post-test performance questions were given to both groups. The results showed that students in the real environment demonstrated significantly better learning outcomes compared to those who received traditional instruction. The findings suggest that performance assessments in real environments positively impact student learning.

35. Analysis of Errors in the Writing of the “Large Intestine and Defecation” Topic in the 1403 Edition of Biology 1 Textbook and Suggestions for Improvement

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A precise understanding of the anatomy of various body parts and their interrelations significantly contributes to comprehending their functions and characteristics. Sometimes, the way a text is written can lead to misunderstandings among students, resulting in incorrect conclusions. In this article, the topic of the large intestine and defecation, page 26 of chapter 2 of the Biology 1 textbook published in 1403, was reviewed, and its errors were explained based on classroom experiences. The students' misunderstandings in this regard were related to the anatomy of the large intestine. Due to the book's text, students believed that the rectum was not part of the large intestine and, therefore, did not have mucosa like the large intestine. Since they thought this part did not have mucosa, they considered the statement that “the entire digestive tract has mucosa” to be incorrect. First, using reputable articles and websites, the structure of the large intestine was fully explained, and this information was then compared with the textbook text. Following this comparison, the students' misunderstandings were clarified in the classroom. Finally, based on the presented documentation, suggestions were made for better writing of this section of the textbook to resolve the students' ambiguities on this subject.

36. The effect of getting to know Bionic science in motivating search and increasing the interest and attractiveness and practicality of the biology students of Professor Hashabi High School in 1401-1402

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The purpose of this research was to familiarize students with bionic science and its effect on interest and motivation for research. It is an interdisciplinary approach because in addition to biological and biosystematic information, this science also uses robotics /engineering/ mathematics and chemistry information. The problem was that the high school biology books have dealt more with the theoretical issues and the level of knowledge of the cognitive field, which has caused fatigue and demotivation and reduced the interest of the students towards the biology course. Action research method and questionnaire were used. The tested group was the students of a class of 35 people, the 11th grade of the high school of Prof. Hessabi, district 5 of Tehran, in the academic year 1401-1402. The students were first asked to search about bionic science. Then with the survey method designed in Google Forms the students were asked to answer the questions and the results were drawn in the form of a diagram. Some opinions of students in the survey are: God is a great creator. This science is mostly used in construction, which is modeled on birds and insects and has a lot of similarities with it. The more search is done on it, the better, more exciting, and more beautiful applications are discovered. the students found an interdisciplinary attitude that biology is related to other sciences. The integration of biology with other sciences increases students' perspective and the connection between science and life. In addition, integrated education leads to learning the subject from different perspectives and this type of education eliminates the gap between the intended and implemented curriculum. Suggestion after this research for

colleagues: biology materials must be taught in an applied way for students, students' familiarity with bionic science creates motivation for students to participate in the Khwarizmi Festival.

37. Evaluating and assessing the readability of the biology chapters of the experimental sciences textbook Eighth grade based on Flash, McLaughlin and Gunning Fog methods

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The purpose of this research is to evaluate, assess and analyze the content of the biology chapters of the 8th grade experimental science textbook, published in 1402, based on the quantitative methods of Flash, McLaughlin and Gunning Fog in terms of the appropriateness of the texts with the class level, age and level of understanding and access to the degree of compliance of its contents to the principles of planning, including the principle of the sequence of simplicity to difficulty in setting the structure. The research method was quantitative content analysis and the statistical method was descriptive. First, three chapters were randomly selected from the biology chapters of the 8th grade experimental science book, and then the relevant formulas were used to analyze the data using Flash, McLaughlin, and Gunning Fog methods and the obtained statistical sample was analyzed. The results of the research indicated that the readability level of the mentioned textbook according to the flash method is equivalent to the eighth to ninth grade, according to the McLaughlin method it is equivalent to the eighth grade and according to the Gunning Fog method it is equivalent to the eleventh grade, and the course material is a bit difficult for eighth grade students. Also, in the selected texts, the principle of simplicity was hardly observed, and there was no specific order to observe the mentioned principle in the eighth grade experimental science textbook.

38. Artificial Intelligence Technology in Biology Education: Perspectives, Applications, and Challenges

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The widespread use of artificial intelligence (AI) in educational programs has been reported and plays a significant role in increasing the speed and accuracy of learning. AI technology in biology education is emerging and developing, with great potential to improve the teaching-learning process. AI can assist by providing customized instruction, more accurate assessment, analyzing learning patterns, and identifying learners' strengths and weaknesses through machine learning. It can also enhance interaction and motivation of learners. In biology education, AI can be used in content design, educational activities, providing quick and personalized feedback, visualization of complex biological phenomena, and educational data analysis with analysis algorithms. Major barriers include limited access to high quality educational data, ethical and legal challenges, infrastructural costs, and the need for technical expertise. Ensuring the long-term effectiveness of AI systems can also be challenging. This research discusses the developmental and research applications of AI and its impact on biology education. Despite the challenges, AI holds significant potential in biology education and is gradually being developed and applied. Success in this field requires collaboration among education, biology, and IT experts.

39. The Impact of AI Games on Students' Learning in Biology

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The use of AI games in biology education is an innovative and engaging method that can enhance students' learning. With advancements in AI technologies and the expansion of educational games, traditional methods of teaching biology have been influenced, creating new opportunities for improving learning. This review aims to analyze existing studies on the impact of AI games on students' learning in biology and to provide a comprehensive view of their effects. Scientific articles and authentic researches from various databases were collected and reviewed. Key findings indicate that AI games used in creating educational questions significantly improve understanding of complex biology concepts such as genetics and biochemistry. These games have not only increased students' motivation and engagement but also strengthened their critical and analytical thinking skills. Additionally, AI educational games facilitate interactive and experiential learning and provide more accurate and efficient assessments of students. Based on this study, AI games are effective tools for enhancing the quality of biology education. Future research should focus on the long-term effects of these tools and explore cultural and regional differences in their adoption and effectiveness. These results could provide valuable guidance for teachers and curriculum designers in improving biology teaching methods.

40. Creativity-based teaching methods in biology education

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Today's world is a world of creativity and innovation. One of the important fields for applying creativity, which has a significant impact on the education of the future generation, is the field of teaching. Biology is one of the broadest and most interesting fields of experimental sciences. The nature of this science is such that teaching its content only theoretically cannot guide the learner to the goals of education. It is extremely important to show the processes in a practical way for the students and involve them with everyday issues related to the content of the courses. The present research has investigated creativity-based teaching methods in teaching biology by using the library method. Laboratory methods, collaborative learning (brainstorming and group discussion), scientific circulation, technological (use of technology), exploration and conceptual mapping were investigated in this study. In the review of these methods, in addition to the general definition, the method and steps of using them were expressed in a practical and applicable form, and the necessary points for using each method were mentioned. The teaching methods described in this article are among the most important and widely used biology teaching methods. Using these methods in the classroom, in addition to creating dynamics in the teacher's teaching, also causes creativity in students. This itself increases the learning of the material by the students and provides the basis for the emergence of their talents. In the end, biology teachers are suggested to use these teaching methods in their classes despite some limitations.

41. Visualization and Facilitation in Biology Education (A Case Study on Teaching the Electron Transport Chain in Chloroplasts)

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This paper examines the impact of using visual methods to teach complex biology concepts, specifically the electron transport chain in chloroplasts. The aim of this study is to evaluate the effectiveness of visualization in teaching this challenging concept to high school students. In this approach, the classroom was simulated as a chloroplast, with benches representing thylakoids

(each pair of benches as one thylakoid) and the space between the rows of benches representing the stroma. Students on these benches played the roles of different components of the electron transport chain. Additionally, two clay balls were used, one as an electron and the other as an electron carrier molecule. This method not only aided in better understanding of the concepts but also increased students' motivation and interaction. Data for this study were collected through observation, interviews, and questionnaires. The results indicate that students developed a deeper understanding of the electron transport chain process using this method and showed greater interest in the subject. Furthermore, this approach led to better retention of the material in students' minds, facilitating the process of memorization and transfer to long-term memory. This study suggests that using visual and simulation methods in teaching complex concepts can improve the quality of education and learning.

42. Using the STEM approach in modern biology education with an emphasis on learning based on problem solving

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The STEM approach is a new educational method for elementary schools, which consists of the integration of concepts such as Science, Technology, Engineering, and Mathematics. Through STEM, students develop important skills including: problem solving, creativity, critical analysis, teamwork and initiative. In terms of student progress, this approach has a much better performance than the traditional teacher-centered method. STEM problem-based learning (STEM-PBL) should be used in the teaching of biology so that students eliminate misconceptions in biological concepts, retain biological principles learned, and increase their chances of admission to higher educational institutions. This study investigated the communication skills of high school students through STEM-based PBL in biology. The results showed that learning using STEM-based PBL compared to direct STEM-based learning has a significant effect on high school students' communication skills. Studies have shown that students who acquired biological concepts with a STEM approach, with less mental effort, showed more success in the knowledge test, and the knowledge they acquired was retained for a longer period of time than their peers in the non-STEM group.

43. Interactive learning in teaching biology: project-based learning

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Teaching based on lectures, while capable of conveying a lot of information to learners, is a superficial and passive method. It is ineffective in creating motivation, enthusiasm, self-confidence in learners, and professional success for them. Therefore, it is necessary to employ modern methods in education to facilitate comprehensive learning in students. Interactive learning is a type of learning where learners actively participate and learn educational content through interaction. This type of learning uses multimedia technologies and interactive tools to engage learners with the content, resulting in deeper learning. Additionally, it promotes cognitive growth, improves reasoning abilities, and enhances social relationships among students. One form of interactive learning is project-based learning. In this method, learners work collaboratively to answer a question through interactions and sharing their knowledge, ultimately leading to the creation of new knowledge. In this approach, the teacher acts as a guide, facilitator, and evaluator. Techniques such as scientific visits and laboratory activities are utilized. Studies indicate the positive impact of this method on the quality of biology education. Therefore, teachers should master the

implementation of this method and by applying it in the classroom, facilitate deep learning, development of critical thinking, and professional and social skills in students.

44. Impact of Using a Relevant Experiment on Factors Affecting Absorption in the Small Intestine on Student Learning

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Effective education is a hallmark of social advancement. There are many teachers whose main concern is conceptual education. In biology education, experience has shown that students learn concepts better and more deeply when they see and experiment. This paper examines the impact of an experiment on factors affecting absorption in the small intestine on student learning. The study utilizes various sources and personal experiences to conduct experiments with simple devices and investigate factors influencing nutrient absorption in the small intestine. Understanding these factors can help improve pharmaceutical methods for enhancing nutrient absorption in the small intestine.

45. The Effect of Establishing Emotional Connections in Reducing Academic Decline in Top Students in Biology

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This research was conducted at Hazrat Narges High School in Amol, during the 2019-2020 academic year, which was disrupted by the COVID-19 pandemic, necessitating virtual education. The lack of face-to-face emotional communications led to decreased motivation and learning among students. One new student in the twelfth grade experienced severe academic decline, though she had been a top student previously. New educational environment and poor counseling led to her non-participation in classes. If this trend had continued, it might have resulted in her dropping out of school. This action research involved collecting data through observations, interviews with students, principal, and colleagues, questionnaires, and documents to address the problem. Solutions included informing the principal and family, holding face-to-face meetings at school, reviewing past academic and health records, making follow-up calls, and sending messages and creating motivation, encouragement in the virtual classroom and participation in a specialized virtual class created for the top three students. Results from student surveys indicated that teacher-led classroom instruction significantly improved learning and academic progress. It is recommended that teachers as educators emphasize creative thinking, motivation, and other developmental aspects.

46. Facilitating Biology Education: A Case Study on Teaching Muscle Contractions Using Chicken Wings and Legs

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Scientific education in biology is of great importance and can have a profound impact on students' learning and understanding of the natural world. This article examines the teaching of muscle contractions in the skeletal system using chicken wings and legs as examples. Additionally, due to structural similarities, the wings and legs serve as a practical model for explaining muscle contraction mechanisms. The study aims to provide eleventh-grade experimental students with a better understanding of the relationship between muscle structure and function in bone movement. In the experiment, after separating the skin from the chicken wings and legs using a surgical knife, they were used as instructional samples. Subsequently, students identified and examined the posterior and anterior muscles (agonist-antagonist pairs) of the arms and legs, along with their associated tendons. By manipulating different tendons, movement within the bones was observed

and studied. The results demonstrated that students, through hands-on experience, became familiar with muscle and tendon function, gaining deeper insights into the vital role tendons play in transmitting force from skeletal muscles to bones and facilitating movement. This practical approach encourages students to observe theoretical concepts and enhance their learning.

47. Artificial Intelligence: A New Tool for Teachers to Learn About Plants

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Artificial Intelligence (AI) is increasingly recognized as a valuable tool in education, offering opportunities to enhance learning experiences and outcomes. This paper examines AI strategies for elementary education related to plants and highlights challenges and recommendations for future research. Practical AI applications in elementary education and introducing students to the world of plants include interactive educational programs, plant growth simulators, augmented reality, smart virtual assistants, and machine learning for personalized education. Given the rapid advancements in AI, broader application in elementary education and other educational levels is expected. Despite promising benefits, challenges and limitations related to AI integration are noted. Additionally, research into the ethical and social consequences of AI integration in elementary education is crucial to ensure responsible and fair use of AI technologies and to avoid over-reliance on virtual environments. Using AI technologies, teachers can create innovative and engaging learning opportunities, enhancing students' scientific understanding and technological competencies. Addressing challenges and ethical considerations related to AI integration, along with advancing empirical research on AI in plant science education, is essential to maximizing AI benefits in elementary education.

48. The necessity of employing innovative biology teaching methods during the COVID-19 pandemic

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The COVID-19 pandemic presented significant challenges in education, forcing many countries to adopt online and remote learning methods. In this context, utilizing modern teaching methods such as dubbed engaging animations and videos can greatly enhance comprehension and improve the learning process. To this end, a group of biology students was assembled to explore their interests in producing educational content. Those with better translation skills were assigned to translation tasks, while those with better voice skills were chosen for dubbing. Videos relevant to curriculum topics were selected, translated, and scientifically edited by faculty members. The scientific and educational group, BioVision, produced approximately 300 videos. Some were provided to the curriculum planning organization, while others were shared on Instagram and Telegram channels. These resources were eventually compiled into educational packages for grades 10, 11, and 12, receiving positive feedback. Given the impact of this educational approach, similar efforts are underway for animations related to university-level biology and basic medical sciences. Multimedia content, including videos and animations, can enrich and make learning more engaging, and by presenting complex concepts in a visual and understandable way increase students' motivation and interest, and provide a better understanding of the subject matter.

49. Critical and Innovative Thinking in Teaching Methods

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Innovation in teaching is a fundamental pillar for improving learning and education. It involves adopting new approaches, using modern technologies, and creating engaging and effective learning environments. These changes not only help increase student motivation but also significantly improve the quality of learning. Recent studies have shown that innovative methods, such as project-based learning and interactive learning, positively impact educational outcomes. Research also indicates that traditional teaching methods are inadequate for addressing student needs. Problem-Based Learning (PBL) is an educational approach where learning occurs through solving real-world problems. In this method, students are involved in practical activities rather than merely learning information. Features of PBL include: focusing on real-world issues to help develop problem-solving skills, encouraging independent research, and finding resources necessary for solving problems. Project-based learning examines students' experiences and their connection with the environment and encourages group activities in 4-5 person groups. Subsequently, questionnaire can be created and quantitative analysis of average scores can be assessed before and after interventions. Innovation in teaching is a necessity for the educational system. Given the continuous changes in society and the job market, the need for innovative teaching methods is increasingly felt. This not only empowers teachers and students in learning but also paves the way for creating a creative generation.

50. The Application of Artificial Intelligence in Biology Teaching

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With the advancement of technology, computer simulation processes have found a wide application in teaching scientific concepts, especially biology. Artificial intelligence, as an advanced technology, is providing a basic and fundamental changes in teaching and learning methods. This technology not only imitates human cognitive processes, but by providing advanced learning tools with continuous improvement capabilities, has become a key driving force in enhancing the quality of science education and learning in different sciences. In this article, an attempt has been made to provide a view of the achievements of this newly emerging technology in improving the teaching and learning methods using the bibliometric methods, and reviewing and analyzing of various sources and researches conducted in the field of artificial intelligence application in teaching of various sciences, especially biology. In the following, the role of artificial intelligence in the quality of teaching and learning and the challenges and opportunities for its advancement have been investigated. The results of the studies show that artificial intelligence with facilities such as interactive simulations, personalized learning, advanced data analysis, automatic assessment, providing instant feedback and virtual coaching, has been able to improve the traditional methods of education. Meanwhile, the role of artificial neural networks that have the ability to simulate the function of different biological systems such as the human brain is more prominent in this field. The review of various sources in this article showed that the combination of artificial intelligence with biology education by using innovative and creative methods, can improve learning, create positive changes in traditional structures of education, and increase flexibility.

51. Evaluation of the Health, Hygiene, and Environmental Protection Course at Farhangian University Based on Constructivist Components and Its Alignment with Human and Environmental Sciences, Health, and Hygiene Courses in Secondary Education

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This study aims to evaluate the Health, Hygiene, and Environmental Protection course at Farhangian University based on constructivist components and its compliance with human and environmental sciences, health, and hygiene courses in secondary education. The present study is applied in terms of purpose, quantitative in terms of approach, and descriptive-correlational in terms of method. The statistical population includes professors at Farhangian University, secondary school teachers in Tehran and some other cities in Iran, and undergraduate students in the biology education program at Farhangian University. Data were collected using researcher-made questionnaires. After ensuring the validity and reliability of the questionnaires, they were distributed among the research population, and the data were analyzed using SPSS24 software at both descriptive and inferential levels. The findings indicate that, according to the professors, the Health, Hygiene, and Environmental Protection course is consistent with the constructivist elements (objectives, content, teaching-learning strategies, and evaluation). However, according to students, this course does not align with constructivist elements. The books "Human and Environmental Sciences" for the 11th grade and "Health and Hygiene" for the 12th grade are consistent with constructivist elements and align with the Health, Hygiene, and Environmental Protection course at Farhangian University according to professors. However, according to students and teachers, these books do not align with constructivist components but align with the Health, Hygiene, and Environmental Protection course.

52. Investigating the amount of bacterial contamination of different levels available with students at Farhangian University of Shahid Hashminejad Mashhad

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Microbial contamination of surfaces in universities can be a source of various diseases and infections. This study aims to investigate the extent of microbial contamination on surfaces frequently touched by students at the university. In this study, 10 surfaces frequently touched by students (e.g., classroom chairs, markers) were selected. Sampling was conducted using the streak plate method on Nutrient agar. Gram staining was used for qualitative and quantitative isolation of bacteria. Initial investigation revealed that based on appearance, 40 different types of colonies were identified, which were ultimately subjected to Gram staining for bacterial isolation. Results showed that Gram-negative cocci made up 46.2%, Gram-positive cocci 38.4%, and Gram-negative bacilli 15.3%, with Gram-negative cocci being the predominant colonies. Measures such as regular disinfection of surfaces and fostering a culture of hygiene in educational environments can help prevent the transmission of infectious diseases. The results of this study can assist in improving hygiene conditions at the university.

53. Review of Barriers and Solutions in Laboratory-Based Biology Education

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One of the main goals in teaching biology is to effectively and optimally utilize laboratory work for deeper, more complete and more practical teaching of the concepts discussed in the textbooks. However, several barriers such as shortcomings in textbooks, lack of laboratory facilities in schools, low practical knowledge of teachers, and insufficient time allocated for laboratory activities have made achieving this goal seem impossible in practice. Seeking help from experts,

providing separate grades for laboratory activities, and revising textbooks or using separate books for laboratory activities could help address these barriers. This article, using a review method and by reviewing various sources and articles, examines the barriers in the proper use of the laboratory for teaching biology and suggests effective solutions for conducting laboratory activities in biology education.

54. The Role of Students in Managing Environmental Risks

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This paper examines the role of students in managing environmental risks. Environmental risks are recognized as one of the main challenges of the present century. This review-based article collects data from scientific documents and articles. The results indicate that environmental risks include climate change, water and air pollution, habitat destruction, and loss of biodiversity. Given the importance of this issue, the involvement of all social strata, including students, in managing these risks is essential. Additionally, students, as the future generation, have a high potential for identifying, assessing, and mitigating environmental risks. Their active participation in environmental activities enhances public awareness, develops problem-solving skills, and fosters a sense of responsibility towards the environment. However, challenges such as lack of resources, inadequate support from schools and relevant institutions, and lack of necessary training in environmental risk management hinder widespread student involvement. Based on the results of this study, recommendations are made to strengthen the role of students, including integrating environmental topics into curricula, organizing workshops, training courses, competitions, environmental festivals, and supporting student ideas in environmental issues. Investing in education and student participation can help create an informed and responsible generation towards the environment.

55. Content analysis of the 11th grade biology textbook based on the six areas of the Fundamental Transformation of Education document

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The main goal of the current research is to analyze the content of the 11th grade biology book based on the six areas of the document of the fundamental transformation in education. It is an applied research with qualitatively oriented content analysis. The research population was the 11th grade biology book and the fundamental transformation document, which due to the nature of the subject was not sampled. According to the research findings; this book does not deal with doctrinal, religious and moral education. The amount of attention paid to other educational fields is 3.3% social and political, 34% biological and physical, 3.3% aesthetic and artistic, 9.8% economic and vocational, 13.1% scientific and technological, and 36.5% is related to other contents. This book deals with the five areas of the fundamental transformation document, the most attention is being paid to the biological and physical areas. In reviewing the book, it seems necessary to pay attention to the doctrinal area because of its importance.

56. The Application of Virtual Reality Headsets in Biology Education

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Virtual reality, as an emerging technology, has revolutionized various fields, including education. Biology instruction has traditionally relied on conventional methods. This article investigates the applications of virtual reality headsets in biology teaching. Employing a systematic review methodology, the authors examined 45 articles from domestic and international databases such as SID, ScienceDirect, Google Scholar, and Scopus, published between 2009 and 2024, and personal experiences to explore the potential of augmented reality in biology education. This technology enables students to engage in interactive and immersive experiences to grasp complex biological concepts. The benefits of virtual reality in biology education are diverse. It allows students to visualize cellular structures, organs, and ecosystems in three dimensions with high detail. Moreover, simulating hazardous and costly experiments, studying anatomy and physiology, and virtual field trips to diverse natural environments are among the significant applications of virtual reality in this field. However, the use of virtual reality in education is not without challenges. The high cost of equipment, technical limitations, the need for teacher training, and potential impacts on health are among these challenges. In conclusion, virtual reality holds immense potential to transform biology education. By developing high-quality educational software, facilitating access to equipment, and teacher training, this technology can be utilized as a powerful tool to create engaging and memorable learning experiences for students.

57. Comparison of effectiveness of flipped classroom training method and traditional method in students' learning in training biology related topics

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In the flipped classroom, the normal way of teaching is reversed, the students learn the lesson in their personal learning space at home and through records, notes, PowerPoint, podcasts and even videos that the teacher has prepared in advance and made available to them. The effectiveness of this method has been described in various studies. The present study was directed with the aim of comparing the effectiveness of the flipped classroom teaching method and the traditional learning process. Matched with the research objective of this quasi-experimental study, there were 58 male and female students in the radiobiology course of Azad University, Medical Sciences Unit of East Azarbaijan region in the academic year of 1400-401 in two classes. Learners were randomly divided into 2 groups of 29 people. One group was educated with the flipped classroom method and the other group was trained with the traditional method during the semester. The amount of learning was measured through an exam and the scores of the two groups were compared by a questionnaire. The results were analyzed using SPSS software, with analytical statistics and t-test. The average score of the test in the experimental group was considerably higher than the control group. The findings of the current study showed that the flipped classroom method had a significant effect in increasing the amount of learning and scores of students compared to the traditional lecture method. These results can potentially be used as a guide for professors and teachers who want to use the flipped classroom method to increase their students learning outcomes.

58. Effects of utilizing technology and artificial intelligence on biology education

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In recent decades, significant advancements in technology and artificial intelligence have provided new tools and opportunities for improving educational processes. Biology education, as a foundational discipline, requires continuous updating and development to keep pace with scientific and technological progress. The aim of this research is to assess the impact of technologies on enhancing student's understanding, improving teaching methods, and elevating the quality of biology education. Specifically, this study will examine aspects such as increased student interaction with educational content, the potential for personalizing the learning process, and the use of advanced simulations and modeling in biology education. The research methodology in this paper is review-based, with the author seeking to identify and analyze changes and improvements resulting from the use of technology and artificial intelligence systems in the learning and teaching processes of biology, through a thorough examination of numerous sources and personal experiences. Accordingly, the use of technology and artificial intelligence can lead to significant improvements in the learning and teaching of biology; however, it requires precise management and appropriate training. Intelligent use of these technologies can contribute to better and more efficient development of biology education, preparing a new generation of students to face future scientific and technological challenges.

59. Examining the Effectiveness of Team Teaching versus Active Teaching Methods on Eleventh Grade Students' Biology Learning

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Traditional teaching methods have adversely affected social growth, academic progress, and psychological well-being of students in Iran. Active teaching methods involve both teachers and learners working effectively to facilitate optimal teaching and learning through interactive communication. Team teaching methods are derived from pedagogical approaches. This article examines the effectiveness of team teaching (team members) versus inductive teaching (a type of active teaching) through an experimental approach. The study utilized an equivalent groups experimental design with a post-test, involving 30 eleventh-grade students from the Ansarifard Girls' High School in Sabzevar, randomly divided into two groups. One group was taught the fourth chapter on chemical regulation using team teaching, while the other group received the same content using active teaching methods. At the end of the fourth session, a post-test was administered to both groups, and the average scores were compared using descriptive and inferential statistics (t-test). The results showed that the scores of the group taught by team teaching method are significantly better ($P < 0.05$) than the group taught by active teaching method. Based on these results, it is recommended that biology teachers use diverse team teaching methods in their classes and that education departments include team teaching training in their professional development programs.

60. Facilitating Biology Education: A Case Study of Avian Digestion Using Chicken Dissection

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Biology is one of the branches of experimental sciences and learning this science is based on observation and experiment. The dissection of living things and the close examination of their constituent structures is still used as a very old but effective teaching method, and because there's no need for high-cost devices and equipment, as well as the tremendous effect on increasing

motivation and interest of students, and deepening learning and making the contents of the book tangible to them, many teachers use dissection as an effective teaching method. It is also considered as a kind of motivating and attractive educational entertainment for students. According to the many years of experience I had in teaching the digestive system of animals, after prior coordination and following the health tips, including wearing laboratory clothes and latex gloves, I dissected the domestic chicken with my students, seeing the different parts of the bird's digestive system and the participation of the students themselves in doing the dissection caused indescribable enthusiasm and excitement in them. It is worth mentioning that in the meetings I have had with the students' parents, I have always received positive feedback and appreciation for doing dissection. Presenting how to dissect a chicken and transferring this many years of educational experience can be useful for biology teachers, especially new teachers.

61. Examining the Brain's Ability to Learn and the Duration Words Persist in Memory Based on Consonants and Vowels

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The auditory cortex is the crucial region for transforming auditory input signals into discrete mental representations, and it is our center of analysis. Understanding spoken language is one of the most fascinating functions of the human brain. What is important is how the brain processes and differentiates between consonants and vowels in words and its ability to learn and remember them. This study investigates the brain's capacity to learn and memorize words at different ages. The sample included a large number of individuals across various age groups from elementary students to college students in Izheh County in 2023. A purposive sampling method was used, selecting approximately 80 participants randomly from among students and college students in Izheh, who were categorized into four age groups of 20 people each: one group of elementary students, one group of middle school students, one group of high school students, and one group of college students and educators. The data collection tools included the Nejati Cognitive Abilities Questionnaire (2013), the Sunderland and Colleagues' Everyday Memory Questionnaire (1983), and a researcher-made questionnaire. The data obtained were analyzed using SPSS software version 26. Repeated measures ANOVA and Bonferroni post-hoc tests were performed. Results indicated significant differences between short and long syllables, and between long syllables with extended sounds and the retention of words in memory. The duration of word retention depends not only on consonants and vowels but also on the phonetics of the words.

62. Investigating the Effectiveness of Multimedia Instruction in Improving Students' Attitudes Toward Learning Biology

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In today's rapidly advancing information technology world, using modern teaching methods has become a major concern for educational systems. One such method is multimedia instruction, which enriches and makes the learning experience more engaging by integrating various elements such as text, images, sound, and video. Previous studies have shown that multimedia instruction, by engaging multiple senses, especially vision and hearing, enhances students' understanding of complex concepts. However, despite the numerous benefits of multimedia instruction, there has been limited research specifically examining its impact on students' attitudes toward learning biology. This review study concluded that multimedia instruction used in teaching biology in secondary schools leads to improved attitudes towards learning. Students exposed to multimedia

instruction achieved better results compared to students who were exposed to traditional teaching methods. If multimedia instruction is combined with traditional methods, it will increase sensory involvement (75% vision and 13% hearing) in learning, improve students' understanding, and enhance classroom management by teachers. Multimedia instruction is an interesting and creative method that increases learning and positive attitudes compared to traditional methods. Therefore, it is recommended to use multimedia instruction in teaching biology to improve students' attitudes and learning.

63. Comparison of the Impact of Using AI-Based Games with Traditional Evaluation Methods on Student Performance

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Given the rapid advancements in educational technologies, the use of artificial intelligence as a novel tool in the learning process has gained significant importance. The integration of educational games into biology teaching has emerged as a significant pedagogical strategy to enhance learning outcomes and student engagement. Research has demonstrated that educational games can positively impact the teaching and learning of biology, offering an effective alternative to traditional teaching methods. This study investigates and compares the impact of using AI-based games versus traditional methods of questioning and examination on students' academic performance, motivation, and satisfaction. The sample population of this study included 60 tenth-grade female students from a secondary school in Tehran, randomly divided into two groups of 30. The experimental group was taught using AI-based games, while the control group was taught using traditional methods. Data were collected through pre-tests, post-tests, and satisfaction questionnaires, and analyzed using ANOVA and descriptive analysis. The results showed that students in the experimental group scored higher and had greater satisfaction with the learning process. These findings suggest that using AI-based games can significantly improve students' academic performance and motivation. This study recommends that teachers and educational policymakers utilize modern technologies like AI-based games to enhance the quality of education.

64. Examining the Impact of Animation in Biology Education

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Traditional methods of teaching biology are highly valued but sometimes are less effective in advancing biological knowledge. Educators often face challenges in teaching biological processes using only two-dimensional tools, which generally lack depth. Animation, as an advanced educational tool, improves students' visualization skills and reduces visualization problems related to fundamental biology concepts. This approach should be employed to enable students to learn through understanding rather than rote memorization. Studies from various countries have shown that students who use animations in biology learning perform significantly better in follow-up tests than those who do not. This research collected information from educational resources, articles, and books to assess the educational impact of animations. Personal experience with animation in creating engaging and effective learning environments further supports that this method not only enhances deep learning but also increases interest and reduces fatigue. Therefore, incorporating animation alongside other methods significantly improves the quality of students' learning.

65. A review of the importance and use of multimedia in teaching biology

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Traditional teaching methods in biology education have become inadequate over time, creating a constant need for innovation to revitalize the teaching-learning process. Multimedia has gained a place in educational settings by addressing the shortcomings of conventional methods; however, there is still insufficient use of this technology in biology classrooms. This article aims to present comprehensive information about the importance of incorporating multimedia elements in biology education to motivate the development of technological classes within society's educational context. This review was conducted using library resources and databases such as Google Scholar, SID, and ResearchGate, employing keywords like "education," "biology education," and "multimedia." The findings indicate that the multi-sensory nature of multimedia complements the theoretical and visual aspects of biology, engaging all five senses, enhancing students' perception, and improving their attitudes toward learning while supporting active learning approaches. The success of this innovative method depends on teachers' skills in utilizing various multimedia types and their understanding of their advantages and disadvantages. Video films that enhance learners' analytical memory and interactive learning software are two powerful multimedia tools in biology education. It is hoped that with improved infrastructure, teacher training, and the development of standard educational multimedia, no classroom will be without this valuable technology in the near future.

66. The life table of living things and its role in teaching biology: a description of the systematic system of the world of living things

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Despite the fact that we live in the era of modern biology and for several decades scientists in this field have developed advanced technologies such as gene cloning, PCR and CRISPER, however, in elementary and secondary schools, we are forced to use the basic concepts of biology, which are included in the field of traditional biology; like the scientific classification of living things. In this article, I intend to examine the importance of teaching the classification of living things on the learning of biology in the educational system, and by presenting a new model of the general introduction of living things called Life Table, I will answer some important questions: For the introductory teaching of general biology in high school, is there a need to be familiar with the general characteristics and main groups of living things? What is the necessity of this work? How can high school students be introduced to the main groups of living things efficiently? What is the effect of this process in learning different topics of biology? To investigate the importance of this issue, the necessary information was collected and analyzed while examining the textbooks of experimental science and biology books and examining the topics of biology education in primary and secondary schools. The results show that the lack of teaching the classification of living things in the educational system has made understanding the relationships between groups of living things and the gradual changes and order in nature very difficult and complicated. Therefore, it is hoped that while revising the textbooks, essential concepts will be taken into consideration.

67. Artificial Intelligence in Education: Applications, Benefits, and Challenges

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Artificial intelligence (AI) as an emerging field is rapidly advancing and making its way into our daily lives, influencing and being utilized in various aspects. This has led to a transformation in our learning processes. The objective of this research is to examine the applications, benefits, and challenges associated with the use of artificial intelligence in education. The findings of this research indicate that educators can leverage various AI tools for more effective presentations. For example, they can quickly create diverse PowerPoint presentations using AI tools, leading to time savings. However, there are foundational issues in the implementation and utilization of AI, including problems like filtering, limited access of all students to intelligent systems, and the crucial issue of preserving individuals' privacy. The latter is a significant and sensitive topic that instills fear in individuals when using AI tools. The use of artificial intelligence in education has many potentials that can lead to the improvement of learning and educational processes. However, in order to take full advantage of these potentials, it is necessary to pay attention to the existing challenges and provide suitable solutions for them. It is hoped that with the advancement of technology and its intelligent use, education will become one of the most effective and efficient parts of society.

68. Analyzing the Alignment of the Photorespiration Topic in the Twelfth Grade Biology Curriculum with Reliable Scientific Sources

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The fixation of carbon dioxide and the production of organic materials by autotrophic organisms are vital for life on Earth, as they provide the organic substances required by heterotrophic organisms. Several methods for carbon dioxide fixation have been identified, with the Calvin cycle being the most significant and widely used. The key enzyme in the Calvin cycle is Rubisco, which has both carboxylase and oxygenase activities. The carboxylase activity initiates the Calvin cycle, whereas the oxygenase activity of Rubisco leads to the onset of photorespiration reactions, which in most plants results in a 20% to 50% reduction in photosynthesis. The sixth chapter of the Twelfth Grade Biology textbook discusses photorespiration. This study aims to examine the compliance of the photorespiration topic in the twelfth-grade textbook with reliable academic sources and recent scientific articles and address some ambiguities in the textbook. The findings indicate that the textbook content is not scientifically accurate; as in photorespiration reactions, two two-carbon molecules combine to release one molecule of CO₂ and produce one three -carbon molecule, which is converted to phosphoglycerate in peroxisomes and chloroplasts and then enters the Calvin cycle. Therefore, considering these results, it is necessary to present the lessons correctly and scientifically while simplifying them for better student understanding, and to use appropriate diagrams in this section of the textbook.

69. An investigation into the impact of an innovative integrated approach (Gamification and Project-Based Learning) on increasing biology learning motivation and reducing exam anxiety in boy high school students

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Gamification, a tool for presenting educational content in an engaging manner, that if be combined with project-based learning by deep learning creation, enabling high school students to achieve create of Bloom's cognitive taxonomy. Advantage of these approaches promote active learning skills. This research was conducted by both documentary and field methods. To this end, 30 boy 8th grade students, in 6 working-study months for active learning of nervous system topic in the form of an innovative project designed and produced an interactive science board game based on textbooks and the curriculum with an environmental approach. To evaluate the learners, before and after the implementation of the project, questionnaires were used to measure the attractiveness of learning and exam anxiety. The Kolmogorov-Smirnov test was used to check the normality of the data distribution and the t-test was used to compare them. The results showed that the project significantly increased the attractiveness of learning and reduced exam anxiety. The minimum significance level of difference between the data was considered ($p < 0.05$). Based on the research results, this approach: 1) is highly suitable for the implementation of attractive blended learning, and 2) covers initial, formative and summative assessments in the form of fun science-cognitive tests with the aim of reducing anxiety. It seems that project-based gamification, as an educational-training tool, has the capacity to cultivate all-round students according to different time and place conditions.

70. The effect of pantomime game in teaching concepts and words of genetics

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The purpose of this study is to facilitate the learning of genetics concepts of the 11th biology book and to consolidate its words in the minds of students, with the help of pantomime game. The present research method was quasi-experimental with a pre-test-post-test design with a control group. The statistical population of the research was the female students of the 11th experimental grade of Isfahan city; In this way, 60 students were selected by available sampling method and were homogeneously divided into two control and experimental groups in terms of grade point average and biology grade. The curriculum of the experimental group included teaching with the help of pantomime game to teach the subject of genetics for 4 weeks and 4 hours each week. While the training of the control group during this period was only in the traditional way. The students of both groups, before the beginning and after the end of the course, responded to the pre-test and post-test created by the researcher, whose content validity and reliability were confirmed. The obtained data were analyzed with t-test and a significant increase in the average scores of the experimental group compared to the control group was determined ($p < 0.05$). According to the result, it was shown that the pantomime game can be suggested to facilitate the learning of genetics concepts and fix its words in the students' minds.

71. Designing Mathematics Instruction for Biology Education Students at Shahid Sharafat University

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This research investigates the impact of modeling instruction on students' experiences with various mathematics problems (modeling and knowledge enhancement), goal orientation (mastery approach, performance approach, curriculum development), and identification of their challenges in solving modeling problems. The research method was descriptive-analytical and semi-experimental. The study involved 58 students from the 2022 intake of biology education at Shahid Sharafat University. The intervention involved applying mathematical models to geological problems. The findings indicate that the educational intervention had a significant impact on students' experiences with knowledge enhancement, their performance on analytical and modeling problems, while curriculum development goal orientation was not directly affected. Additionally, analysis of student responses revealed difficulties in understanding real-world situations, simplifying, and structuring information extracted from given contexts. The results suggest that students' problems in solving modeling problems stem from weaknesses in their metacognitive abilities, which have enhanced their ability to analyze quantitative and experimental data in biology. Moreover, creating conditions that foster flow experiences is crucial to increasing students' motivation for learning mathematics, particularly modeling problems. This research highlights the need for improved quantitative skills beyond first-year mathematics courses for biology education students.

72. Content Analysis of Plant Sections (Chapters 6 and 7) in the Tenth Grade Biology Textbook (Ninth Edition 2024) Based on William Romy's Active and Passive Categories

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Textbooks, due to their significant role in shaping educational policies, are a focal point for many education professionals. The ideal content of textbooks can challenge students intellectually and liberate them from cognitive and mental rigidity. Accordingly, a content analysis of chapters 6 and 7 of the 2024 Tenth Grade Biology textbook, focusing on plants, was conducted using Romy's method. The study population included the text, images, and activities. A random sample of 221 text sentences (15 consecutive sentences on 15 pages) and 20 images was selected. The results showed that the engagement coefficients of the text and images were 0.099 and 0.9, respectively, and the activity-oriented index of the book was 0.4. The findings indicate that the activities and images in the plant sections of the 2024 Tenth Grade Biology textbook are active and dynamic, but the text does not challenge students adequately and requires revision.

73. The Effect of Artificial Intelligence in Biology Teaching- Learning Process

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Artificial Intelligence in Education (AIED) refers to the machine intelligence technology in the advancement of the education field, encompassing teaching, learning, evaluation, and management. Given the current global development trend, traditional teaching approaches are unable to meet educational requirements, and modern teaching methods must be employed for effective and efficient education. The significance of this subject in understanding of biological phenomena in biology is remarkable. The present review research aimed to investigate the effect of artificial intelligence (AI) in biology education, using descriptive- analytical, and library methods. Therefore, relevant literatures and electronic tools in biology education were examined,

especially regarding Augmented Reality (AR) and Technology Enabled Active Learning (TEAL). The results show that the integration of artificial intelligence technology and education has a significant transformative potential. It provides teachers with the opportunity to identify and address learning gaps, foster innovation, enhance the quality of instruction, enable intelligent evaluation, reduce discrimination, and design tests, etc. Furthermore, it has a significant impact on enhancing students' learning through personalized learning, facilitating concept comprehension, promoting collaborative learning, fostering motivation and creativity, and providing better access to education, etc. Despite the importance and benefits of AIED, we are also faced with concerns about data privacy and security, technical problems and internet speed, initial investment cost, and lack of emotional intelligence (EQ). At a result, the best approach in the field of biology education is suggested to be a combination of artificial intelligence and teacher instruction, which together can provide a more effective education.

74. "VR" and "AR" a new innovation in biology education

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The purpose of this review research is to use new educational methods in biology teaching. Biological science is one of the broadest and most attractive fields of experimental sciences, and with its special charm, it calls students to it. In the teaching of biological science, the better the learner can make a connection between the material and his experiences, the better he understands the lesson. But the main problem of biology is that many of the topics are not objective and tangible and a correct image of the topics is not created in the student's mind. By using augmented reality and virtual reality technologies, complex concepts in biology can be made more tangible and understandable, and learning efficiency can be increased in topics such as genetics, photosynthesis, cellular respiration, and cell division. Augmented reality and virtual reality technologies are new teaching-learning models that meet the needs of 21st century learners. In this article, a systematic review has been done on researches in the field of virtual reality and augmented reality applications. In the research process, the keywords "virtual reality", "augmented reality", "biology education" and "technological education" were used in PubMed, Google Scholar, Scopus databases. The results of the research in terms of the application of these technologies in the field of education and learning are of great importance because these technologies solve the existing problems in biology, including the unavailability of resources and the intangibility of topics, and by creating excitement and entertainment, motivation and efficiency. They increase students' learning.

75. Narrative on the Impact of Research on Students' Motivation in Biology

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Developing a research culture in schools is a critical area of focus. Research activities provide optimal learning conditions and teach students not only how to think and learn but also enhance collaborative and cooperative spirit among them. The research method used is based on self-narration of lived experiences and is qualitative. The aim of this study is to examine students' familiarity with research and its impact on their motivation and enthusiasm for learning biology. The study sample consists of 64 eleventh-grade experimental students from one of the Shahid high schools in Isfahan Province for the academic year 2023-2024. Results indicate that a research-based science teaching method can help teachers in fostering a research-oriented and flexible mindset while striving to teach the thinking process to learners. Teaching research to students not

only engages them in the learning process but also reduces stress from the heavy content of biology and makes students more enthusiastic about learning the subject.

76. Investigating the effect of conducting experiments on the effective learning of plant biology in the tenth grade

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Biology laboratories play a vital role in the education and learning of students. This article examines the effect of conducting experiments on the effective learning of plant biology concepts in the 10th grade experimental biology book. The purpose of this study is to analyze the importance and benefits of using practical laboratories in improving the understanding of plant biology concepts and increasing students' practical skills and critical thinking. The method of this research is to review previous articles and studies in this field. Findings show that working in the laboratory enhances students' understanding of complex concepts, increases motivation and interest in biology topics, and develops critical thinking and problem-solving skills. It also improves students' cooperation and teamwork skills. The conclusion of this article shows that biology laboratories as an effective educational tool have a significant impact on improving the quality of biology education. As the book's authoring has focused on laboratory activities in this chapter, therefore, it is suggested that more up-to-date laboratory equipment and training courses be organized for teachers in order to use this teaching method in the best way.

77. Review and analysis of the biology content of the book 12th grade Salamat v Behdasht

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An article in the leading analysis of the biology content of the Salamat v Behdasht book. Choosing this topic is important because the book, it is a student of the 12th grade of theoretical, technical and vocational fields. The theoretical framework that governs the book is according to the national curriculum and in compiling the contents biology of the book is focused on the 5th and 9th areas of the national curriculum. Due to teaching this book is a prerequisite for all majors, most non-experienced students the biological contents of the book do not have knowledge. Based on VARK's learning style, book contents and more pictures on the style the visual and to some extent the listening style is focused. In compiling the content of the book. A lesson based on the three areas of educational goals in "Bloom" most of the pictures in the book It conveys the content well and some images have meaning in addition to conveying hypertext is good and increases thinking in learners. It is suggested to add the necessary prerequisites in the new edition, including the method of impact Vaccines in immunity, supplementary material in the form of "learn more" and some images be considered richer.

78. Structural Modeling to Facilitate the Understanding of Plant Tissues in Biology Education

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Teaching complex biology concepts, such as the structure and function of plant ground tissue systems, can be challenging due to the abstract nature of these ideas. Utilizing creative teaching methods can help make these concepts more accessible. This article explores the effectiveness of using urban analogies to teach the cells of parenchyma, collenchyma, and sclerenchyma tissues. In this approach, parenchyma cells are compared to the "ordinary citizens of the city," collenchyma cells to the "guards," and sclerenchyma cells to the "city walls." These analogies were integrated into classroom activities, including role-playing games and visual models, to present the concepts in a more tangible and understandable way. The use of these analogies resulted in increased student

engagement and motivation, as well as a deeper comprehension of the concepts. Students were able to clearly identify the different roles of the cells and establish better connections with the material. This teaching method, by creating relatable and engaging connections, can significantly enhance the learning of complex biology concepts. It is recommended that teachers apply similar strategies to other challenging topics and evaluate the results in diverse educational settings.

79. Skill –Oriented Process Teaching Method Effective in Learning of Biology 3

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The purpose of this research was to create effective learning and improve the level of learning in biology 3 for one of the experimental 12th grade students. This research was based on strengthening the motivation and teaching a skill-oriented process in the 3rd biology. Due to this student's special skills in drawing and painting and because of her poor grades in Biology 1 and 2 in the 10th and 11th grades, at the beginning of the academic year, when she entered the 12th grade, she was asked during the academic year, she illustrated and named the shapes of the 12th grade biology book in a drawing book. At the end of the year, checked grades of this student and it was observed that her class grades and the semi-final and final grade of biology 3 compared to the class and final grades in the past years, lessons 1 and 2, she has had a significant increase in biology3 which showed her effective learning in biology lesson 3. Therefore, it can be concluded that the use of types modern teaching methods of biology, especially the use of individual skills of students in teaching biology, can make their talent flourish and strengthen their effective learning in this course.

80. Evaluating the Effectiveness of Teaching with the Drawing Method in Biology Education in Savadkuh County

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Teachers and curriculum developers are familiar with the meaning and nature of the term "teaching." Various teacher interpretations of teaching can impact their attitude towards students and their approach to working with them. Key issues include foundational knowledge deficiencies and differences in translating and interpreting educational perspectives. Sometimes, confusion about educational concepts leads to misconceptions among educators and students about concepts like cultivation, education, teaching, and vocational training. This paper addresses different teaching models in biology to help teachers and researchers utilize these methods. The research method involves teaching biology in Savadkuh County through both field and library methods. The aim of this paper is to offer suitable teaching methods for this foundational subject. Teachers need to identify educational goals and acquire the necessary skills for teaching to utilize the best methods and resources available in their region. Hence, examining the state of biology education in each province is essential.

81. Modern Methods in Biology Education: From Traditional Classes to Active Learning

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Biology education encompasses a range of methods and approaches designed to enhance student understanding and engagement. Recent research has examined traditional lecture-based methods and innovative, student-centered approaches to determine the most effective biology teaching strategies at various educational levels. Biology education benefits from interactive processes that use visual aids and models to understand complex concepts. Despite efforts to implement innovative methods, traditional lecture-based methods remain common due to their familiarity and ease of execution. There is an increasing emphasis on active learning strategies, such as inquiry-

based and collaborative learning, which have been shown to improve student engagement and learning outcomes. Even with active learning strategies, many educators revert to authoritative discussions, focusing on fact recall rather than shared knowledge. Enhancing scientific literacy, especially biological literacy, is crucial for preparing students to make informed decisions as active citizens. This requires curricula that integrate diverse learning resources and modern teaching methods. Effective biology teaching should encompass theoretical frameworks and historical contexts to help students understand and apply biological concepts. Practical strategies, such as laboratory work, field studies, and digital content, are essential for making biology education more engaging and effective. Consequently, biology education is evolving towards interactive and student-centered approaches. Despite existing challenges, innovative methods promise improvements in biology education across all levels.

82. Designing Collective and Collaborative Activities for Teaching Environmental Basics in the Biology and Environmental Health Textbook

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Environmental education becomes meaningful when the knowledge acquired by learners is applied in their daily lives and the skills gained are used to address environmental issues. Teachers often use traditional, teacher-centered methods to teach this subject. This paper proposes a novel approach that shifts biology teaching from a rigid, classroom-based framework to an active, school-based instruction. Specific areas within the school were chosen to implement pre-set goals. Through collective student collaboration and active participation, the following outcomes were achieved: increased student engagement in identifying patterns and relationships related to nature, enhanced understanding of the material through tangible activities, active student involvement and acquisition of new experiences, and increased trust between students and the teacher. Only those who appreciate the natural environment will be diligent in its preservation. Thus, out-of-class and real-life experiences clarify this fact, and direct interaction between students and teachers with their surroundings makes the learning process more practical, engaging, and meaningful.

83. The study of biology lesson assessment methods with emphasis on combined evaluation methods and practical, research and working group activities in Tabas High School.

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Evaluation is one of the important aspects of lesson planning and a part of the teaching-learning process that determines the success rate of students in achieving educational goals. In designing new measurement and evaluation methods, attention should be paid to the individual characteristics, interests and habits of the student. Due to the importance of evaluation and implementation of educational justice, it is necessary to use various evaluation methods. Therefore, the purpose of this research is to investigate the methods of assessment of biology lesson with emphasis on combined evaluation methods and practical, research and work group activities in the tenth grade of Farzangan High School in Tabas city, which includes the investigation of tools and techniques that are used to evaluate learning and performance. Students are employed. These methods can help teachers gain a deeper understanding of students' knowledge and skills in biology. Due to the importance and high impact of the biology course in academic records, in addition to full-scale teaching, in addition to online simultaneous and asynchronous virtual evaluation and face-to-face evaluation, for research and practical activities in the form of associations and scientific research festivals and conducting A separate score was considered for the work group in the preparation of biological structures. The results showed that in addition to the actual evaluation score, it made the students familiar with the benefits of research and

teamwork and deep and sustainable learning of biological science. As a result, the culture of research and teamwork can be institutionalized in students.

84. The effect of the color of biology pictures on the learning rate of students

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The use of colors in educational plays an important role in creating different emotional reactions and attracting students' attention. The purpose of this study was to investigate the effect of the color of biology books on students' learning. In this research, from 24 articles indexed in the databases Internal and external information was used. The findings of the research showed that the red color in the pictures, due to the emotional spirit, makes the students out of the calm state and makes them lively and prevents them from concentrating. The yellow color in the images symbolizes the speed of thinking and decision-making and increases concentration. Orange is a stimulating, lively, invigorating, warm and relaxing color, so it prevents students from being sleepy and disinterested, especially in the early hours of the morning. Blue color has a cold and official quality. Therefore, it is better to use this color in combination with other colors in educational books and classes. In the design of the educational space, he combined purple with white, green and lilac colors. The color green can create a perfect balance within the psychological structure of students and is the most pleasant of all colors, because the eye does not need to adjust the retina to focus on it. Therefore, it is suggested to the authors and teachers of biology books to be very careful in choosing the type of color and observing the proportion between them in the pictures of the books to improve the learning of the students.

85. A Review of the Impact of Active Compounds from Saffron, Cardamom, and Lavender in Niosomes on Pain and Inflammation

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Today, analgesics are commonly used to relieve pain and inflammation. However, some people experience problems such as improper drug delivery to target areas and allergic reactions with chemical medications. Typically, pain arises from the activation of nociceptors (pain receptor cells) in the peripheral receptor system or from damage to the central nervous system. Inflammation is a localized response of the body to injuries such as abrasions, cuts, burns, and other tissue damage. Niosomes have garnered interest as carriers for targeted drug delivery in modern medicine because they can encapsulate a large amount of material in a relatively small volume compared to other vesicles. Additionally, niosomes improve drug stability and pharmacokinetics, enhancing therapeutic effects and reducing side effects. Based on existing studies, this paper suggests isolating anti-inflammatory and analgesic compounds from the medicinal plants Saffron (*Crocus sativus*), Cardamom (*Elettaria cardamomum*), and Lavender (*Lavandula angustifolia*) to create an optimized niosome formulation. This niosome-based analgesic, rooted in green chemistry principles, aims to minimize side effects compared to currently available chemical analgesics. This project has been conducted using a library-based method, utilizing reputable articles and websites.

86. Investigating the effectiveness of environmental stimuli on the lung health of sensitive groups

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The title of the present study is to investigate the effectiveness of environmental stimuli on the lung health of sensitive groups. Nowadays, due to the increase in air pollution, the number of smokers and also the desire to keep birds at home, the incidence of respiratory problems is increasing. For this purpose, in this study, the effect of air pollution, environmental tobacco smoke, and the presence of pet birds in the house on the occurrence of allergies and asthma on sensitive groups, especially children and pregnant women, was comprehensively investigated. Considering that the research topic is investigating the effectiveness of stimulants on the lung health of sensitive groups and the type of research is descriptive and review, in this article, the library method was used to collect information. More than 270 samples were obtained from Iranian and foreign databases based on keywords. In separating the articles according to the title, 98 articles were found and then in the screening based on the abstract related to the objectives of the current research, 47 articles were found. Finally, by quickly reading the full text of the sources, 23 cases remained, which are the basis of the upcoming research. Due to the importance of the increasing impact of air pollution and cigarette smoke on sensitive groups, especially pregnant women and children, studies on determining air pollution indicators, how to detect their impact on lung health, especially in asthma, the performance of the respiratory system in dealing with pollutants, the role of the health system and its organs in the society have taken place in the face of the polluted air we breathe. In the end, it can be said that environmental stimuli can play an important role in human health, especially in sensitive groups, in the occurrence and exacerbation of respiratory diseases, including asthma, which is one of the most common. In the meantime, the health system plays a very prominent role in detecting and controlling air polluting sources and timely notification of air pollution and necessary warnings to prevent damage caused by it.

87. Diatom assemblages in coral reef ecosystems: A comparative study of Oil-Polluted (Kharg) and Pristine (Khargoo) Locations

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Understanding the impact of environmental stressors on diatom communities in coral reef ecosystems is crucial for assessing ecosystem health. This study surveys the diatom communities within the coral reef ecosystem across both an oil-polluted and a pristine location. A total of 86 diatom taxa belonging to 32 genera were identified. Among these, the most abundant benthic diatom species were *Amphora coffeaeformis* (9%), *Amphora borealis kutzing* (6%), and *Nitzschia distans* (5%). The analysis revealed no significant difference in diatom species richness between the oil-polluted and pristine locations. However, significant differences were observed when comparing different substrates: dead corals harbored the most diverse diatom species compared to live corals and coral rubbles. This finding underscores the varying microhabitats provided by different coral states, highlighting the complex dynamics of diatom community structure in coral reef ecosystems. Further investigation is warranted to understand the implications of substrate type on diatom diversity in oil-polluted environments.

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