ABSTRACTS

43rd

PAKISTAN CONGRESS OF ZOOLOGY

(International)

JUNE 23-25, 2025

AT

DEPARTMENT OF ZOOLOGY

UNIVERSITY OF OKARA, OKARA

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ABSTRACTS

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PLENARY LECTURES

PLENARY LECTURE-1

GLYMPHATIC DYSFUNCTION IN TRAUMATIC BRAIN INJURY: IMPLICATIONS FOR THERAPEUTIC STRATEGIES

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Traumatic brain injury (TBI) emerges as a devastating neurological disorder among healthy adults in the modern age. Variability in injury severity, affected brain regions, and co-morbid conditions contribute to diverse and unpredictable clinical manifestations and recovery trajectories. Notably, the dynamics of cerebral fluid flow in the aftermath of TBI remain poorly understood. Our findings in a preclinical TBI model reveal a disruption in cerebrospinal fluid (CSF) transport along perivascular spaces, named glymphatic system. This impairment leads to a dysregulated neurochemical environment, characterized by elevated noradrenaline levels, which significantly suppress glymphatic flow. Consequently, acute post-traumatic edema ensues, exacerbating neuronal damage, promoting secondary injury cascades, and contributing to persistent sleep disturbances. Pharmacological blockade of the noradrenergic axis emerges as a promising intervention, effectively mitigating cerebral edema by restoring glymphatic function and normalizing sleep-wake cycles. In sum, this seminar provides critical insights into the intricate pathophysiological interplay between TBI and glymphatic dysfunction, highlighting a novel therapeutic avenue for neuroprotection and targeted intervention strategies.

PLENARY LECTURE-2

VARIATIONS IN AMPHIBIAN POPULATION SIZES IN NORTHEAST ASIA OVER THE LAST MILLENNIA AND IN THE PROXIMATE FUTURE

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Amphibian populations are impacted by fluctuations in habitat quality and availability, and in the case of northeast Asian treefrogs, this translates into rice agricultural landscapes over the last few thousand years. Using genomic data for the four *Dryophytes* treefrog species distributed around the Yellow Sea, we demonstrated how marine transgressions were less important than anthropogenic activities in explaining fluctuations in population sizes for our target species, with species-specific variations linked to the landscape where the species occurs. While powerful, genomic analyses cannot yet resolve population dynamics over the last decades, and using the peak in pesticide use in northeast Asia as a temporal threshold, we examined how human diet preferences and (inter)national trade policies for rice are linked to population dynamics in two of the focal species. Finally, we determined the impact of global warming on the breeding phenology of three of the focal species to understand fluctuations in breeding activities over the last decades. Based on this baseline, we predicted the variations in breeding phenologies in the future, and hypothesised the threshold where global warming will result in the decoupling of breeding phenologies and agricultural practices, resulting in the entire habitat loss for the three *Dryophytes* species restricted to agricultural wetlands.

PLENARY LECTURE-3

STUDIES ON INHERITED SCHIZOPHRENIA IN CONSANGUINEOUS PAKISTANI FAMILIES SUGGEST BOTH MONOGENIC AND POLYGENIC CONTRIBUTORS TO THE DISORDER

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Schizophrenia is the most common psychotic disorder. Psychosis encompasses hallucinations and delusions. Monogenic causes of schizophrenia are seldom described. We designed a study to molecularly characterize schizophrenia in multiple consanguineous families. Structured clinical evaluations of all participants were completed using different psychiatric evaluation tools. Exome sequencing was performed on DNA samples from the patients and their available siblings and parents. The data obtained were filtered using a standard pipeline for an autosomal recessive or an X-linked disorder and only retained variants with frequencies of less than 1% in the public databases. The shortlisted variants were further prioritized based on their predicted deleterious nature as well as the conservation of the affected amino acids or nucleotides in diverse orthologues. Our evaluations confirmed the diagnoses of schizophrenia in patients from nine families and its absence from other participants. Exome sequencing did not identify any putative potentially pathogenic variant for patients in four families. Among the remaining five families, we were able to link missense variants of *RGS3*, *IL1RAPL1*, *USP53*, *INSR* and *NFXL1* with schizophrenia. All the variants were rare in public databases. The missense variants affected absolutely conserved amino acids while the intronic variant was predicted to affect exon splicing. Our findings indicate a need for further evaluation of multiple genes to decipher their roles in schizophrenia. In addition, the lack of genetic findings in four families implicate either a polygenic inheritance model or suggest that a different strategy such as genome sequencing is needed to identify the missing genetic variants.

PLENARY LECTURE-4

HEALTH CHALLENGES OF 21ST CENTURY AND TREATING LIFE-STYLE MEDICINE

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Despite the advancement in the pharmaceutical medicine, disease burden is not curtailed. Over the period of time, there is a progress in reducing mortality due to infectious diseases, but there is increasing global trend of morbidity and mortality due to non-communicable diseases (NCDs) which include hypertension, atherosclerosis, diabetes, Alzheimer's disease, osteoarthritis, low back pain, menstrual disorders, impotence and urinary, respiratory, psychological and stomach disorders along with some forms of cancer. These are mainly the result of sedentary and stressful life in a highly competitive material life, impure and processed foods, eating behaviour and obesity, inability or lack of social support to cope with stress, and use of tobacco products and alcohol. The leading causes of death in high-income and middle-income countries (including Pakistan) in the 21st Century are heart diseases, stroke and Cancer/diabetes. Many obesity-related NCDs are not best cured with pharmaceutical medicines, rather it provides symptomatic relief, requires life-long use of multiple medicines, which are not only expensive but also results in multiple adverse-effects; hence public is now turning back to nature particularly when evidence is emerging in favour of lifestyle medicine. The key components of Lifestyle Medicine include Nutrition, Physical activity, Stress management, Peaceful sleep, social connectivity and abstaining from Harmful substances such as tobacco, alcohol, and even processed and impure food. It is important to clarify that obesity is not merely the overweight rather accumulation of fat on abdomen (central obesity) is the main risk factor, which has a multi-factorial etiology including genetics, metabolic, environmental, eating behavior and lifestyle components; hence it offers a therapeutic challenge which demands coordinated efforts targeting proper nutrition, changes in eating behavior, regular physical activity along with developing skills to relax and peaceful sleep, as there is no pill available to control obesity and related NCDs. It is not only important what you eat but equally important is that how you eat and when you eat. Now there is sufficient scientific evidence that a diet based on natural foods rich in fiber, legumes, complex carbohydrates (cereals), fruits and vegetables, olives, fish along with lifestyle characterized by mental peace and physical activity helps to control obesity and restore health/wellness. Similarly, some knowledge on the value of caloric restriction (fasting) and medicinal value of herbs and foods, such as, ginger, garlic, onion, turmeric, blackseeds, cinnamon, olives, green-tea, Chia seeds, lemon and honey along with some knowledge on the individual variation in responding to different measures helps to maintain good health and restore wellness. At the end, the discourse on Life-style medicine would remain incomplete without mentioning the life style of the Holy Prophet, which includes not only eating/sleeping habits and physical activity, but also social components, such as patience/tolerance, forgiveness and caring nature along with strong spiritual and social connections, all help to ensure mental peace and contribute immensely to wellness and staying healthy.

PLENARY LECTURE-5

GLOBAL ORTHOPTERA TRENDS: OVERCOMING CHALLENGES AND SHAPING THE FUTURE

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Insects play diverse ecological roles as phytophagous organisms, pollinators, predators, parasites, detritivores, and prey for other animals. Additionally, they have been used in medicine, nutrition, and industry throughout human history. Among the principal orders of class Insecta, Orthoptera, a significant insect group comprising approximately 30,198 species globally, plays a crucial role in food webs as a food source for vertebrates and arthropod predators. Their microhabitat preferences are closely linked to vegetation structure, making them useful indicators of ecosystem naturalness, vegetation succession, and microclimatic gradients at fine scales. Some Orthoptera species are considered major agricultural threats due to the significant crop losses they cause. Combatting these pests has led to severe environmental damage and high financial costs due to the extensive use of chemical insecticides, prompting the search for eco-friendly alternatives. According to the IUCN 2024 list, Orthoptera is the fourth most-threatened insect order globally, highlighting the need for further exploration, particularly in undiscovered habitats such as mountain regions. These areas provide valuable opportunities to study species distributions and the factors influencing them. Notably, some Orthoptera species, including *Schistocerca gregaria* (Forskål, 1775), *Oedaleus abruptus* (Thunberg, 1815), and *Calliptamus italicus* (Linnaeus, 1758), have shown an increase in occurrence in previously uninhabited areas. This shift may be due to adaptations to changing environmental conditions or alterations in habitat availability. Furthermore, the extinction risk for certain rare Orthoptera species is concerning. Studies on *Schizodactylus* (Brullé, 1835) in Asia indicate that 9+0–95% of its population is at high risk due to habitat destruction, and without conservation efforts, 40–50% of its population may face extinction. These findings emphasize the need for habitat preservation and sustainable land use to mitigate such risks. Beyond their ecological roles, insects provide proteins, peptides, and biopolymers such as silk, chitin, and chitosan, which have applications in pharmaceuticals and the food industry. The metabolic adaptations of insects make them valuable for biotechnological advancements. In particular, *Schistocerca piceifrons piceifrons* (Walker, 1870) offers industrial potential through chitin and chitosan extraction, which have biocompatible and biodegradable applications in pharmaceuticals and food processing. This highlights the potential for utilizing insect pests as sources of bioactive compounds rather than focusing solely on their eradication. Orthoptera species present promising opportunities for sustainable food production and industrial applications. Their nutritional value can help address food security challenges, while their biochemical properties and associated microbiota provide innovative possibilities in pharmaceuticals, food processing, and biofuel industries. Therefore, fostering a balanced approach that includes conservation, sustainable use, and further research on Orthoptera is essential. The grant received from the Higher Education Commission (HEC), Islamabad, for the Research Project (HEC NRPU No. 14787) is highly appreciated.

PLENARY LECTURE-6

IDENTIFICATION OF DISEASE GENES IN NEURODEVELOPMENTAL DISORDERS

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The identification of canonical pathogenic variants will require the integration of different types of mutations affecting the same genes. Therefore, we plan to find convergent genomic evidence to identify novel ID genes from candidate loci of balanced chromosome translocations and microdeletions/ microduplications in combination with the WES approach. We hypothesize that the positional candidate genes in these loci will have point mutations identified by WES. Our approach complements the gene discovery strategy using sole WES, which has become the norm in medical genetics. The validity of the causative gene will come from the accumulating evidence from each approach that collectively contributes to the identification of novel disease genes. The integration of different types of mutations affecting the same genes will offer a unique and powerful route to gene discovery. An illustrative example of this approach can be seen in the 1p32.3 microdeletion/microduplication syndrome, a contiguous genomic disorder characterized by intellectual disability (ID) and craniofacial anomalies (CFA). In this case, the combination of positional cloning techniques and next-generation sequencing (NGS) helped pinpoint a critical gene, SSBP3. By employing breakpoint mapping of two independent subjects with balanced translocations involving 1p32.3 and comparative mapping of 9 CNVs along with 6 intragenic variants in 8 individuals with matching phenotypes, we provided compelling evidence that the ID and CFA observed in this syndrome are both caused by disruption of the SSBP3 gene. This gene's involvement was further confirmed by functional studies in zebrafish and Drosophila, where knockdown of the respective SSBP3 orthologs led to distinct craniofacial and behavioral phenotypes. This example highlights how integrating positional cloning and NGS in combination can lead to the identification of novel disease genes, exemplifying the power of this approach in deciphering the genetic underpinnings of complex disorders.

PLENARY LECTURE-7

ZOONOTIC INFLUENZA VIRUSES

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Influenza viruses are posing unprecedented and emerging public health concerns due to their biophysical properties and capabilities to jump across multiple animal species (referred as zoonoses). Historically, epidemics and pandemics potential influenza viruses have originated from avian and swine populations particularly subtypes such as H5N1, H7N9, and H1N1, are known for their zoonotic potential, with wild birds serving as natural reservoirs. The evolution of zoonotic influenza viruses is driven by antigenic drift and shift, enabling them to evade host immunity and acquire mutations for human adaptation. Factors such as intensive farming, live animal markets, and global trade contribute to increased human exposure. Certain animal species, including poultry, cattle, swine, and even companion animals, have been implicated in outbreaks. Surveillance and early detection in these animal reservoirs are crucial for mitigating spillover events. Effective control measures include vaccination programs for high-risk animal populations, biosecurity practices in farms, and public health interventions such as culling infected flocks. Additionally, one-health approaches integrating veterinary and human health sectors are essential for monitoring emerging strains. In this lecture, I will be highlighting some of these outstanding and pressing questions that need attentions in the future in safeguarding public health.

PLENARY LECTURE-8

CROSS-KINGDOM COMMUNICATION

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Cross-kingdom communication represents a fascinating frontier in applied biosciences, where organisms from different biological kingdoms, plants, animals, fungi, and microbes exchange molecular signals to coordinate interactions that can be mutualistic, antagonistic, or adaptive. In recent years, advances in biotechnology and molecular signaling have explored how cross-communication is transduced, and NGS has confirmed the presence of the metabolic regions that are responsible for communication. Intriguingly, such interactions often extend to impact kingdom physiology, immunity, and behavior, particularly their interaction. Understanding these complexes signaling networks not only reveals how ecosystems are maintained at the molecular level but also provides novel insights into achieving sustainable development goals. This presentation explores the molecular dialogues that transcend kingdom boundaries, highlighting their ecological relevance and potential applications in biotechnology.

SHORT TALKS

SHORT TALK-1

ADVANCING INSECT IDENTIFICATION: FROM CLASSICAL TAXONOMY TO AI-DRIVEN INNOVATIONS

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Identity of insects has advanced through different scientific eras, from classical morphology-based taxonomy to one executed via digital and molecular techniques. The earliest classification of insects can be found in Historia Animalium by Aristotle (384–322 BC), in which some insect groups were mentioned. In 1758, Carl von Linné gave us hierarchical taxonomy and established the binomial nomenclature, placing all insects into seven orders. Much later, Edward Baker (1878) used exclusive reliance on male genitalia for species identification, a method that remains heavily relied upon to this day. Although these early methods were hampered with bias and poorly designed studies, they laid the groundwork for modern entomology. In 2003, Paul Hebert pioneered DNA barcoding with the introduction of species identification using the cytochrome c oxidase I (COI) gene. In addition to traditional morphology, this genetic tool provides a rapid and standardized method. DNA barcoding has facilitated the discrimination of cryptic species, larvae, and morphologically similar taxa resulting in applications in biodiversity assessment and pest management. Still, there are specific situations in which morphological verification is required. Since then, the Barcode of Life Database (BOLD) has enabled worldwide collaboration on molecular insect taxonomy. Machine learning or artificial intelligence (AI) based recent developments are in the process of revolutionizing the identification of insects. AI-driven digital recognition mechanisms offer automation in species identification that are not only more accurate but also more accessible. Image processing and neural networks can be applied to 3D reconstructions of morphology to allow for quick analyses of insect behavior. Several techniques, including Elliptic Fourier transformation and artificial neural networks, have been utilized to study insect orders Coleoptera, Lepidoptera, Hymenoptera, Diptera, and Orthoptera. Future work will advance public datasets, reduce photographic bias, and optimize deep learning models for more general use. Integrating DNA barcoding, AI, and digital taxonomy will be a major necessity for sustainable research for agriculture, ecology, and history. These technologies streamline the process, enabling quicker and more widespread identification of species. Marrying the expertise of classical taxonomy with digital tools provides a thorough and future-oriented perspective on our understanding of insects.

SHORT TALK -2

THE ORIGIN OF SPECIES BY MEANS OF FORMULAS

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Evolution is an interesting subject attracting not only the biologists and researchers but also the people who take interest in biological sciences. The speaker will give alternative theory to negate both the conservative or religious school and the rational or scientific school rejecting Darwin theory. He exquisitely argues the concept of re-berth, which is part and parcel of some religious communities like Hindus, on scientific basis. The author discusses the missing link in the evolution process as narrated in the Darwin theory. The speaker will discuss key components of evolution theory including variations, natural selection, adaptation, survival for existence and survival of the fittest. Darwin erected and built his whole 'edifice of evolution' on the basis of the theory of population by Thomas Robert Malthus, who was a social scientist. Malthus established the relation between surge in human population and increase in resources. The human population increases geometrically, the resources increase mathematically, according to Malthus. The population increase and scarce resources lead to resource wars and those who survived were the fittest. And here comes Darwin's much known evolutionary dogma, the survival of the fittest. The author claims that while Malthus talked about only the human population, Darwin applied his theory to all living organisms including animals.

SHORT TALK-3

ALIGNMENT OF RESEARCH WITH SDGS CAN HELP THE ACADEMIA OVERCOME ITS UPCOMING CHALLENGES IN PAKISTAN

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Academia in Pakistan has been under a debate for being unable to provide the guiding role in the prosperity of the nation. There have been a number of issues with the academia in Pakistan. The issues with academia encompass isolated and horizontal raw process reporting research that has resulted in shrinkage of employment opportunities among the educated youth of the country. Integration of academia with the society has been debated since long but, still there is no concrete practical role model available in the country. Funding opportunities for higher education sector are continuously squeezing with every passing day. Conventional approach in the academia has been under a serious criticism in policy making circles of the country raising another alert for the academia. Considering these circumstances, we propose an out- of -the- box strategy for the alignment with Sustainable Development Goals (SDGs) which can create a breathing space for academia in the country. All the research and teaching carried out in the higher education sector falls in any (or more) of the 17 SDGs, and aligning the research on SDG framework can revitalize the higher education sector of the country. The alignment with SDGs can address the challenges like funding, employment generation and national development at large. We have been exercising this approach in AJ&K with a significant success and it can also be replicated elsewhere in the country.

SHORT TALK-4

INTRINSICALLY DISORDERED REGION OF CDC14A IS ESSENTIAL FOR HEARING IN HUMAN AND MOUSE

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A large proportion of the proteins or their regions lack a defined 3D structure under physiological conditions, such proteins or regions are termed as intrinsically disordered proteins (IDP) or regions (IDR). Human CDC14A is a 623-residue protein, it comprises of a globular N-terminal catalytic domain and a long intrinsically disordered region (IDR) comprising of 278 amino acids at the C-terminus. Mutations affecting N-terminal globular domain cause hearing impairment infertile male syndrome (HIIMS) while mutation in the IDR cause isolated hearing loss. By biochemical structural and functional studies, we are trying to understand this phenotype-genotype correlations and importance of IDR of CDC14A in hearing.

SECTION - I

CELL BIOLOGY, MOLECULAR BIOLOGY, GENETICS, PHYSIOLOGY, TOXICOLOGY, VIROLOGY

1. **HERBAL MEDICINE, BIOCHEMISTRY, AND BIOTECHNOLOGY**
2. **CELL AND MOLECULAR BIOLOGY, CELL BIOLOGY, GENETICS**
3. **MICROBIOLOGY**
4. **PHYSIOLOGY**
5. **TOXICOLOGY**

1. HERBAL MEDICINE, BIOCHEMISTRY, BIOTECHNOLOGY AND BIOINFORMATICS

CBGP-1
Biotechnology

COMPARISON OF PRODUCTION PERFORMANCE AND EGG QUALITY PARAMETERS OF DOMESTIC HENS FED WITH WHEY, FOOD WASTE AND COMMERCIAL FEED

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The study was based on determining the concomitant effect of whey, food waste and commercial feed on egg quality traits and performance of domestic hens. The whey and food waste were collected from market and different wedding halls, respectively, and their chemical analysis was made in the laboratory. The commercial feed for laying hens was purchased from the market. Forty-eight egg laying hens were kept individually in iron cages at poultry trial unit of University of Veterinary and Animal sciences, Pattoki campus. The birds were divided into four treatment groups namely WhC, KW-15%+Wh, KW-30%+Wh and KW-45%+Wh. There were twelve birds per group with three replicates and four birds per replica. The control group (WhC) was given 100% commercial feed with 5% whey in drinking water. The experimental groups viz. KW-15%+Wh, KW-30%+Wh and KW-45%+Wh were given 15%, 30% and 45% kitchen waste food and 5% whey in drinking water respectively. Eggs were collected daily and their physical traits were analyzed weekly. The egg length, width, surface area, volume, shell strength, shell weight, shell thickness, albumin height, albumin weight, albumin ratio, yolk height, yolk diameter, yolk index, yolk ratio, haught unit and yolk color values were non-significant for all the treatment groups at $p \leq 0.05$. The values of egg weight, shell ratio, albumin diameter, albumin index and egg production rate were significantly higher in KW-30%+Wh as compared to other groups at $p \leq 0.05$. The WhC group showed significant values of yolk weight, feed intake and egg mass at $p \leq 0.05$. The significantly higher shape index and lower feed conversion values were shown by KW-15%+Wh ($p \leq 0.05$). The study revealed that concomitant use of whey, food waste and commercial feed in diet of laying hens can improve their egg quality traits and production performance. It may be helpful in minimizing the use of commercial feed, leading to resolve economic issues of poultry feed as well as environmental problems due to dairy and kitchen wastes. Production of poultry proteins may also be enhanced to fulfill needs of poor masses.

CBGP-2
Biotechnology

LAB-SCALE TREATMENT OF PHARMACEUTICALS VIA UV-OXIDATION AND OZONATION

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This work targeted at testing and optimization of ozonation and oxidation with ultraviolet light, of pharmaceuticals, on lab scales alternative to conventional wastewater treatment technologies. Ozone performed with higher efficiency though the difference was statistically insignificant. UV intensity and ozone dose had weak to moderate, while exposure time had moderate to strong positive correlation with the removal efficiency of all the tested drugs. 32W UV intensity and 8g/h of ozone dose were determined as optimum. It took ozone 5, 10 and 120 minutes to completely degrade 100ppm lab-prepared amoxycillin, promethazine and diclofenac sodium, while it took UV 30min to completely degrade amoxycillin and promethazine while <60% diclofenac sodium degradation was achieved with UV in even 2hr of exposure.

CBGP-3
Biotechnology

PREPARATION OF GLUCOSE SYRUP BY BACTERIA AMYLASE FROM POTATO PEELS

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This work explores the possibility of producing glucose syrup by using amylase bacteria (*Baciluus subtilis*) that are isolated from potato peels. As a byproduct of the potato processing industry, potato peels are high in starch and show promise as a source of bacteria that produce amylase. First, using culture-based techniques, bacteria were isolated from potato peels, and then, using both qualitative and quantitative enzyme assays, their capacity to make amylase was verified. The most productive bacterial strain (*Bacillus subtilis*) that produced amylase was then found and grown in ideal conditions to increase the production of enzymes. The starch in potato peels was then hydrolyzed to glucose using the crude enzyme extract that was extracted from the bacterial culture. By examining a number of variables, after 24 hours of incubation at 37ºC, 2% inoculum size, 5% Substrate concentration and 8 pH, producing the

highest amounts of enzymes (0.015±0.015µmol/ml/min) and glucose production (0.055±0.055mg/ml/min). Using bacteria amylase to make glucose syrup from potato peel powder has multiple beneficial uses in a variety of industries like food industry, beverage industry, pharmaceutical industry, biotechnology, cosmetic industry, agriculture and environmental applications etc. The glucose content of the resultant glucose syrup was measured and contrasted with glucose syrups that were sold commercially. Our research shows that it is feasible to produce glucose syrup economically from potato peels using the bacterium amylase, providing a long-term way to value potato processing byproducts and cut down on food industry waste.

CBGP-4
Biotechnology

OPTIMIZATION OF ENZYMATIC PRODUCTION OF MALTOSE FROM RICE BRAN

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Rice bran, a readily available and inexpensive agricultural by-product was explored as a substrate for enzymatic production of maltose. This study focuses on conduction experiment to determine the optimal combination of factors such as enzyme concentration, reaction time, temperature and optimizing the enzymatic process to maximize maltose yield while minimizing resource consumption and waste generation. Both liquefication and saccharification was performed and optimized to determine their individual and interactive effects on maltose production efficiency. Results indicate that optimal conditions for Maltose production was 0.077 mg/ml involve incubation time of 96 hours, a pH of 5, a temperature of 37°C and 1% *Bacillus Subtills* culture with a 30% rice bran concentration. The optimum amylase activity was 2.950 µmol/ml/min from combination of 30% rice bran concentration, 1% *Bacillus Subtills* inoculum, 96 hours of incubation time, 37°C of temperature and pH of 5 & 7 pH. Moreover, the findings offer insights for further research and industrial scale applications aimed at maximizing the efficiency and sustainability of enzymatic processes for maltose production.

CBGP-5
Biotechnology

EXPLORING INNOVATIVE MATERIALS: DEVELOPING ALTERNATIVE FISH LEATHER TANNING METHODS FOR SUSTAINABLE HANDICRAFTS DESIGN

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The rising demand for sustainable materials has fostered interest in alternative resources for leather production. Fish leather, derived from species like Rohu (*Labeo rohita*), Tilapia (*Oreochromis niloticus*),

and Common Carp (*Cyprinus carpio*), offers a durable, eco-friendly option. This study explores novel tanning techniques to enhance fish leather's physical and chemical properties, supporting its use in sustainable handicrafts. The study aims to develop and evaluate innovative tanning methods, aldehyde tanning, vegetable tanning, and oil painting, assessing their effectiveness in producing high-quality fish leather for handicraft applications. Physical (thickness, tear strength, shrinkage temperature, organoleptic properties) and chemical (solubility in dichloromethane, pH, Cr_2O_3 content) analyses were conducted. Statistical comparisons were made using ANOVA to determine the effects of tanning agents on the processed leather. Red beet root tanning yielded the highest thickness (20.83%) and enhanced hydrothermal stability (shrinkage temperature: 78°C in carp). Carp consistently demonstrated superior tear strength and organoleptic quality compared to Rohu and Tilapia. Ph levels were maintained to support tanning stability, with Cr_2O_3 levels confirming effective tanning. Fish leather, particularly processed through vegetable tanning, proves to be a sustainable, high-quality material for handicrafts. Carp emerged as the most suitable species for tanning due to its favourable physical and chemical properties. Future studies should optimize degreasing techniques, explore additional plant-based tannins, and evaluate the scalability of fish leather production. Expanding product lines beyond handicrafts could enhance the commercial viability of fish leather as a sustainable alternative.

CBGP-6
Biotechnology

INTEGRATED APPROACH (VERMI-COMPOST AND PLANT GROWTH PROMOTING VERMI-BACTERIA) PROMOTES SPROUTING AND GROWTH OF ORNAMENTAL CROPS

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The current research aimed to evaluate the impact of the co-application of vermi-compost (VC) and vermi-bacteria, on the growth and production of ornamental crops i.e. marigold (Tagetes erecta) and pansy (*Viola x wittrokiana*). Eleven vermi-bacteria i.e. *Bacillus mycoides* (B1, B4, and U3), *Bacillus aryabhattai* (B2), *Staphylococcus hominis* (B3), *Bacillus licheniformis* (B6), *Bacillus subtilis* (U1), *Bacillus mojavensis* (U2), *Bacillus toyonensis* (U4), *Bacillus anthracis* (U5) and *Bacillus paranthracis* (U6) were used as microbial bio-fertilizers, either alone, or in combination with vermi-compost during the potting experiment. Significant outcomes were recorded on the application of vermi-bacteria alone. However, the co-application of vermi-bacteria and vermi-compost, not only enhanced seed germination and seedlings, but it also improved the soil health and stability as indicated by the pre and post physicochemical analysis of germination media, among both plants. The maximum seed germination and seedling parameters i.e. shoot length, number of leaves, the diameter of leaves, length and area of leaves, the whole length of young plant, and root length were recorded in both plants, when treated with the combinations of VC and vermi-bacteria, compared to the controls (un-inoculated samples). Pansy showed the highest seed germination and seedling parameters, when treated with vermi-compost + *Staphylococcus hominis* and vermi-compost + *Bacillus paranthracis* respectively. Whereas, marigold exhibited highest seed germination and seedling parameters, on treatment with vermi-compost + *Bacillus aryabhattai*, and vermi-compost + *Bacillus licheniformis*, respectively**.** Hence, it concludes that, the co-application of

vermi-bacteria and vermi-compost possess potentials to increase seed germination and growth of pansy and marigold under organic growing conditions.

CBGP-7
Biotechnology

MOLECULAR CHARACTERIZATION OF SPRING WATER ASSOCIATED BACTERIA AND EFFICIENT SPRING WATER DECONTAMINATION USING PLANT-BASED BIOSORBENTS

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The current study was designed to evaluate the efficacy of *Brassica rapa* and *Spinacia oleracea* in the purification of spring water as plant-based biosorbants. Screening, isolation, characterization and molecular identification of pathogenic bacteria were carried out through cultural media, microscopic techniques, biochemical tests and ribotyping. Sequencing Primer F: 785F 5' (GGA TTA GAT ACC CTG GTA) 3'; Sequencing Primer R907R 5' (CCG TCA ATT CMT TTR AGT TT) 3'; PCR Primer: 27F 5' (AGA GTT TGA TCM TGG CTC AG) 3'; and PCR Primer: 1492R 5' (TAC GGY TAC CTT GTT ACG ACT T) 3' were used. Antibiogram and resistogram analysis were also assessed. The antimicrobial activity of *Brassica rapa* and *Spinach oleracea* extracts was evaluated against fifteen spring water associated bacteria through agar well diffusion method as well as via ex-situ remediation. *Bacillus amyloliquefaciens*, *Bacillus subtilis*, *Bacillus cereus*, *Bacillus anthracis*, *Lysinibacillus fusiformis*, *Bacillus wiedmannii*, *uncultured Bacillus sp.*, *Bacillus weihenstephanensis*, and *Bacillus thuringiensis* were characterized through the Maximum Likelihood method and Tamura-Nei model. Antibiogram analysis results showed that all isolated SWABs (SWAB-1 to SWAB19) were resistant against Amoxycillin (AMC-30), Aztreonam (ATM-30), Tobramycin (TOB-10), Tazobactam (TZP-110), Ceftriaxone (CRO-30), and Cefuroxime sodium (CXM-30). Similarly, all isolated SWABs showed resistant against lead, cadmium, and chromium. *Spinacia oleracea* showed maximum inhibition of tested bacteria compared to the *B. rapa* seeds extract was applied. Ex-situ remediation findings illustrated that both plants efficiently declined the microbial load, had no effect on the sprouting and growth of *B. rapa* compared to the *S. oleracea*, and could be used as biosorbant to decontaminate the contaminated spring water.

CBGP-8
Biotechnology

EVALUATION OF SPRING WATER QUALITY PARAMETERS AND HYPERACCUMULATOR-BASED PURIFICATION OF CONTAMINATED SPRINGS

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The current study was designed to assess the quality of spring water available in different localities of district Muzaffarabad, Azad Jammu & Kashmir, Pakistan, and to evaluate the efficacy of phyto-hyperaccumulators i.e. *Brassica rapa* and *Spinacia oleracea* in the purification of spring water. Physicochemical parameters i.e. pH, temperature, electrical conductivity, turbidity, Total dissolve solids, dissolved oxygen, chemical oxygen demand, biological oxygen demand, and heavy metals were analyzed. Vermicompost and garden soil was used for the growth and development of *Brassica rapa* and *Spinacia oleracea*. Findings revealed that physicochemical parameters of contaminated spring water i.e. temperature was recorded in the range of 14.03±0.80°C to 18.76±1.52°C, maximum pH (6.5- 8.5), minimum values of electrical conductivity (245±7.54 µS/cm to 365.13±13.89 µS/cm), turbidity (0.6±1.00 NTU to 2.6±2.51 NTU), and total dissolved solids (122±1.00 ppm to 247.6±3.21 ppm), BOD (4.1±0.9 mg/L to 8.06±0.550 mg/L), maximum dissolved oxygen and chemical oxygen demand was recorded than recommended permissible limit by WHO and PSQCA. Similarly, maximum levels of heavy metals (Cd, Zn, Cu, Ni, Pb, Cr) were recorded and exceeded the limits of WHO and PSQCA as well which indicated high risks of health issues for the people rely on these water sources. It was observed that spring water had no effect on the sprouting and growth of *B. rapa* compared to the *S. oleracea.* On the other hand, *Brassica rapa* and *Spinacia oleracea* treated spring water not only declined the values of physicochemical parameters but also remediate the heavy metals efficiently. It was observed that all *B. rapa* and *S. oleracea* treated spring water showed pH (7.67±0.58 and 7.43±0.06 to 8.0±0.00) under the range of permissible limit (6.5- 8.5) as recommended by WHO and PSQCA. Temperature of all *B. rapa* treated and *S. oleracea* treated spring water was recorded in the range of 12.4±0.36°C to 13.2±0.26°C and 12.4±0.61°C to 13.27±0.15°C. The small variations in the electrical conductivity (245±7.54 µS/cm to 365.13±13.89 µS/cm) turbidity (0.6±1.00 NTU to 2.6±2.51 NTU), and total dissolved solids (122.0±1.00 ppm to 247.6±3.21 ppm) was recorded in *B. rapa* treated and *S. oleracea* treated spring water. Dissolved oxygen values (4.6±0.53 mg/L to 7.9±0.1 mg/L in case of *B. rapa* and 4.53±0.42 mg/L to 6.8±0.7 mg/L in case of *S. oleracea*) was reduced compared to the DO of contaminated spring water. BOD values of *B. rapa* treated spring water ranging in 4.07±0.85 mg/L to 4.97±0.06 mg/L under the permissible limit (<5) was recorded compared to the *S. oleracea* treated spring water (5.1±0.1 mg/L to 5.13±0.15 mg/L. Similarly, the minimum values of chemical oxygen demand were recorded in SPW-4, SPW-6, SPW-8, SPW-9, and SPW23 in case of *B. rapa* treated spring water and SPW-4, SPW-6, SPW-8, and SPW-9 in case of *S. oleracea* treated spring water. Results revealed that *Brassica rapa* showed maximum accumulation of heavy metals compared to *Spinacia oleracea*, Bioconcentration factor, remediated metal fraction (mg/kg), and planting season remediation (%) supported the efficient use of these plants as hyperaccumulators. The entire study concluded that *Brassica rapa* and *Spinacia oleracea* purified and remedied heavy metals from spring water.

CBGP-9
Biotechnology

PRODUCTION OF BIO-METHANE GAS FROM THE ORGANIC WASTE THROUGH ANAEROBIC DIGESTION

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Energy shortfall is a primary problem of Pakistan. Anaerobic codigestion is a promising solution to this problem. This study was designed to assess the potential of biomethane production through various cellulosic biomasses like fruits waste and domestic vegetable waste along with flower waste in optimal ratios using the principle of anaerobic codigestion. Four different mixing ratio were used: Fr:Veg:Fl (Set 01=1:1:1, Set 02 =1:1: 2, Set 03=2:1:1, Set 04=1:2:1 and 1.0:1.0:1.0) for fruit waste (Fr), vegetable waste (Veg) and flower waste (Fl) respectively. The codigestion was carried out in 1 L polypropylene digesters in batch mode under mesophilic temperature. The experimental results showed that the co-digestion significantly affected the bio-methane production rate. At four mixing ratio tested, after 20 days of digestion, the average bio-methane yield was determined to be in four Sets were 152.7 cm^3, 214.5 cm^3, 196.3 cm^3 and 165.6 cm^3 respectively. The higher methane contents and yields were obtained from Set 02 (214.5 cm^3) with mixture ratio Fr:Veg:Fl (1:1:2). Bio-slurry of this mixture was proved to be a good soil conditioner against DAP.

CBGP-10
Biotechnology

THERAPEUTIC APPLICATIONS OF ANIMALS IN KALLAR KAHAR COMMUNITY

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Traditional medicine was taken because it was widely available and accepted in the community. The fact that traditional medication is less expensive than biological treatment. The complex links that exist between human societies and the animal species they encounter are the subject of the interdisciplinary science of ethno zoology. By combining viewpoints from anthropology, zoology, and ecology, it investigates how various fidelity level categorize, use, and interact with animals. Within the context of domestic animals and wildlife, this topic offers insights into traditional ecological knowledge and cultural values and practices. Researchers may learn more about how native people view animal behavior, conservation, and the place of animals in myths, customs, and everyday life by investigating ethno zoological systems. By exposing customs and local knowledge that might guide contemporary conservation tactics, this research not only advances our understanding of cultural diversity but also helps to conserve biodiversity and promote sustainable resource management. This research intends to provide important insights into the relationship between cultural values and biodiversity by examining how different cultures view animals and their roles in different societal circumstances. The *Apis mellifera*

(Honeybee) has highest IMA. *Apis mellifera* has the highest functional capacity (40), while the Wolf and Horseshoe bat have the lowest (2). Passers and others have the highest fidelity level (100), and Naemorhedus goral has the highest corrected fidelity level.

CBGP-11
Biotechnology

PHYSICO-CHEMICAL CHARACTERISTICS AND ANTIOXIDANT POTENTIAL OF DATE FRUIT ADDED DAHI

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The current study sought to check the product quality and antioxidant potential of date fruit added to dahi during storage. Date varieties physico-chemical properties were investigated, and the antioxidant strength of water-soluble extracts (WSEs) of various pastes was determined. In the present study, the physical-chemical properties, microbiological and sensory quality, and antioxidant potential of dahi during storage (0–8 days) at a cold temperature were evaluated. Total phenolics (TP) and flavonoids were found to be present in date pastes of all varieties, and it was shown that these pastes had noticeably higher antioxidant activity (TF) than control dahi. Dahi supplemented with various pastes produced the highest levels of TP (1350.70 g Gallic acid equivalent/mL), TF (1903.30 g Quercetin equivalent/mL), RP (5776.00 g Trolox equivalent/mL), DPPH radical scavenging activity (1645.70 mol equivalent of Trolox), and TEAC (5986.00 mol equivalent of Trolox). According to the study's conclusions, dahi that has been enhanced with date pastes possesses potent antioxidant effects. The pH value of the Muzafati cultivar was higher (5.48). Popo data revealed a lower pH value (4.58). Aseel date displayed 5.43, and Ajwa date displayed 5.00. In comparison to other pastes, Muzafati paste had the highest Acidity (%) (1.17) value and Ajwa paste had the lowest Acidity (%) (0.75) value. Aseel paste had a value of 0.92% while Popo paste got 0.81%. The most valuable paste was murafati. Ajwa paste has a higher percentage of total sugar (%) (49.64) than other pastes. Aseel paste had a rating of 53.05 while Popo paste had 46.47%. The highest amounts of moisture, ash, and acidity were found at Muzafati. In comparison to other pastes, Muzafati paste had the highest reducing sugar value (%) (53.02), while Aseel paste had the lowest (%) (48.80). Ajwa paste has a value of 47.97% and Popo paste of 40.80%.

CBGP-12
Biotechnology

POST MORTEM INTERVAL (PMI) CALCULATION OF ORYCTOLAGUS CUNICULUS THROUGH FORENSICALLY IMPORTANT INSECT FAUNA

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Post mortem interval (PMI) is calculated through various means during crime scene investigations. PMI for rabbit *Oryctolagus cuniculus* (Linnaeus, 1758) was calculated through the developmental rates of forensically important insect fauna on a decomposing carcass of O. cuniculus. The blow fly, *Chrysomya albiceps* (Wiedemann, 1819) belonging to family Calliphoridae was the common and first visitor species to the rabbit carcass. The developmental rate of *C. albiceps* associated with the ambient climatic conditions was used as a model for the calculation of PMI. Temperature correction factor of the carcass temperature versus met station temperature was calculated through regression analysis. The accumulated degree days (∑ADD) and accumulated degree hours (ADH) were calculated to estimate the PMI. Five decomposition stages of *O. cuniculus* were identified as fresh, bloated, active decay, advanced decay, and dry remains stage. The findings of the present study can be applied to the calculation of PMI of known and unknown animal and human cadavers for resolving medicolegal issues in crime scene investigations.

CBGP-13
Biotechnology

EXPLORING THE FATTY ACIDS COMPOSITION AND THE DISTRIBUTION OF MARINE LONG CHAIN POLYUNSATURATED FATTY ACIDS (OMEGA 3 AND 6) IN *PANAEUS MONODON* AND *SEPIA PHARAONIS*

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Fatty acid composition and distribution in edible species of shellfish: shrimps *Panaeus monodon* and cuttle fish *Sepia pharaonis* captured in the Pakistan's Northern Arabian Sea were studied, with a focus on omega-3 and 6 long-chain polyunsaturated fatty acids (ω-3 and ω-6 PUFAs). Fatty acids were quantified using gas-chromatography coupled with flame ionization detection (GC-FID), and the distribution of different fatty acids within lipid classes (neutral and polar lipids) was achieved after oil extraction using the O'Fallon method and separation of lipid classes via solid-phase extraction for further GC-FID analysis. The analyzed cuttle fish contained the highest amount (15.45 and 2.5 g/100 g) of omega-3 and omega-6 fatty

acids, respectively whereas in black tiger shrimps (13.00 and 15.11 g/100g) both omega-3 and omega-6 fatty acids were reported high. Among both shellfish species: black tiger shrimps and cuttle fish, considerable amount of *eicosapentaenoic acid* (EPA:2.5 and 1.00 g/100g) and *docosahexaenoic acid* (DHA: 0.09 and 0.1 g/100g) were reported. The nutritional quality of lipids; PUFA/SFA and n-6/n-3 ratio fatty acid index were calculated and reported to be ≥ 1 in both species. The marine long-chain omega-3 PUFAs; (EPA and DHA) are reported to have healthy effects on brain functioning, cardiovascular improvement, fortifying bones and enhanced antioxidants activities. This research study provides a novel nutritional insight which may be useful for formulation of sustainable human diet through ocean foods.

CBGP-14
Biotechnology

CADMIUM RESISTANCE AND UPTAKE BY YEAST, *Pichia hampshirensis* 4AER, ISOLATED FROM INDUSTRIAL WASTEWATER AND ITS POTENTIAL USE IN EFFLUENT PURIFICATION

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Pichia hampshirensis 4Aer is the first ever yeast used for the bioremediation of environmental cadmium (Cd^{+2}), which could maximally remove 22 mM/g and 28 mM/g Cd^{+2} from aqueous medium at lab and large scales, respectively. The biosorption was found to be the function of temperature, pH of the solution, initial Cd^{+2} concentration, and biomass dosage. Competitive biosorption was investigated in binary and multi-metal systems, indicating the decrease in Cd^{+2} biosorption with increasing the competitive metal ions attributed to their higher electronegativity and larger radius. FTIR analysis revealed the active participation of amide and carbonyl moieties in Cd^{+2} adsorption, as confirmed by EDX analysis. Electron micrographs summoned further surface adsorption and increased cell size due to intracellular Cd^{+2} accumulation. Our experimental data were consistent with Langmuir as well as Freundlich isotherm models. The yeast obeyed the pseudo-second-order kinetic model, which makes it an effective biosorbent for Cd^{+2}. The high bioremediation potential and spontaneity and feasibility of the process make *P. hampshirensis* 4Aer an impending foundation for green chemistry to exterminate environmental Cd^{+2}.

CBGP-15
Biotechnology

EVALUATION OF BIOGENIC ZINC NANOCOMPOSITE HYDROGEL FOR SKIN TISSUE REGENERATION

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Tissue regeneration is a typical physiological healing response to the damaged tissue to recuperate its

normal functionality. Wound healing is now a challenging global clinical problem in which fibroblast, microvascular cells, keratinocytes, and immune cells play key roles. Several antimicrobial and moisturized wound dressings are being developed with various features to heal the wound. The current study was designed to prepare the zinc nanoparticles (ZnNPs) based hydrogels combined with curcumin to accelerate tissue regeneration. The conjugation of curcumin with ZnNPs was confirmed by UV-Vis spectroscopy and Fourier Transform Infrared Spectroscopy (FTIR). A biopsy punch (6mm) was used for the excision of experimental wounds. The wound contraction percentage, serum proteins, liver enzymes, and histology evaluated the tissue regeneration potential of ZnNP curcumin conjugates. The ZnNP-curcumin hydrogel application resulted in complete wound healing in 12 days only. The level of serum proteins significantly increased in different treatment groups as compared to control groups. Catalase and GST levels significantly decreased ($P<0.05$), while SOD levels significantly increased ($P<0.05$) in Zn-Curcumin NCs hydrogel as compared to control and treatment groups. These results indicate minimal oxidative stress, allowing the fast recovery of the wound. Histological examination further confirmed the same.

2. CELL AND MOLECULAR BIOLOGY, CELL BIOLOGY, GENETICS

CBGP-16
Cell and Molecular Biology

PREVALENCE OF DIGESTIVE ENZYMES IN HOUSEHOLD PICKLES AND YOGHURT

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Digestive enzymes in pickles and yoghurt have a wide range of applications in food and nutrition. Pickles and yoghurt are fermented food items widely used in the world due to their health benefits. In this study, the household pickle was systematically analyzed and compared with the National brand Pickles' different enzymatic potentials. Although homemade yoghurt is not compared with any market brand but provides a novel standpoint on digestive enzymes in fermented dairy products. Protease, amylase, and lipase activities of pickle and yoghurt samples were obtained by standardized assays. The highest protease activity (86.75±0.69) in household pickles was displayed by chili and in National pickles, carrot (130.04±1.15) stood out. Radish showed the highest amylase activity (479.9±0.47) among household pickles whereas mango had the highest amylase activity (195.8±2.03) among the National pickles. In the case of lipase, carrot had the highest lipase activity (25377.8±125.35) across household pickles and lemon of National pickles had the highest value (22255.57±125.38). Homemade yoghurt demonstrated protease, amylase and lipase activities up to (68.6±0.84), (510.67±0.78) and (3311.13±29.43) enzyme units respectively. The principal objective of this study was to develop a better understanding of the digestive enzymes i-e protease, amylase, and lipase in household and National Pickles to evaluate the regional and cultural influences on the process of fermentation involved. These findings delve deep into the importance of considering the ingredients and fermentation environment that leads to the variation of hydrolytic enzymes.

CBGP-17
Cell and Molecular Biology

INVESTIGATING THE GENETIC BASIS OF RESIDUAL FEED INTAKE (RFI) FOR PREDICTING FEED EFFICIENCY IN BEEF BULLS

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Residual Feed Intake (RFI) is the difference between actual feed consumption and the expected feed

intake, which is calculated based on a bull's live weight, growth, and maintenance requirements. People perceive bulls with low RFI values as more efficient because they consume less feed than those with higher RFI rates. It's hard to figure out which marker genes control RFI because there are so many differentially expressed genes (DEGs) and some genes that may affect RFI in both positive and negative ways. This review looks at possible genes, their corresponding single nucleotide polymorphisms (SNPs), chromosomal locations, and expression patterns to help us learn more about how RFI traits in bulls are controlled by genes. This evaluation analyzes over 200 research studies on RFI in beef bulls and steers, published between 2012 and 2022, according to established inclusion criteria. Genome-wide association studies (GWAS) and gene set enrichment analysis (GSEA) were used to find 511 genes spread out over 240 chromosomal regions in 7,992 beef bulls. Of these, 52 genes were consistently linked to RFI, while 469 were reported uniquely in a single study. During the review period, researchers repeatedly documented 228 of the 244 chromosomal locations, while they only recorded 16 once. In the review of the literature, 11 studies were found to link bovine chromosome 6 (BTA6) to quantitative trait loci (QTLs) for RFI in bulls. Similarly, eight studies connected BTA8, ten studies linked BTA7, and eight studies associated BTA11 with RFI QTLs. From 2012 to 2023, researchers identified 228 SNPs across 30 chromosomal loci. This study gives us new information about the molecular processes that control feed efficiency (FE) and sets the stage for finding molecular markers linked to FE in different bull breeds and populations.

CBGP-18
Cell and Molecular Biology

A CROSS-SECTIONAL STUDY ON ACUTE AND CHRONIC LEUKEMIA PATIENTS REPORTED CASES FROM THE NUCLEAR MEDICINE CANCER CARE AND RESEARCH CENTER GAMBAT, SINDH, PAKISTAN

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Leukemia is one of the fatal diseases, and its morbidity and mortality rates increase day by day all over the world. We designed this research study to determine the prevalence of different types of leukemia in Gambat, Sindh, Pakistan, from January 2024 to December 2024. Material and Method: The retrospective research work was conducted at the Nuclear Medicine Cancer Care and Research Center in Gambat, Sindh, Pakistan. We evaluated the 400 admitted leukemia patients. The results showed that acute leukemia (80%) was more prevalent than chronic leukemia (20%). Acute lymphocytic leukemia (ALL) made up 49.5% of the cases (n = 198), while acute myelogenous leukemia (AML) made up 31.25% (n = 125), chronic myelogenous leukemia (CML) made up 10% (n = 40), and chronic lymphocytic leukemia (CLL) made up 9.25% (n = 37). These were the less common types of leukemia in this study. It was also found that leukemia was more prevalent in male patients (64.5%, n=258) as compared to females (35.5%, n=142), and the male-to-female ratio was 1:8:1. Most of the patients were under the age of 20 years. Conclusion: During this study in this part of the country, acute leukemia was more common than chronic leukemia and requires attention.

CBGP-19
Cell and Molecular Biology

STUDY ON THE BIOCHEMICAL ANALYSIS OF WHITE MEAT OF BROILER BIRDS OF KHAIRPUR AND ITS ADJOINING AREAS.

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The biochemical analysis of white meat from broiler birds in Khairpur and its adjoining areas was conducted to evaluate its nutritional composition, quality, and safety for human consumption. Samples were collected from local poultry farms and markets, ensuring representation from different management practices. The study focused on determining key biochemical parameters, including protein content, fat composition, moisture levels, ash to assess the meat's nutritional adequacy. The findings revealed that the white meat of broiler birds in the region is a rich source of high-quality protein and essential nutrients. However, variations in fat content were observed in different age group birds, influenced by differences in feed quality and farming practices. This study provides valuable insights into the nutritional and safety aspects of broiler white meat, emphasizing the need for standardized farming practices and quality control measures to ensure its suitability for human consumption. The results serve as a benchmark for improving poultry farming in Khairpur and neighboring areas while addressing consumer health and nutritional demands

CBGP-20
Cell and Molecular Biology

COMPARATIVE STUDY OF MILK FROM DIFFERENT ANIMAL SPECIES IN DISTRICT SUKKUR

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Milk is a vital source of essential nutrients, and its composition varies across different animal species. This study aims to compare the physicochemical properties and nutritional composition of milk from various domesticated species, including cows, buffaloes, goats, and sheep, in District Sukkur. Samples were collected from local farms and markets to analyze key parameters such as fat content, protein levels, lactose concentration, mineral composition, and overall quality. The results revealed significant variations in milk composition among species. Buffalo milk exhibited the highest fat and protein content, making it ideal for dairy products, while cow milk had a balanced nutritional profile suitable for regular consumption. Goat and sheep milk, though produced in smaller quantities, were found to be rich in essential fatty acids and minerals, offering potential health benefits. Additionally, microbial analysis was performed to assess the hygiene and safety of milk from different sources. This comparative study provides valuable insights into the nutritional diversity of milk from different species, helping consumers make informed dietary choices. The findings also emphasize the need for maintaining proper milk hygiene and quality standards to ensure public health and dairy industry sustainability in District Sukkur.

CBGP-21
Cell and Molecular Biology

AI-ENHANCED BIOINFORMATICS FOR CANCER RESEARCH: UNCOVERING NOVEL PHARMACOGENOMICS BIOMARKERS

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Cancer is a global health burden and a leading cause of mortality. Pharmacogenomics, which examines the genetic determinants of drug response, has become a cornerstone for precision oncology. However, analyzing vast and complex datasets from next-generation sequencing and other omics technologies presents significant challenges. Artificial intelligence, including machine learning, deep learning, and natural language processing, offers powerful tools for enhancing bioinformatics in cancer research. This study aims to explore to explore AI integration in cancer bioinformatics, focusing on recent advancements in pharmacogenomics biomarker discovery, multi-omics data analysis, and drug design, alongside associated challenges and future perspectives. A review of AI-driven bioinformatics techniques was conducted, highlighting their application in multi-omics data integration, biomarker discovery, and computational drug repurposing. Advanced algorithms, such as convolutional neural networks, recurrent neural networks, generative adversarial networks, and transformer-based models, are evaluated for their contributions to pharmacogenomics and personalized oncology. AI-driven tools advance biomarker identification by integrating genomics, transcriptomics, and proteomics data. Deep learning enhances single-cell RNA sequencing analysis, exposing tumor heterogeneity and resistance mechanisms. AI aids epigenetic biomarker discovery and deciphers tumor microenvironments for immunotherapy prediction. Platforms like DeepChem and AlphaFold optimize drug repurposing and design. Major hurdles include inconsistent data formats, biases, and poor model interpretability limiting clinical use. Ethical concerns about data privacy, consent, and algorithmic fairness also persist. AI is reshaping bioinformatics for cancer research, enabling novel biomarker discovery and precision therapy. Overcoming data standardization and ethical issues is crucial. Future synergies with CRISPR and quantum computing promise unprecedented breakthroughs. Collaborations across academia, industry, and regulators will accelerate translational applications.

CBGP-22
Cell and Molecular Biology

ASSESSMENT OF TRADITIONAL KNOWLEDGE ABOUT THE ETHNOMEDICINAL USE OF ANIMAL AND PLANT BASED PRODUCTS BY LOCAL COMMUNITY OF DISTRICT BHAKKAR

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Ethnomedicine involves the use of traditional healing practices by indigenous and local communities to address various health issues through natural resources. This discipline merges cultural beliefs, spiritual practices, and empirical knowledge passed down through generations. Therapeutic remedies in ethno medicines frequently incorporate animal based (zoo therapy) ingredients, creating complex formulas that address both physical and spiritual health needs. It documents numerous animal parts for their medicinal properties, preparation techniques, and specific health applications among the residents of Darya Khan, located in District Bhakkar. The main goal is to catalog and evaluate the types of animals utilized, the ailments they are believed to address, and the cultural relevance of these practices. Various statistical methods were employed for data analysis, including Frequency of Citation (FC), Fidelity Level (FL), Relative Importance Level (RIL), Corrected Fidelity Level (CFL), and Informants of Major Ailments (IMA). The Macropus rufus was noted for having the highest IMA value while Bos Taurus (cow) and crocodile (*Crocodylus porosus*) were found to have the highest RIL value of 1.Initial results indicate a wide array of therapeutic uses, with some animals playing a key role in local health rituals and treatments. The research aims to offer a thorough understanding of these practices, their historical backgrounds, and their potential impact on both local and broader medicinal fields. By capturing these traditional approaches, the study helps preserve local knowledge and sheds light on the relationship between culture, tradition, and health.

CBGP-23
Cell and Molecular Biology

PREVALENCE OF DIFFERENT SKIN DISEASES WITH RESPECT TO GENDER IN SARGODHA, PAKISTAN

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The aim of this cross-sectional study was to investigate the prevalence of skin diseases with respect of gender in Sargodha. For this purpose, clinical survey was conducted from at DHQ Sargodha. A total of 876 (female 527 and male 349) patients were studied. Infectious cases 66.9% and non-infectious cases 33.1% were observed. Scabies were 41.1%, Psoriasis 16.7%, fungal infection 11.9% and eczema 9.5% were observed as dominant diseases. Patients having poor hygienic conditions were 52.5%, moderate 23.3% and with good hygienic conditions were 11.1%. With respect to gender females were exposed to

more skin diseases as compared to males due to poor hygienic conditions, over crowdedness, usage of shared clothes and contact with children.

CBGP-24
Cell and Molecular Biology

EXPLORING THE ETHNO MEDICINAL PRACTICES AMONG INDIGENOUS COMMUNITIES OF DISTRICT KHUSHAB, PAKISTAN

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Ethno medicine is the study of traditional medicinal practices and remedies unique to various cultures. It involves to investigate how different societies use natural resources for healing and the associated beliefs and rituals. This field documents and analyzes indigenous health knowledge and practices. The research aims to uncover local ethno biological knowledge used in traditional medicines and document the ethno medicinal uses of animals, analyze preparation and administration methods. The study involved 100 participants from various Khushab regions. A statistical analysis includes Fidelity Level (FL), Frequency of Citation (FC), Relative Importance Level, (RIL), correction fidelity level (CFL) and Informants of Major Alignment (IMA). The *Trombidium holosericeum* (Velvet mite) was noted for having the highest IMA value *while Lacerata sincus* and Apis were found to have the highest RIL value of 1. Earthworm has 88 CFL. The specie with highest FC value of 45 is sand lizard. Body parts such as meat, fat, skin, blood, brain, liver teeth, musk and scales were used to treat human health issues like diabetes, respiratory, digestive problems etc. The research provides insights into traditional medicine practices and their effectiveness, highlighting the value of preserving indigenous knowledge and its potential integration with modern healthcare for improved community health. This research underscores the importance of preserving indigenous knowledge and suggests integrating these practices with modern healthcare approaches. Future research could explore the application of these findings to broader contexts or investigate additional traditional remedies.

CBGP-25
Cell and Molecular Biology

CHEMOPREVENTION EFFICACY OF *MORINGA OLEIFERA* LEAF AQUEOUS EXTRACT AND GREEN SYNTHESIZED SILVER NANOPARTICLES AGAINST DMBA-INDUCED MAMMARY CARCINOGENESIS IN FEMALE SWISS ALBINO MICE

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Breast cancer is the most common type of cancer among women and characterized by an uncontrollable growth of mammary tissues. Traditional treatments like chemotherapy, radiation therapy

and lumpectomy offer challenges like high costs, low availability and specific side effects on human health. Therefore, it is necessary to find out natural alternative anti-cancer therapeutics that can mitigate cancerous effects. This study focuses on investigating the chemoprevention efficacy of *Moringa oleifera* (MO) leaves aqueous extract (MLE) and silver nanoparticles (M-AgNPs) on DMBA-induced mammary gland carcinogenesis in virgin female Swiss albino mice. M-AgNPs were synthesised and characterised by UV-vis spectroscopy, SEM and XRD. To induce mammary gland carcinogenesis, 80 mg/kg of DMBA in olive oil (1mg/8mL) were administered to the female mice by oral gavage. After fourteen weeks of DMBA administration, mice were treated orally with 500 mg/kg of MLE, M-AgNPs (6 and 8 mg/kg) and tamoxifen (20 mg/kg) via an intragastric tube for three weeks. Synthesis of M-AgNPs was confirmed by observing a ~340 nm peak at UV-vis spectra, SEM showed a mean size of 13.4 nm and the diffraction peaks at 38.16°, 45.6°, 64.8° and 77.52° corresponding to the (111), (200), (220) and (311) planes by XRD technique. All applied dosages demonstrated chemoprevention efficacy and the potential to improve life expectancy. MLE and M-AgNPs treated mice showed significantly normal level of all oxidative stress markers and glucose, LDH and Ca levels. At the same time, M-AgNPs with 8 mg/kg concentration illustrated the significantly improved alterations in biochemical oxidative stress markers, liver function, haematological and histopathological parameters as compared to the other treated groups. The study concluded that MLE and M-AgNPs can regulate oxidative enzymes, blood parameters and damaged mammary tissues, potentially alleviating carcinogenesis. However, M-AgNPs could be a promising therapeutic candidate against cancer in a dose-dependent manner.

CBGP-26
Cell and Molecular Biology

THE PREVALENCE OF INTELLECTUAL DISABILITY AMONG POPULATIONS OF PESHAWAR, KARAK, UPPER CHITRAL AND CHARSADDA, KHYBER PAKHTUNKHWA, PAKISTAN

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Intellectual Disability (ID), which began before maturity and has a long-lasting impact on development, is characterized by a markedly diminished capacity to comprehend new or difficult information, acquire new skills, and manage autonomously. One of the most unresolved issues in healthcare is intellectual disability (ID). To check its prevalence, study was conducted in Khyber Pakhtunkhwa (KPK), Pakistan from September 2023- September 2024. In which data of 135 children suffering from Intellectual disability was collected from different special education centers of Peshawar, Upper Chitral, Karak and Charsadda. Different demographic variables like gender, age, level of disability and area were assessed. According to this study, 73.3% (n = 99) were males and 26.7% (n = 36) were females. Out of 135 cases, 33.3% (n=45) were from Charsadda, 4.4% (n=6) from Karak, 49.6% (n=67) are from Peshawar, and 12.6% (n=17) are from Upper Chitral. District and locality appear to be more important determinants in predicting the severity of disability experienced by individuals, since age (estimate = 0.152, p = 0.354) and gender (male estimate = -0.367, p = 0.334) have not been shown to greatly impact disability level. District and locality were found to be more important determinants in predicting the severity of disability, as age and gender have not been shown to significantly impact disability levels. In Pakistan, especially in KPK, the great majority of people

reside in rural areas with limited access to medical care. Therefore, the study will help individuals learn more about the nature, inheritance, and diagnosis of ID.

CBGP-27
Cell and Molecular Biology

GENOMIC APPROACHES TO IMPROVE SUSTAINABILITY IN LIVESTOCK PRODUCTION SYSTEMS

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The growing global demand for animal products, coupled with the challenges posed by climate change and environmental degradation, necessitates innovative solutions to enhance sustainability in livestock production systems. Genomic approaches offer promising avenues to address these challenges by improving efficiency, resilience and sustainability in livestock. This research explores the potential of genomic tools, including genome-wide association studies (GWAS), genomic selection and CRISPR-based technologies, to optimize traits such as feed efficiency, disease resistance and reproductive performance. By leveraging genomic data, livestock populations can be selectively bred for optimal traits that reduce resource consumption, lower greenhouse gas emissions, and improve animal health and welfare. This study also examines the ethical considerations, regulatory frameworks, and the integration of genomic technologies with traditional breeding methods. The outcomes of this research provide a comprehensive understanding of how genomics can contribute to sustainable livestock systems and offer a pathway for future research and application in the livestock sector.

CBGP-28
Cell and Molecular Biology

GENOMIC IDENTIFICATION, EVOLUTION, AND FUNCTIONAL CHARACTERIZATION OF HEAT-SHOCK PROTEIN GENES IN *THERMOMONAS HYDROTHERMALIS*

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Heat-shock proteins (HSPs) are major molecular chaperones that enhance cellular viability under heat

stress by averting protein misfolding and aggregation, extremely in thermophilic bacteria. This study aimed to characterize the HSP genes in *Thermomonas hydrothermalis* through evolutionary, structural, and functional mutation analyses to examine gene duplication events and their potential effects. In *T.hydrothermalis'* genome assembly IMG-taxon 2582581272 we observed four HSP genes, including Hsp33 (hslO), ClpK ATPase, and two Hsp20/α-crystallin family proteins, which play pivotal roles in stress response and protein stabilization. Structural and physicochemical analyses made it evident that these proteins showcase thermostability, facilitating their role in heat adaptation. Evolutionary analysis pined out high conservation amidst these genes, with potential gene duplication events scrutinized in the Hsp20/α-crystallin family. Functional mutation analysis identified sequence variations that may impact protein stability and function, potentially influencing the organism's stress response and adaptability. These revelations reinforce our understanding of HSP genes' genomic organization, evolutionary conservation, and functional significance in *T. hydrothermalis*, providing insights into thermophilic adaptation mechanisms.

CBGP-29
Cell and Molecular Biology

BRAIN TUMOR DETECTION USING ARTIFICIAL NEURAL NETWORKS: A SIMPLE AND FAST APPROACH FOR EARLY DIAGNOSIS

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Brain tumors will continue to be a serious health concern, requiring early detection for better treatment and improved survival rates. In the future, many hospitals will still rely on doctors to manually examine MRI scans, which may take time and lead to errors. This study will focus on developing an automated system using Artificial Neural Networks (ANNs) to assist in detecting brain tumors from MRI images. The process will begin with enhancing image quality by reducing noise and improving contrast. Important details from MRI images will be extracted using a method called the Spatial Gray Level Dependency (SGLD) matrix, which will help identify patterns in the images. These details will then be used to train a neural network, enabling it to classify MRI scans as tumor or non-tumor. The system's accuracy and reliability will be tested to ensure its effectiveness. By using artificial intelligence, this research will provide a faster and more reliable way to detect brain tumors, allowing doctors to make quicker and more accurate diagnoses. The study will contribute to the future of healthcare by improving brain tumor detection and making medical diagnosis more efficient.

CBGP-30
Cell and Molecular Biology

USE OF CRISPR-CAS IN GENETIC MODIFICATION OF RABIES VIRUS

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Rabies is a life-threatening Neurological Disease caused by Rabies Virus (RABV). Therapies against Rabies virus include Rabies Vaccination, Immunoglobulin Treatment and Antiviral Drugs. Despite these therapies Rabies virus is still endemic in few regions today. One of the new therapies against Rabies is invented and is in Practice known as CRISPR CAS gene editing technology. This Technology offers genetic modification of the antigenic fragments of Rabies Virus (RABV). CRISPR CAS is also known as a molecular Scissor that can change the viral antigenic structures such as Nucleoproteins Genes and Glycoprotein Genes. CRISPR CAS aids in causing viral mutation rendering the viral pathogenicity hence making it less virulent. Some of the distinct molecules of CRISPR CAS are CRISPR CAS 9 (that is a host integrated Viral DNA), CRISPR CAS 13 (for direct RNA targeting) and CRISPR Interference (CRISPRi). One of the significances of this gene modification technology is that it stops the replication of the virus inside neuron cells of the infected host. CRISPR CAS gene editing technology offers a promising therapy against Rabies.

CBGP-31
Cell and Molecular Biology

PREVALENCE AND MOLECULAR DETECTION OF *RICKETTSIA SPP.* IN BAT ECTOPARASITES FROM DISTRICT KASUR

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The Rickettsia genus comprises a highly diverse group of vector-borne bacteria, including several zoonotic species, with some strains using bats as reservoirs. Many species within this genus are pathogenic to humans and are increasingly being reported worldwide. In Pakistan, there is a notable gap in knowledge regarding the prevalence and molecular identification of Rickettsia species in animals, particularly in bats. This study was conducted in the Kasur district of Punjab, Pakistan. A total of 80 bats were captured across four tehsils in District Kasur and examined for Rickettsia by collecting ticks. Data on host species, habitat types, age, gender, urbanicity, and ectoparasite presence were systematically recorded. Molecular detection involved DNA extraction and PCR targeting the *gltA* (581 bp) and *ompB* (776 bp) genes, followed by sequencing of *gltA*-positive and *ompB*-positive samples. Chi-square analysis was used to explore associations between positive samples and potential risk factors. The findings revealed a

remarkably high prevalence of Rickettsia DNA in bat-associated ticks (n=16; 20%). Significant associations were observed between positive cases and factors such as habitat type and the presence of ectoparasites. The Rickettsia sequences identified closely matched those of species reported in various countries. In conclusion, this study highlights the high prevalence of Rickettsia DNA in ticks and blood samples from bats in the Kasur district of Punjab, Pakistan.

CBGP-32
Cell and Molecular Biology

EXAMINATION OF GENETIC VARIATION IN BURROWING FROG (*SPHEAROTHECA* SPP) BY USING NUCLEAR AND MITOCHONDRIAL DNA

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Amphibians include anurans (frogs and toads), caudates (newts and salamanders), and caecilians. Amphibians are an integral part of any ecosystem performing valuable services from controlling populations of pests as well as providing a source of protein for human consumption in many parts of the world. About 41% of the world's amphibians are threatened with extinction due to multitude of threats such as infectious diseases; climate change; habitat degradation and loss, and habitat fragmentation due to infrastructure development. Even many amphibian species with the least conservation status are showing decreasing population trends. In Pakistan, amphibians are represented by 21 species belonging to four families: Bufonidae, Megophryidae, Microhylidae, and Dicroglossidae. This study was conducted to examine genetic variation in the uncommon frog (*Sphaerotheca maskyei*), samples were collected from natural and degraded habitats, DNA was extracted from tissue samples (toe clips) and sequenced for the 16S rRNA (mitochondrial gene) and RAG 1 (nuclear gene). The genetic analysis revealed that all samples collected during the present study formed a clade with *Sphaerotheca maskeyi* which confirmed the species. Based on 16S gene, *S. maskyei* is found to have a high haplotype diversity (natural: haplotype number (N)=1, haplotype diversity (Hd)=0.96; degraded: N=4, Hd= 0.76); low nucleotide diversity (π) (natural= 0.06, degraded=0.06) showing recent divergence form a common ancestor or population expansion with insufficient time for mutation to accumulate; excess of rare alleles and population expansion, higher mutations but with low frequencies (natural: Tajima's D= -2.43, degraded: D= -1.54) which is also confirmed by Fu and Li's F values (natural= 0.99, degraded=0.67, P> 0.05) showing no strong evidence of deviation from neutrality. Results of AMOVA revealed low genetic differentiation (F_{ST} : 0.10, P=0.07) where only 10% genetic difference is due difference among populations and the rest (90%) of the genetic variation occurs within populations. Based on RAG 1 gene, *S. maskyei* is found to have a high haplotype diversity (natural: N=4, Hd=0.98; degraded: N=4, Hd= 0.67); high nucleotide diversity (π) (natural= 13, degraded=50) showing a population where mutations are accumulating; excess of rare alleles and population expansion, higher mutations but with low frequencies (natural: D= -1.26; degraded: D= -0.05) which is also confirmed by Fu and Li's F values (natural= 0.89, degraded=0.67, P> 0.05) showing no strong evidence of deviation from neutrality. Results of AMOVA revealed low genetic differentiation (F_{ST} : 0.014, P=0.07) where only 1.47% genetic difference is due difference among populations and the rest (98.5%) of the genetic variation occurs within populations.

CBGP-33
Cell and Molecular Biology

MOLECULAR IDENTIFICATION OF SOME COASTAL RAY-FINNED GRUNTS THROUGH DNA BARCODING OF GWADAR, PAKISTAN

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The coastal region of Gwadar district in Balochistan province is one of the vital wetlands in Pakistan. This part of the province is capable to generate income for traditional fishers and ecological supports for surrounding regions as a nursery ground and spawning area possibly for many estuary fishes. The main purposes of this study were to identify fish species using DNA barcodes or partial sequences of Cytochrome oxidase subunit I (COI) and to assess the diversity of fish in Gwadar coasts. Identification with DNA barcoding method is expected to minimize errors in determining the name of species that exist in marine environment of Gwadar. In total 106 out of 551 fish specimens were included for m*olecular analysis. The fish species,* Diagramma picta *had the greatest diversity (number) compared to species of the genus* Pomadasys. A total of 58 mitochondrial COI barcode sequences were obtained from two genera, one family and one order of fishes. The mean length of the sequences was 614 base pairs (bp). *Results revealed 99.84%-100% sequence identity with conspecifics from various geographical regions including Bangladesh, China, India, Iran, Myanmar, Pakistan, Saudi Arabia and United States of America.* These results are the initials of molecular information on fisheries resources in the area and significant for future research on genetic and biological diversity of other fish species. It is concluded that DNA barcoding is an efficient tool for species identification, and the data of this study can be used for formulating sustainable management of marine fisheries in the Gwadar sea waters.

CBGP-34
Cell and Molecular Biology

UNRAVELLING THE GENETIC ETIOLOGY OF HEREDITARY DISORDERS IN SOUTHERN KASHMIRI POPULATION

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AJ&K (Azad Jammu and Kashmir), nestled in the picturesque Himalayas, is a region of breathtaking beauty and rich cultural heritage. Governed by its own president and prime minister, it enjoys semi-autonomous status within Pakistan. The southern districts of Azad Kashmir, include Bhimber, Kotli, and Mirpur. We assessed patients from multiple consanguineous families from Southern Districts of AJK, exhibiting non-syndromal intellectual disability postnatal microcephaly, Hearing loss Hereditary oculocutaneous albinism. With whole exome sequencing (WES) followed by Sanger sequencing and cosegregation analysis. WES analysis identified novel candidate genes, novel mutations in known genes linked with genetic disorders and previously reported mutations in known genes. Thus, our study expands the phenotypic spectrum of the genes linked with hereditary disorders in Kashmiri Population and hence contributed towards better understanding of mechanisms involved in these genetic disorders.

CBGP-35
Cell and Molecular Biology

MYO9B KNOCKDOWN DECREASES THE INVASIVE CAPACITY OF CERVICAL CANCER AND COLON CANCER BY RHOA ACTIVATION IN A SLIT-ROBO DEPENDENT MANNER.

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Cancer progression and metastasis is the leading cause of death worldwide. Myosins are involved in cell movement from primary tumor site to site of invasion. Myosin9B was reported of having a unique Rho-GAP domain that negatively regulates RhoA. This impaired Rho activity leads to increase in cell migration. Slit 2 (a neuronal guidance molecule) activates RhoA and inhibits cell migration. Intracellular domain of Robo is on the other hand reported to interact with Myosin9B diminishing its activity. So, the present study was aimed to investigate whether the Myo9B mediated inactivation of RhoA is dependent on the interaction of Myo9B with Slit-Robo pathway. To elucidate the biological role of Myo9B in multiple carcinomas and its potential use as a rational molecular target for anticancer therapy, siRNA mediated knockdown of Myo9B was employed. Slit2 protein was exogenously administered to evaluate its contribution in Myo9B mediated carcinogenesis. Upon data interpretation, the relationship between Myo9B and Slit-Robo pathway was substantiated, as most of the expression changes that Myo9B suppression instigated, were reversed altogether with Slit2 treatment. Myo9B knock down leads toward depletion of carcinogenic phenotypes in Slit2 dependent manner, so it was further elucidated that Myo9B-Slit-Robo pathway has the capacity to be targeted as potential cancer marker. This is to our knowledge, the first ever report confirming cancer modulation by Myo9b-Slit2-Robo1 pathway in colon cancer and cervical cancer. Additionally, our findings unrevealed future insights to target this very less explored pathway for diagnostic and therapeutic purposes.

CBGP-36
Cell and Molecular Biology

IDENTIFICATION OF INSECT SPECIES THROUGH DNA BARCODES

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The present study aimed to ascertain the diversity of dipteran flies (true-flies) utilizing DNA barcoding technique to gather regional barcode variation insights in Quetta, Balochistan. DNA barcodes or partial sequences of Cytochrome oxidase subunit I (COI) were generated for 283 flies of six genera and seven species (22 BINs) across three subfamilies. The mitochondrial gene cytochrome C oxidase subunit (COI) accessed to examine the genetic diversity among seven different muscid flies. The mean length of the sequences was 658The mean length of the sequences was 614 base pairs (bp). The species *Coenosia attenuatta* identified as the most common representing 83% of all the collected specimens. According to the barcode probe, the largest conspecific divergence was 1.43%, whereas the divergence from the nearest neighbour species ranged between 7.41% to 13.55%. The barcoding of seven fly's species sequence divergence of <2% compared to sequences available in the Barcode of Life Data (BOLD) Systems. A significant difference was found between maximum intra-specific and minimum nearest neighbour distances in all seven species of flies. The neighbour-joining tree analysis demonstrated that all species formed a monophyletic cluster supported by high bootstrap values. The results revealed seven species matching to Barcode Index Number (BINs), five being new to Pakistan (ADZ8350, AEA1946, ADZ9134, AEA2865, AEA0284) and remaining already known from other Asian countries suggesting a shared DNA barcode library highlighting the significance of DNA barcoding in taxonomic resolution and biodiversity efforts. These results indicated the role of COI gene sequences in uncovering the diversification of insects, hence contributing a novel information about DNA barcode diversity of a highly diverse and under studied order of insects.

CBGP-37
Cell and Molecular Biology

UNVEILING THE POTENTIAL OF *ALOE VERA* EXTRACT SUPPLEMENTATION: A COMPARATIVE INVESTIGATION OF ITS EFFECTS ON GROWTH, BODY COMPOSITION, AND HISTOLOGY IN MAJOR CULTURABLE CARP SPECIES *CATLA CATLA* AND *LABEO ROHITA*

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Aloe vera, rich in polysaccharides, having antimicrobial properties is recognized as immunostimulant

making it beneficial in fish feed formulations. This study aimed to investigate the effects of aloe vera leaf extract (ALE) supplementation on growth, body composition, and histology of Major culturable carp species *Catla catla* and *Labeo rohita*, with the goal of developing sustainable growth enhancement methods and reducing reliance on chemical treatments. The experiment was run in triplicates and divided into four treatments i.e. T_0= Control, T_1=1%ALE, T_2=5%ALE, T_3=10%ALE dietary supplementation mixed with the basal feed. The research span was three months using glass aquaria having 10 fish per aquarium. Results showed significantly improved growth under T_2 and T_3, in terms of increase in weight (g), increase in length (cm), specific growth rate ($SGR^{\%}$) and feed conversion ratio (FCR). Body composition analysis demonstrated significantly higher levels of crude protein (%) and fat (%) in T_2 and T_3, while moisture content (%) and ash content (%) were significantly higher in T_0 and T_1 and lower in T_2 and T_3. Histological results were found significant in terms of muscle diameter (µm) and intestine villi length (µm) as they were higher in T_2 and T_3 following the order $T_3 > T_2 > T_1 > T_0$. *Catla catla* showed significant results in terms of growth, body composition, and histology as compared to *Labeo rohita* and this might be due to inherent behaviour of organism making it novel from the others. These findings suggested that aloe vera extract have significant potential as eco-friendly promoter to improve the growth, body composition, and histology of Major culturable carp species (*Catla catla* and *Labeo rohita*).

CBGP-38
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EVALUATING THE EFFICACY OF DIETARY *ALOE VERA* EXTRACT SUPPLEMENTATION ON GROWTH, HEMATOLOGICAL PARAMETERS, AND MEAT QUALITY IN *CIRRHINUS MRIGALA* AND *CTENOPHARYNGODON IDELLA*

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Aquaculture growth is hindered by high feed costs, poor seed quality and disease outbreak. Aloe vera as a growth promoter can offer a natural solution to enhance fish growth in aquaculture facilities. Therefore, the present research was designed for evaluating the effects of dietary aloe vera leaf extract (ALE) supplementation on growth, hematological parameters, and meat quality in *Cirrhinus mrigala* and *Ctenopharyngodon idella*. Four treatments i.e. T_0; Control, T_1; 1%ALE, T_2; 5%ALE and T_3; 10%ALE dietary supplementation mixed with the basal feed with three replications for each treatment and fish were used. The trial was performed for three months duration using glass aquaria of 100L water capacity. The growth [increase in weight (g), increase in total length (cm), specific growth rate (SGR %), and feed conversion ratio (FCR)], hematological parameters (total RBC, total WBC and Hb content), and meat quality [water holding capacity (%), tenderness (N), color, and pH] were analyzed during the research trials. The results revealed that increase in body weight(g) and total body length (cm), and SGR (%) were significantly higher ($p<0.05$) in the T_2 and T_3 treatments as compared to the T_0 and T_1 groups for both the fish following the order $T_3 > T_2 > T_1 > T_0$ while the FCR was in an order of $T_0 > T_1 > T_2 > T_3$. ALE supplementation (T_2 and T_3) significantly influenced hematology of both fish species in terms of increased RBC count and Heamoglobin (Hb) content while WBC was found higher in T_0 as compared to other treatments. The effect of ALE on meat quality was found significantly higher in terms of water holding

capacity (%), tenderness (N), and color under exposure of T_3 while there was no significant result observed in pH of meat among all treatments in both fish species.

CBGP-39
Cell and Molecular Biology

CADHERIN LIKE AND ABC TRANSPORTERS AS BIO-CONTROL IN LEPIDOPTERANS ALTERNATIVE FOR SAFER CLIMATE, HEALTH, FOOD AND HABITAT

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First coined by Harry Smith in relation to the biological control of insects Suppression of insect populations by native or introduced enemies Generic terms A population-leveling process in which the population of one species lowers the number of another. Inexpensive production and formulation of agent must be developed. Biological Control has Constraints as well as Not immediately effective and some others. Classic Biological Control Viruses, Bacteria, Microsporidians, Entomopathogenic fungi, Entomopathogenic nematodes. *Bacillus thuringiensis* (*Bt.)* is gram positive bacterium which forms endospores and produces parasporal crystals. We were able to develop an active formulation by using locally available ingredients like water, sugar, antifoam solution, wheat flour, milk powder and gum Arabica. Toxin-receptor interaction was analyzed by using four different cry proteins. Western blotting, ligand blotting and alkaline Phosphatase (ALP) assay was performed to identify binding-proteins/receptors. From LC-MS/MS data we concluded that the proteins which are possibly important in the mechanism of action of cry proteins are ALP receptors, APN receptors, ABC transporter and others. We are reporting these proteins for the first time which can be probably the receptors of Cry proteins.

CBGP-40
Cell and Molecular Biology

AMELIORATIVE POTENTIAL OF ROBINETIN AGAINST POLYSTYRENE MICROPLASTICS INSTIGATED TESTICULAR TOXICITY VIA MODULATING NRF-2/KEAP-1 PATHWAY, BIOCHEMICAL AND HISTOPATHOLOGICAL PROFILE

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Polystyrene microplastics (PSMPs) are ubiquitous environmental pollutants which adversely affect various body organs including testis. Robenitin (ROB) is a flavonoid which exhibits a wide range of

therapeutic potential. The current study was designed to investigate the ameliorative potential of RN against PSMPs induced testicular damages in adult male rats. Forty-eight adult male albino rats were randomly distributed into 4 groups including control, PSMPs (0.1 mg/kg) treated, PSMPs (0.1 mg/kg) + ROB (50 mg/kg) and ROB (50 mg/kg) only supplemented group. It was revealed that PSMPs exposure reduced the expression of Nrf-2 as well as the activities of glutathione reductase (GSR), glutathione peroxides (GPx), superoxide dismutase (SOD), and catalase (CAT) while escalating the levels of malondialdehyde (MDA) and reactive oxygen species (ROS) and Keap-1. Furthermore, PSMPs intoxication reduced sperm motility, viability, and total sperm count. Besides, the expressions of steroidogenic enzymes (17β-HSD, 3β-HSD and StAR) were reduced in response to PSMPs treatment. Furthermore, PSMPs exposure escalated the expressions of Bax & Caspase-3 while downregulating the expression of Bcl-2. Moreover, administration of PSMPs notably elevated the morphological abnormalities in the normal architecture of sperm (head, tail, and mid-piece). Additionally, the levels of FSH, LH and plasma testosterone were reduced following the exposure to PSMPs. Moreover, administration of PSMPs prompted various histopathological impairments in testicular tissues of rats. However, ROB treatment remarkably protected the testicular tissues via regulating aforementioned biochemical as well as histopathological impairments owing to its antioxidative, anti-inflammatory and androgenic potential.

CBGP-41
Cell and Molecular Biology

CARDIOPROTECTIVE EFFECTS OF ALPINUMISOFLAVONE AGAINST ATRAZINE-INDUCED OXIDATIVE STRESS, INFLAMMATION AND APOPTOSIS

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Atrazine (ATZ) a synthetic triazine herbicide commonly used to control grassy and broadleaf weeds in crops, is a major pollutant of soil and water ecosystems. ATZ exposure has been linked to cardiovascular diseases, which are a leading cause of morbidity and mortality worldwide. Alpinumisoflavone (AIF), a naturally occurring flavonoid, is found in various plants of the *Fabaceae* family and is known for its potent antioxidant, anti-inflammatory, and cardioprotective properties. Therefore, this study was designed to evaluate the therapeutic effects of AIF against ATZ-induced cardiotoxicity in male albino rats. A total of 24 male albino rats were randomly divided into four equal groups: control, ATZ-intoxicated group (50 mg/kg), ATZ + AIF-treated group (50 mg/kg + 15 mg/kg), and AIF-only treated group (15 mg/kg). The results of this study demonstrated that ATZ exposure reduced the activity of catalase (CAT), glutathione peroxidase (GPx), superoxide dismutase (SOD), glutathione-disulfide reductase (GSR), glutathione S-transferase (GST) as well as glutathione (GSH) while elevating the levels oxidative stress markers such as malondialdehyde (MDA) and reactive oxygen species (ROS), while reducing the activities of key antioxidant enzymes. Moreover, ATZ administration led to an elevation in cardiac injury markers, including creatine kinase-MB (CK-MB), lactate dehydrogenase (LDH), and troponin, indicating severe myocardial damage. Additionally, pro-inflammatory cytokines such as tumor necrosis factor-alpha (TNF-α) and interleukin-6 (IL-6) were markedly elevated in ATZ-treated rats. Furthermore, ATZ exposure dysregulated apoptotic markers by increasing Bax and caspase-3 expression while reducing Bcl-2 levels. Histopathological examinations further revealed significant

myocardial degeneration, necrosis, and fibrosis in ATZ-intoxicated rats. However, treatment with AIF significantly restored all biochemical, molecular, and histological alterations, demonstrating its strong cardioprotective effects. Our findings suggested that AIF may serve as a promising therapeutic candidate against ATZ-induced cardiotoxicity, primarily through its antioxidant, anti-inflammatory, and anti-apoptotic mechanisms.

CBGP-42
Cell and Molecular Biology

PHARMACOTHERAPEUTIC ROLE OF NARIRUTIN AGAINST POLYSTYRENE MICROPLASTICS INDUCED HEPATIC DYSFUNCTION VIA REGULATING NRF-2/KEAP-1 PATHWAY

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Polystyrene microplastics (PSMPs) are environmental contaminants and have become a global concern owing to their adverse effects on living organisms. Narirutin (NR) is a naturally occurring polyphenolic compound which demonstrates a wide range of pharmacological potentials. The current investigation was conducted to elucidate the hepatoprotective role of NR against PSMPs instigated hepatotoxicity. Twenty-four albino rats were equally distributed into four groups, i.e., control, group PSMPs (0.01 mg/kg) treated, PSMPs (0.01 mg/kg) + NR (50 mg/kg) co-treated, and only NR (50 mg/kg) supplemented group. Our results revealed that exposure to PSMPs reduced the activities of antioxidant enzymes, including catalase (CAT), superoxide dismutase (SOD), peroxidase (POD), glutathione reductase (GSR), glutathione peroxidase (GPX) and glutathione S-transferase (GST) while escalating the levels of reactive oxygen species (ROS) and malondialdehyde (MDA). Furthermore, PSMPs intoxication elevated the levels of alanine aminotransferase (ALT), alkaline phosphatase (ALP), and aspartate aminotransferase (AST). Besides, PSMPs administration increased the levels of nuclear factor (NF)-κB, tumor necrosis factor (TNF)-α, interleukin (IL)-1β, interleukin (IL)-6, and activity of cyclo-oxygenase (COX-2). Moreover, the PSMPs exposure upregulated the expression of Bax, Caspase-3, and Caspase-9 while downregulating the expression of Bcl-2. Additionally, PSMPs administration disrupted the normal architecture of hepatic tissues. Nonetheless, ROB treatment significantly protected the hepatic tissues via regulating aforementioned dysfunctions. The current research manifested that NR is a useful curative compound due to its medicinal properties against PSMPs prompted hepatotoxicity.

CBGP-43
Cell and Molecular Biology

THERAPEUTIC POTENTIAL OF ROBINETIN AGAINST POLYSTYRENE MICROPLASTICS INSTIGATED CARDIAC TOXICITY VIA MODULATING NRF-2/KEAP-1 PATHWAY, INFLAMMATORY, APOPTOTIC AND HISTOLOGICAL ASSESSMENT

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Polystyrene microplastics (PSMPs) have gained world attention due to their widespread distribution and hazardous impacts on body organs including the heart Robinetin (ROB) is naturally occurring flavonoid with extensive curative properties. The current investigation was planned to investigate the protective effects of ROB against PSMPs induced cardiac damage. Thirty-two male albino rats (n=6) were divided into four groups: control, PSMPs (0.1mg/kg) m PSMPs (0.1mg/kg) + ROB (20mg/kg) and only ROB (20mg/kg) treated group. Our results revealed that exposure to PSMPs reduced the activities of antioxidant enzymes, including catalase (CAT), superoxide dismutase (SOD), peroxidase (POD), glutathione reductase (GSR), glutathione peroxidase (GPX) and glutathione S-transferase (GST) while escalating the levels of reactive oxygen species (ROS) and malondialdehyde (MDA). Furthermore, PSMPs intoxication elevated the levels of creatine kinase-MB (CK-MB), creatine phosphokinase (CPK), lactate dehydrogenase (LDH) and Troponin I. Besides, PSMPs administration increased the levels of nuclear factor (NF)-κB, tumor necrosis factor (TNF)-α, interleukin (IL)-1β, interleukin (IL)-6, and activity of cyclo-oxygenase (COX-2). Moreover, the PSMPs exposure upregulated the expression of Bax, Caspase-3, and Caspase-9 while downregulating the expression of Bcl-2. Additionally, PSMPs administration disrupted the normal architecture of hepatic tissues. Nonetheless, ROB treatment significantly protected the hepatic tissues via regulating aforementioned dysfunctions. The current research manifested that NR is a useful curative compound due to its medicinal properties against PSMPs prompted hepatotoxicity.

CBGP-44
Cell and Molecular Biology

NEPHROPROTECTIVE EFFECTS OF ALPINUMISOFLAVONE AGAINST GLYPHOSATE-INDUCED KIDNEY DAMAGE IN MALE ALBINO RATS

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Glyphosate is a ubiquitous and water-soluble herbicide which has potential to cause systematic poisoning. Glyphosate intoxication is known to be associated with various clinical complications including nephrotoxicity. Alpinumisoflavone (AIF) is a plant-derived pyranoisoflavone that is found in many plants, such as *Erythrina variegate*, *Erythrina lysistemon*, and *Millettia thonningii*, and the fruits of *Cudrania tricuspidate.* This study was designed to estimate the protective effect of AIF, against glyphosate-induced

renal toxicity in rats. Animals were separated into four different groups and designated as control, Glyphosate (50 mg/kg) treated, Glyphosate + AIF (50 mg/kg and 15 mg/kg respectively) treated, and AIF (15 mg/kg) treated groups. After 30 days of trial, rats were dissected and antioxidant enzymes, renal damage markers, inflammatory markers, DNA damage, and histopathology were observed. Catalase (CAT), glutathione peroxidase (GPx), superoxide dismutase (SOD), glutathione-S-transferase (GST) activities and glutathione (GSH) content were significantly reduced. In contrast, malondialdehyde (MDA) and reactive oxygen species (ROS) levels were significantly increased due to Glyphosate exposure. Glyphosate treatment caused a significant ($p < .05$) increase in urea, creatinine, urobilinogen, kidney injury molecule-1 (KIM-1) and neutrophil gelatinase-associated lipocalin (NGAL) levels while a substantial reduction in creatinine clearance was observed. Glyphosate exposure significantly increased the inflammatory markers, including nuclear factor kappa-B (NF-κB), tumor necrosis factor-α (TNF-α), Interleukin-1β (IL-1β), Interleukin-6 (IL-6) levels and cyclooxygenase-2 (COX-2) activity. The results demonstrated that Glyphosate exposure significantly increased the histopathological damages. However, AIF treatment significantly restored the damage induced by Glyphosate. These results revealed that the AIF is an effective compound, having curative potential to counter the Glyphosate-induced renal damage.

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Cell and Molecular Biology

PROTECTIVE EFFECTS OF C. CASSIA AGAINST BISPHNOL A IN LIVER OF MALE SPRAGUE DAWLEY RATS

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Bisphenol-A (BPA) is a toxic, endocrine-disrupting, mutagenic, and carcinogenic compound. Cinnamon (*C. cassia*) has gained attention for its antioxidant properties. This study evaluated the protective effects of *C. cassia* against BPA-induced toxicity in Sprague Dawley rats. The study used rats averaging 300g body weight, divided into control and treated groups. The control group included normal control (C; untreated), vehicle control (P; 1ml olive oil), and positive control (BG1; BPA-treated). Treated groups included pre-treated (CG2; *C. cassia* at 225 mg/kg/BW 24 hours before BPA) and post-treated (CG3; *C. cassia* at 225 mg/kg/BW after BPA). Liver biomarkers (Total bilirubin, ALP, LDH, ALT) and kidney biomarkers (BUN, creatinine, uric acid) were assessed. BPA exposure significantly elevated ALT and ALP levels, indicating liver injury and increased liver weight. Similarly, blood parameters increased in BPA-treated rats, followed by post-treated and pre-treated groups. The study concluded that BPA exerts severe adverse effects, with greater toxicity in post-treated rats than pre-treated ones. *C. cassia* showed partial protective effects, suggesting its potential in mitigating BPA-induced toxicity when administered before exposure.

CBGP-46
Cell and Molecular Biology

DNA BARCODING, PHYLOGENETICS, AND MORPHOMETRIC ANALYSIS OF VARIOUS FRESHWATER FISHES

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Fish are diverse aquatic organisms, economically significant as a primary source of food and nutrients. Accurate species identification is crucial for conservation, taxonomy and management. This study combined morphological and COI gene-based approaches to identify and characterize fish diversity from three locations in Malakand Division, Khyber Pakhtunkhwa Pakistan. All species were identified morphologically. DNA was extracted using phenolchloroform method followed by PCR and sequencing. The consensus sequences were then utilized as search queries in BLASTn. BioEdit was used for trimming and MEGA X for phylogenetic study. Fourteen specimens representing eight species (*Tariqilabeo latius, Mastacembelus armatus, Tor putitora, Carassius auratus, Cyprinus carpio, Garra gotyla, Channa punctata and Channa gachua*) from three orders were analyzed. Results showed AT (54.23%) and GC (45.77%) contents, and a high Simpson's diversity index (0.925), indicating rich species presence and evenness. Density, relative density, frequency, relative frequency and morphometric measurements were also calculated. This study validates the effectiveness of integrating morphological and molecular identification using COI gene for fish species in the region, highlighting its potential for broader application. Biodiversity metrics provide insights into its distribution in the area. Our findings contribute to the understanding of fish diversity in Pakistan and inform conservation and management efforts.

CBGP-47
Cell and Molecular Biology

SCREENING OF THE FAMILIES WITH HEREDITARY SKELETAL DYSPLASIA

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Skeletal dysplasia is a clinical and genetic multiplex disorder of bone and cartilage growth that affects the development, growth and maintenance of the human skeleton. Recently, 100 types of skeletal dysplasia have been reported, making diagnosis difficult. The presence of individual conditions rarely increases diagnostic complexity. Establishing a precise diagnosis is important for several reasons, including the exact recurrence risk, forecast of normal adult height, appropriate clinical cure, and prenatal findings of pregnancies. In current study Two Kashmiri families segregating hereditary skeletal anomalies were recruited from Neelum Azad Jammu and Kashmir. Homozygosity mapping of Family A showed a homozygous region on *WNT10B* gene. Sanger sequencing revealed a variant c.338G>A (p. Gly113Asp) in

exon 4 of *WNT10B* gene (previously reported in a Pakistani family of KPK origin). Family B is Post Axial Polydactyly type A (PAPA) which failed to show any homozygous region on previously reported PAPA genes (*FAM92A1, IQCE, GLI1, ZNF141, KIAA0825, EFCAB7, DACH1*). Thus, our study broadens the phenotypic spectrum of Hereditary Skeletal dysplasia in Pakistani Population.

CBGP-48
Cell and Molecular Biology

LICORICE ROOT EXTRACT AND AMNIOTIC MEMBRANE IN HYDROGEL FORMULATIONS: A HERBAL APPROACH TO BURN WOUND CARE

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Burns remain one of the most devastating injuries in emergency medicine, necessitating the development of novel bandages. Because of their low toxicity and equivalent efficacy, herbal medications are increasingly being used instead of synthetic treatments. Biomaterials such as the human amniotic membrane (AM) and diverse plant extracts are gaining popularity among researchers worldwide because to their potential use in enhanced wound healing therapies. Licorice *(Glycyrrhiza glabra*) is a popular medicinal plant, used in both traditional and modern formulations for its anti-inflammatory, antimicrobial, and wound-healing properties. The primary goal of this study was to create hydrogel dressings that included licorice root extract and amniotic membrane to improve burn wound healing. Licorice hydroalcoholic extract was made with ethanol as a solvent. Under general anesthesia, the albino rats were shaved, and second-degree burns were inflicted on their dorsal skin. The control group was given a local anti-inflammatory cream, whereas the intervention group was given hydrogel formulations with three different doses of licorice root hydroalcoholic extract alone, as well as three formulations with both the extract and the amniotic membrane combined. To examine the structural integrity of the hydrogel, the formulations' physicochemical parameters, such as pH, viscosity, spreadability. ty, and swelling ratio, were measured. The extract's antibacterial activities on several wound infection pathogens were also investigated in vitro. GC-MS was used to analyze licorice root extract, detecting many flavonoids and saponins. Histological results, as determined by Hematoxylin and Eosin (H&E) staining, showed that higher concentrations of licorice extract, due to their antibacterial activities, accelerated wound healing, re-epithelialization, and wound contraction. Furthermore, the use of both licorice extract and amniotic membrane produced the best results. Its bioactive components, which include glycyrrhizin, flavonoids, and phenols, make it a promising herbal therapy for burn wound treatment since they reduce inflammation, prevent infections, and promote tissue regeneration.

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Cell and Molecular Biology

MULTIFUNCTIONAL HYDROGEL INTEGRATING *CARCIA PAPAYA* LEAF EXTRACT AND DECELLULARIZED AMNIOTIC MEMBRANE FOR BURN WOUND REGENERATION

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Burn wounds pose significant clinical challenges due to infection risks, delayed healing, and scarring, necessitating advanced therapies. *Carica papaya* leaf extract, rich in proteolytic enzymes (papain, chymopapain) and bioactive flavonoids (quercetin, kaempferol), offers enzymatic debridement and growth factor-mimetic properties. Decellularized human amniotic membrane (hAM), a collagen/fibronectin-rich scaffold with anti-inflammatory and antimicrobial activity, provides a biocompatible extracellular matrix (ECM) for tissue repair. This study engineered a hydrogel combining papaya extract (100–300 mg) with hAM (2 g) to synergistically address burn healing. Physicochemical characterization confirmed optimal pore size, swelling index (220–380%), physiological pH (6.1–6.8), thermal stability (up to 230°C), and spread ability (880–1740 cP), suitable for clinical application. GCMS validated papaya's bioactive compounds, while antimicrobial assays demonstrated efficacy against S. aureus, E. coli, Klebsiella, and Candida species. Cytotoxicity assays (LC_{50}: >1000 µg/mL for 200 mg papaya + 2 g hAM, G2) confirmed safety. The goal was to develop a cost-effective, dual-action hydrogel leveraging hAM's ECM support and papaya's bioactivity. Results showed G2 enhanced fibroblast proliferation (40%) and keratinocyte migration in vitro. In a rat second-degree burn model, G2 achieved 95% wound contraction by day 21, surpassing silver sulfadiazine and hAM-only controls, with histology revealing mature collagen (Type I:III ratio 3:1). This hydrogel integrates tissue engineering and phytotherapy, offering a scalable, affordable alternative for burn care, particularly in resource-limited settings. Further clinical studies are warranted to validate long-term efficacy.

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Cell and Molecular Biology

PREDICTION OF CARCINOGENIC POTENTIAL OF SMALL MOLECULES USING MACHINE LEARNING BASED FEATURE SELECTION APPROACH

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Predicting the carcinogenic potential of different substances that may cause cancer plays a vital role in ensuring public safety and supporting regulatory decisions. Traditional methods depend on long-term in vivo studies using animal models for testing carcinogenicity, which are expensive, time consuming and ethically challenging. To overcome these limitations new approaches have developed including in vitro tests and computational models which offer more effective and quick way to predict the carcinogenic

Potential. In this study, we present a machine learning-based feature selection approach to predict the carcinogenicity of small molecules, utilizing Mold2 and Mold2Vec descriptors to represent chemical structures. A dataset of 863 compounds (561 carcinogens and 302 non-carcinogens) from the National Center for Toxicological Research liver cancer database (NCTRlcdb) was used. The dataset was stratified into training (554 compounds), development (138 compounds), and test sets (171 compounds). Mold2 descriptors capture a wide array of structural features, while Mold2Vec descriptors provide vectorized representations of molecular substructures, allowing for effective encoding of chemical properties. Several machine learning models were implemented, including Support Vector Machines (SVM), Random Forest (RF), Gradient Boosting Machines (XGBoost), and Logistic Regression (LR). Feature selection methods—minimal redundancy maximum relevance (MRMR), mutual information maximization (MIM), and univariate regression—were applied to enhance model performance. Random Forest consistently outperformed other models, achieving the highest AUC-ROC values in both development (0.775) and validation (0.754) phases when using Mol2Vec descriptors. The results demonstrate the efficacy of machine learning models in carcinogenicity prediction, with Random Forest emerging as the most reliable approach. The study underscores the potential of Mold2 and Mold2Vec descriptors in toxicity prediction tasks, offering an interpretable and computationally efficient alternative to deep learning models. Future work will focus on expanding the dataset, incorporating additional molecular descriptors, and validating the models across diverse chemical spaces to further improve their predictive power.

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GENETIC ASSOCIATION STUDY OF PRE-miRNA-196a2 rs11614913 IN LIVER CANCER

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Hepatocellular carcinoma (HCC) is the second leading cause of cancer worldwide, with a male-to-female ratio of 2-2.5:1.8. Most cases are diagnosed at advanced stage, resulting in a low overall survival rate. MicroRNA miR-196a2 (rs11614913) has been linked to HCC progression and may serve as a prognostic marker, especially in Asian populations. This case-control study involved 288 participants including 98 healthy controls (Group I), 96 HCV positive cases (Group II), and 94 HCV positive HCC cases (Group III). Various demographic risk factors, biochemical markers and MicroRNA miR-196a2 SNP rs11614913 were analyzed in cases and controls. Significant differences were observed in gender, age, and education ($p<0.001$), with elevated ALT, AST, and AFP levels in the HCC group compared to controls ($p<0.001$). Group III exhibited lower total protein and albumin levels and higher bilirubin levels than Group II ($p<0.001$). However, no significant difference was observed for miR-196a2 SNP rs11614913 among the groups. This study underscores the role of demographic risk factors, biochemical markers and miR-196a2 SNP rs11614913 in HCC, highlighting the need for further research to validate these findings and explore their potential in early detection and treatment strategies.

CBGP-52
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ASSOCIATION OF CTNNB1 GENE SNP rs3864004 with HCC IN SOUTHERN PUNJAB, PAKISTAN

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Liver cancer is linked to high death rate globally and the hepatocellular carcinoma (HCC) is the very familiar type of the primary liver cancer. Males are more likely to develop HCC than females, which primarily affects those over age 50. HCC is influenced by various risk factors, including non-genetic and environmental factors. One of the important factors contributing to HCC development is persistent inflammation along with particular somatic mutations in primary genes. A somatic mutation linked to a risk of malignant transformation in HCC is CTNNB1 mutations, which activate β-catenin as a result. In this study, the relationship between HCC and rs3864004 polymorphism of CTNNB1 gene in the population of Southern Punjab was examined. A total of 125 patients of HCC as well as 100 healthy individuals from the Multan Institute of Nuclear Medicine and Radiotherapy (MINAR) were included in the study. DNA was extracted using inorganic salt extraction method, followed by genotyping of polymorphism by TETRA ARMS PCR. The association between CTNNB1 rs3864004 with HCC was assessed using a chi-square test. By applying the Hardy-Weinberg equilibrium law to analyze the genotypic frequency of patients and controls, it was determined that the G/G genotype is more prevalent in HCC patients compared to the healthy participants. Statistical analysis demonstrated a significant association between the Homozygous G/G genotype and HCC in Pakistan.

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Cell and Molecular biology

ASSOCIATION OF microRNA-146A SNP rs2910164 WITH BREAST CANCER

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Breast carcinoma is one of the deadliest cancers among other cancers and the most prevalent malignancy in females around the world. Data from public health reports indicate that every year; over a million of females are diagnosed with breast carcinoma globally. MicroRNAs are endogenous molecules of non-coding ribonucleic acids that are short (21–24 nucleotides long) and function post-transcriptionally to control the activity of genes by translational inhibition or mRNA break down. Numerous anomalies have been connected with the alterations in their growth, including breast carcinoma (BC) depending on the type of cancer and the cellular environment, a miRNA can act both as a tumor-suppressive or cancer-causing agent. MiRNA-146a C/G gene variations have previously received greater interest in relation to the aetiology of malignancies. The study consisted of 120 cases and 100 controls. Tetra-ARMS-PCR was employed for genotype analysis of mir-146a SNP rs2910164. Moreover, other risk factors (age,

breastfeeding and family history of any cancer) were also analyzed. Statistical analysis of data among cases and controls showed significant difference in age (Chi-square=45.025, P-value=0.000). However, no statistically significant difference was found regarding family history of any cancer, breast feeding and mir-146a SNP rs2910164.

CBGP-54
Cell and Molecular biology

ASSOCIATION OF Mir-196a2 SNP rs11614913 WITH BREAST CANCER

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Cancer is an extremely complicated disease in which cells divide against their own rules and grow beyond management. Tissue from the breast is the source of breast carcinoma, typically found in the segments which deliver milk to the ducts as well as the innermost layer of the ducts. Breast carcinoma exhibits significant heterogeneity, characterized by a wide range of intratumoral as well as intertumoral non-uniformity and carcinoma variability among affected people. MicroRNAs are small, extremely stable ribonucleic acid fragments which primarily regulate gene expression rather than encoding proteins. The activities of miRNA can be altered by various genetic modifications, such as alterations to epigenetics, massive mutations, and single nucleotide polymorphisms (SNPs). Breast carcinoma has associated with a variety of microRNAs which either act as oncogenic miRNA or tumor suppressive miRNA. Hence the study was designed to find association of Mir-196a2 SNP rs11614913 With Breast Cancer. The study consisted of 120 cases and 100 controls. Tetra-ARMS-PCR was employed for genotype analysis of Mir-196a2 SNP rs11614913. Moreover, other risk factors (menarche age, menstrual status and history of any other disease) were also analyzed. The statistical analysis of data revealed significant differences for Mir-196a2 SNP rs11614913 and menstrual status between cases and controls. But no statistically significant difference was observed for menarche age and history of any other disease.

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Cell and Molecular Biology

IN SILICO STUDIES OF *EUCALYPTUS RUDIS* PHYTOCHEMICALS ON ANTIOXIDANT AND DETOXIFYING ENZYMES OF *TRIBOLIUM CASTANEUM*

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Global postharvest grain losses due to insect pests range from 30% to 40%. *Tribolium castaneum* alone account for approximately 30% of total losses in tropical regions. Excessive use of insecticide negatively affects the environment, non-target organisms, water quality, and human health. This highlights

the need for safer alternatives of pest control like essential oils. This study evaluated the insecticidal potential of *Eucalyptus rudis* essential oil against antioxidant and detoxifying enzymes of *T. castaneum* via computational (*in silico*) approaches. Autodock Vina was used to assess the binding affinities of 15 *E. rudies* phytochemicals (ligands) against *T. castaneum* enzymes (target proteins). Molecular interactions of docked ligand-protein pairs were visualized using PyMOL and Discovery Studio. The ADME properties of the proposed ligand were analyzed using SWISS-ADME, pkCSM, admetSAR, and ADMETlab 2.0 to assess pharmacokinetics and drug-likeness. The results revealed that α-pinene has maximum inhibitory effects on acetylcholinesterases (AChEs), carboxylesterasess (CES), catalases (CATs), cytochrome P450s (CYP) and superoxide dismutase (SODs) enzymes. It is followed by γ-gurjunene, aromadendrene, viridiflorol, ent-spathulenol, and isocaryophyllene. ADME analysis manifested that Isocaryophyllene and γ-Gurjunene had acceptable ecotoxicological profile because of low gastrointestinal absorption and blood brain impermeability. These findings illustrate the potential of *E. rudis* derived phytochemicals as eco-friendly alternatives to existing pesticides, presenting insights for sustainable pest management techniques and emphasizing opportunities for further research and application in pest control.

CBGP-56
Cell and Molecular Biology

INVESTIGATING THE EFFECT OF *MORINGA OLEIFERA* AND *AGARICUS BISPORUS* MEDIATED ZINC OXIDE AND SELENIUM NANOPARTICLES ON ENHANCING GROWTH, CARCASS TRAITS, AND MEAT QUALITY OF JAPANESE QUAIL (*COTURNIX JAPONICA*)

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` Nanotechnology presents innovative opportunities to utilize nanoparticles as alternative sources of conventional poultry feed. Among these, zinc oxide (ZnO) and selenium (Se) nanoparticles (NPs) have recently attracted significant attention for their potential benefits in poultry nutrition. In present study, ZnO and Se NPs were biofabricated using *Moringa oleifera* leaves (Zn-Mg, Se-Mg) and *Agaricus bisporus* (Zn-Ag, Se-Ag). The NPs were characterized by Fourier Transform Infrared spectrometry (FTIR) and scanning electron microscopy (SEM). The effects of varying concentrations of these nanoparticles on the growth performance, carcass characteristics, and meat quality of Japanese quail were evaluated. 85 one-day-old Japanese were divided into 17 groups, each group comprised of 5 birds in a triplicate completely randomized design and fed diets containing biofabricated ZnO and Se NPs for a 5-week period. Group 1 received a basal diet without supplement was used as control group and group 2-17 were fed with a basal diet supplemented with Zn-Mg and Zn-Ag NPs (20-80 mg/kg) and Se-Mg and Se-Ag NPs (0.05-0.3 mg/kg) were used as treated groups. The results indicated that supplementation with Zn-Mg NPs at 40 mg/kg, Zn-Ag NPs at 80 mg/kg, Se-Mg NPs at 0.1 mg/kg, and Se-Ag NPs at 0.3 mg/kg significantly enhanced body weight (163.0 g, 184.2 g, 178.0 g, and 172.8 g respectively) while effectively reducing feed intake (167 g, 175.0 g, 146.4 g, and 150 g respectively) and over all feed conversion ratio for 1-5weeks (3.94, 3.32, 3.58 and 3.60 respectively) as compare to the control (4.76). These optimized nanoparticle doses exhibited marked linear effects on key carcass traits (103.65 g for Zn-Ag NPs),

demonstrating their potential to improve overall growth performance. Additionally, the quality of quail meat was notably improved, with the supplementation leading to optimal pH levels, a shift toward lighter meat color, and a reduction in drip loss. The findings underscore the efficacy of these nanoparticles as dietary supplements particularly Zn-Ag NPs at 80 mg/kg, highlighting their role in enhancing both growth performance and meat quality in Japanese quail, offering promising implications for poultry nutrition and production.

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Cell and Molecular biology

MITOCHONDRIAL ND3 GENE MUTATIONS IN BREAST CANCER PATIENTS: EXPERIMENTAL AND COMPUTATIONAL ANALYSIS of Mt: A10398G

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Breast cancer is the most common malignancy in women and a leading cause of mortality, despite advancements in screening and treatment. The mitochondrial genome shows high variability in breast cancer patients, with mutations linked to altered energy production in tumor cells. This study investigates molecular alterations in the MT-ND3 gene, part of NADH dehydrogenase (Complex I of the respiratory chain), in women with breast cancer. Blood and tissue samples were collected from breast cancer patients, with blood samples from selected healthy individuals. The MT-ND3 gene was amplified using PCR and analyzed via Sanger sequencing. Bioinformatics tools, including PolyPhen-2, PhD-SNP, PANTHER, Align-GVGD, and SNPs & GO, evaluated the pathogenicity of the mutations. Sequencing revealed a mutation at position 10398 (A>G), resulting in a threonine to alanine substitution, along with two synonymous mutations (MT: 10400 and MT: 10253). This mutation was found in 75% of breast cancer patients, consistent with studies from Sri Lanka and Bangladesh, but absent in Polish women. *In silico* analysis indicated this mutation is likely benign but decreases protein stability (free energy change of -0.5 kcal/mol) and increases hydrophobicity. These findings suggest that the MT-ND3 mutation may contribute to breast cancer development and underscore the need for further research to clarify the relationship between MT-ND3 mutations and breast cancer, particularly regarding gene expression and cancer biology implications.

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Cell and Molecular Biology

EXPLORING THE ANTICANCER POTENTIAL OF MARINE BROWN ALGAE AS ESTROGEN RECEPTORS ALPHA INHIBITOR

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Cancer remains a major global health concern and is currently the second-leading cause of death worldwide. Among women, breast cancer is one of the most common malignancies. Current treatments used for breast cancer are effective but have drawbacks such as Tamoxifen resistance, adverse side effects, and the potential for cancer recurrence. Therefore, there is a constant need of novel targeted therapeutics. This study aims to investigate the effects of phlorotannins derived from marine brown algae on the estrogen receptor alpha (ERα) function in breast cancer cells. Molecular docking studies were conducted using AutoDock Vina to predict binding affinities between ERα (3ERT) and selected ligands. CASTp analysis was employed to identify potential binding pockets, providing insights into ligand-protein interactions. Visualization and structural analysis of ligand-protein complexes were performed using BIOVIA Discovery Studio, ensuring accurate evaluation of ligand stability and positioning within the receptor. Molecular docking. The binding energies ranged from -5.1 to -12.7 kcal/mol. Notably, Ligand ID 137388 and Ligand ID 3008867 exhibited the lowest binding energies at -12.7 and -12.5 kcal/mol, respectively, indicating the strongest binding affinity to the ERα protein. ADMET predictions indicated favorable pharmacokinetic properties, supporting their drug-likeness. The computational findings highlight the potential of plant-derived phytoactive compounds as ERα inhibitors, paving the way for future in vitro and in vivo validation.

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Cell and Molecular Biology

EXPLORING THE ANTICANCER POTENTIAL of MARINE BROWN ALGAE FUCOIDAN DERIVATIVES AS ESTROGEN RECEPTOR ALPHA INHIBITOR in BREAST CANCER ESTROGEN RECEPTORS ALPHA INHIBITOR

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Cancer begins when a cell breaks free from the normal restrains on uncontrolled growth and spread. The second most common cause of cancer-related mortalities in women is breast cancer. Breast cancer is when breast cells mutate and become cancerous cells that multiply and form tumors. This study aims to

investigate the role of ERα in breast cancer, evaluate the potential of phytoactive compounds as anticancer agents, and examine the anticancer properties of Fucoidan and its derivatives. The ERα protein is retrieved from the PDB database. The proteins and selected ligands were docked using AutoDock Vina. The resulted complexes were then visualized using discovery studio visualization and ligplot. A total of 13 ligands were examined, with binding energies ranging from -4.9 kcal/mol to -6.0 kcal/mol. Fucoidan and its derivatives can inhibit breast cancer by binding to the estrogen receptor alpha (Erα). Based on specific binding energies, these compounds demonstrate a strong affinity for Erα through hydrophobic interactions, carbon-hydrogen bonds, and conventional hydrogen bonds. A lower binding energy indicates greater stability of the ligand-protein complex. ADMET predictions indicated favorable pharmacokinetic properties, supporting their drug-likeness. The computational findings highlight the potential of brown algae derived fucoidan as ERα inhibitors, paving the way for future in vitro and in vivo validation.

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Cell and Molecular biology

ANTIADIPOGENIC POTENTIAL OF *CISSUS QUADRANGULARIS*

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Herbal alternatives for weight loss present a promising solution, offering effective reductions in body mass index (BMI) without the severe side effects associated with conventional drugs. Among these, *Cissus quadrangularis* (CQ) has emerged as a potent candidate for weight management. Our laboratory research highlights the anti-adipogenic properties of CQ solvent fractions and their potential role in combating obesity. Through comprehensive analysis of cell viability, growth, proliferation, and metabolic activity in the 3T3-L1 cell line, we identified non-cytotoxic, metabolically active concentrations of Ethyl Acetate (CQ-EA), Butanol (CQ-B), Dichloromethane (CQ-D), and Hexane (CQ-H) fractions. These fractions were administered during the differentiation of 3T3-L1 cells into adipocytes (adipogenesis). Subsequent gene expression profiling revealed that CQ fractions significantly downregulated key adipogenic and lipogenic markers, including peroxisome proliferator-activated receptor-gamma (PPAR-γ), adiponectin (ADIN), fatty acid binding protein-4 (FAB4/aP2), and leptin (LPN). The anti-adipogenic potential of CQ fractions was further corroborated by reduced triglyceride levels and decreased neutral lipid accumulation, as evidenced by Oil Red O (ORO) staining. A reduction of 40–50% in triglycerides and neutral lipids was established as the benchmark for an effective anti-obesity agent. *Cissus quadrangularis* demonstrated remarkable efficacy in inhibiting adipocyte differentiation and lipid synthesis, positioning it as a potent anti-obesity agent capable of modulating cytokine production, including adiponectin and leptin. Western blot analysis confirmed lower protein expression levels of PPAR-γ, FAB-4, and fatty acid synthase (FAS), further validating these findings. Finally, Gas Chromatography-Mass Spectrometry (GC-MS) analysis of the CQ-H fraction, which exhibited the most pronounced anti-adipogenic effects, provided additional insights into its bioactive components.

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Cell and Molecular biology

MOLECULAR CHARACTERIZATION OF ZNT REGULON FOR MULTI-METAL RESISTANCE IN *KLEBSIELLA PNEUMONIAE*

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Metals at high concentration are toxic to microorganisms. A chromosomally encoded *znt* operon plays an important role in multi-metal resistance in some members of Enterobacteriaceae. However, its role has not yet been explored in *K. pneumoniae*. This operon comprises two putative genes *i.e. zntR* and *zntA*. *zntR* gene was amplified and cloned in pTZ57R. ZntR protein was expressed in pET expression system and purified through Fast Protein Liquid Chromatography (FPLC). ZntA was purified from *Shigella sonnei* which is 96% homologous to *K. pneumoniae* ZntA. A construct of SsZntA wild type with 6 His-tag in pET22b was proceeded further for affinity chromatography using Ni-NTA resin to yield purified protein. Purified SsZntA protein was used for various crystallization conditions and crystals were observed at 0.05 M to 0.3 M CaCl2.2H2O, 15% to 35% v/v PEG-400, 0.1 M HEPES, pH 7.0 and 4°C (app. -5°C/- 6°C). Transcriptional analysis of znt regulon using different concentrations of metal helped to reach significant results.

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Cell and Molecular Biology

MITIGATION OF NSAID-INDUCED SMALL INTESTINAL DAMAGE IN A MOUSE MODEL USING MORINGA LEAF POWDER

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Nonsteroidal anti-inflammatory drugs (NSAIDs), being analgesic and anti-inflammatory, are one of the commonly used drugs. Patients, such as suffering from arthritis, have to take NSAIDs regularly to relieve pain and inflammation. Capsule endoscopy has shown that long-term use of NSAIDs cause enteric ulcers. However, availability of therapeutic resources is limited. Soluble dietary fibers are considered miracle for the treatment of NSAIDs induced small intestinal damage. In this project, efficacy of moringa leaf powder, a source of soluble dietary fiber, was determined against enteropathy induced through indomethacin (an NSAID) administration in mice model and compared with that of a drug lansoprazole. The gross and histopathological analyses of each of the three parts of small intestine reveled that indomethacin induced inflammation was comparably mitigated in moringa and lansoprazole groups. Protective role of moringa was also checked at molecular level by gene expression study through real-time PCR. An increase in the expression of pro-inflammatory and antioxidant biomarkers (*Tnf-α, iNos, eNos, Cxcl-1* and *Gpx-2*) was observed in the indomethacin group that was partially reversed in moringa and lansoprazole groups. The down regulation of *Cox-2* and mucosal and epithelial layers integrity markers (*Muc-2* and *Cldn1)* in indomethacin group in comparison to control was also mitigated in other groups.

The efficacy of moringa leaf powder against NSAID induced enteropathy in mice, as revealed by this study, suggests that arthritis patients should consider using it during their treatment.

CBGP-63
Cell and Molecular biology

DIFFERENTIAL PROTEOME MAPPING: METAL STRESS RESPONSES IN A NEWLY DISCOVERED PARAMECIUM SPECIES

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Microbial-mediated bioremediation has a substantial potential to successfully restore the polluted environment, however, limited understanding of the underlying mechanisms hampers the implication of microbial-mediated bioremediation. The emergence of transcriptomics, proteomics, and metabolomics (referred to as OMICS) at the whole genome level represent a promising toolkit to address these questions. Here, a mass spectrometry-based quantitative proteome profiling approach was conducted to explore the differential protein levels in cadmium-treated *Paramecium multimicronucleatum*. The Proteome Discoverer software was used to identify and quantify differentially abundant proteins. The proteome profiling generated 7,416 peptide spectral matches, yielding 2824 total peptides, corresponding to 989 proteins. The analysis revealed that 29 proteins exhibited significant ($p \leq 0.05$) differential levels, including a higher abundance of 6 proteins and reduced levels of 23 proteins in Cd2+ treated samples. These differentially abundant proteins were associated with stress response, energy metabolism, protein degradation, cell growth, and hormone processing. Briefly, a comprehensive proteome profile in response to cadmium stress of a newly isolated Paramecium has been established that will be useful in current and future studies to identify critical components involved in the bioremediation and detoxification of metal ions in the environment.

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Molecular Biology

A PHYLOGENETIC ANALYSIS OF SCELIO (SCELIONIDAE: HYMENOPTERA) USING MITOCHONDRIAL CYTOCHROME C OXIDASE I (COI)

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This study investigates the phylogeny and DNA barcoding results of *Scelio* endoparasitoids to assess

their evolutionary relationships and potential as biocontrol agents. Surveys of *Scelio* species, which parasitize acridid eggs, were conducted in the desert regions of Sindh, Punjab, and Balochistan Provinces during 2023–2024. Parasitism of economically important grasshopper and locust species was frequently substantial, confirming the crucial role of *Scelio* species in pest management. Currently, the management of desert locusts relies heavily on costly chemical insecticides. However, due to the detrimental effects of traditional pesticides on the environment and human health, as well as the rise of insecticide-resistant insect populations, alternative pest management strategies are urgently needed. One promising approach is the use of natural enemies and pathogens to control agricultural pests. Among these biological control agents, *Scelio* wasps (*Scelio*nidae: Hymenoptera) play a vital role in regulating locust and grasshopper populations in agricultural fields. These obligatory endoparasitoid wasps significantly impact the biological control of grasshopper eggs (Orthoptera: Acrididae). During prenatal development, the second larval instar of *Scelio* disrupts and ultimately kills the host embryo. In this study, we also examined the suitability of cytochrome c oxidase I (COI) sequences as molecular markers for the phylogenetic analysis of *Scelio* species using DNA barcoding. Cytochrome c oxidase I (Complex IV) is the final enzyme complex in the electron transport chain (ETC), catalyzing the reduction of molecular oxygen to water through copper and heme groups. The cytochrome c protein is frequently used for DNA barcoding and species identification due to its highly conserved amino acid sequence among related species, with minimal variation within the same species. Our DNA barcoding results indicate that COI is a highly reliable marker for the phylogenetic analysis and identification of *Scelio* species. Several *Scelio* species were examined in this study, with *Scelio* hieroglyphi, *Scelio* mauritanicus, and *Scelio* aegyptiacus being the most prominent. The findings of this study are crucial for understanding the parasitic nature, host relationships, phylogenetics, and biodiversity of the genus *Scelio*, as well as their potential application as biological control agents in pest management programs. This research was financially supported by the Higher Education Commission (HEC), Islamabad, under the Research Project (HEC NRPU Research Project No. 14787).

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Molecular Biology

CARDIOPROTECTIVE ROLE OF LEPTOSIDIN AGAINST PERFLUOROOCTANE SULFONATE-INDUCED CARDIAC TOXICITY BY MODULATING APOPTOSIS, INFLAMMATION, AND OXIDATIVE STRESS

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Perfluorooctane sulfonate (PFOS) is a highly persistent environmental contaminant linked to severe multi-organ toxicity, including cardiotoxicity. Leptosidin (LPS), an aurone flavonoid isolated from *C. grandiflora*, has been reported to exhibit diverse pharmacological properties. This study was designed to investigate the potential cardioprotective effects of LPS against PFOS-induced cardiac damages in rats. Twenty-four albino rats (*Rattus norvegicus*) were divided into four groups: control, PFOS-intoxicated (10 mg/kg), PFOS + LPS co-treated (10 mg/kg + 25 mg/kg), and LPS-alone (25 mg/kg) supplemented group. PFOS exposure significantly reduced the activities of key anti-oxidant enzymes, including superoxide dismutase (SOD), catalase (CAT), glutathione reductase (GSR), glutathione peroxidase (GPx), glutathione S-transferase (GST), Heme oxygenase-1 (HO-1) and glutathione (GSH) contents while

increasing, reactive oxygen species (ROS) and malondialdehyde (MDA) levels. Moreover, PFOS administration elevated cardiac injury markers i.e., creatine kinase-MB (CK-MB), troponin I, creatine phosphokinase (CPK), and lactate dehydrogenase (LDH), levels. Moreover, the levels of tumor necrosis factor-alpha (TNF-α), nuclear factor kappa-B (NF-κB), interleukin-6 (IL-6), and interleukin-1β (IL-1β) were augmented after PFOS intoxication. Additionally, PFOS exposure disrupted apoptotic balance by downregulating Bcl-2 expression while upregulating Bax and Caspase-3 expression. Histopathological analysis further confirmed structural damage to cardiac tissues. However, LPS treatment remarkably protected the cardiac tissues via regulating aforementioned dysregulations owing to its anti-oxidative, anti-inflammatory, and anti-apoptotic properties.

3. MICROBIOLOGY

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Microbiology

BIOREMEDIATION OF HEAVY METALS AND DECOLORIZATION OF BLACK LIQUOR USING BACTERIAL MICROBIAL BIOFILMS

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With increased urbanization and industrialization, modern life has led to an anthropogenic impact on the biosphere. Heavy metals pollution and pollutants from black liquor (BL) have caused severe effects on environment and living organisms. Bacterial biofilm has potential to remediate heavy metals and remove BL from the environment. Hence, this study was planned to investigate the potential of microbial biofilms for the bioremediation of heavy metals and BL polluted environments. Eleven biofilm forming bacterial strains (SB1, SB2, SC1, AF1, 5A, BC-1, BC-2, BC-3, BC-4, BC-5 and BC-6) were isolated and identified upto species level via 16S rRNA gene sequencing. Biofilm strains belonging to *Bacillus* sp. and *Lysinibacillus sphaericus* were used to remediate heavy metals (Pb, Ni, Mn, Zn, Cu, and Co). Atomic absorption spectroscopy showed significantly high ($P \leq 0.05$) bioremediation potential by *L. sphaericus* biofilm (1462.0±0.67 µgmL−1) against zinc (Zn). Similarly, *Pseudomonas putida* biofilm significantly ($P \leq 0.05$) decolorized (65.1%) BL. Fourier transform infrared (FTIR) analysis of treated heavy metals showed the shifting of major peaks (1637 & 1629–1647, 1633 & 1635–1643, and 1638–1633 cm−1) corresponding to specific amide groups due to C=O stretching. The study suggested that biofilm of the microbial fora from tanneries and pulp paper effluents possesses a strong potential for heavy metals bioremediation and BL decolorization. To our knowledge, this is the first report showing promising biofilm remediation potential of bacterial fora of tanneries and pulp-paper effluent from Kasur and Sheikhupura, Punjab, Pakistan, against heavy metals and BL.

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Microbiology

ISOLATION, IDENTIFICATION OF MILK BORNE MICROORGANISMS AND EVALUATION OF SYNTHETIC DRUGS VS. PLANT EXTRACTS: A GREENER APPROACH TO ANTIBACTERIAL ACTIVITY

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Milk is a vital component of global nutrition, valued for its high-quality proteins, essential vitamins, and minerals, such as calcium and phosphorus, which support overall health and wellness. However, its

complex composition makes it susceptible to contamination by microorganisms, particularly in regions without effective pasteurization systems. This contamination poses significant health risks, exacerbated by the rise of multidrug- resistant pathogen due to antibiotic overuse. Exploring natural alternatives like plant based antimicrobial agents from *Azadirachta indica* and *Avicennia marina*, offers promising solutions, given their potent activity against harmful microbes. This study investigates the microbiological quality of milk through methylene blue reduction test (MBRT), standard plate count (SPC), bacterial identification, and the antibacterial activity of plant extracts. SPC analysis showed bacterial counts exceeding 8×10^8 in undiluted samples, with reduced growth at lower dilutions. The predominant isolates were *Lactococcus lactis*, *Lactobacillus rhamnosus*, and pathogenic species like *Staphylococcus aureus*, *E. coli*, and *Enterobacter*. The antibacterial activity of plant extracts from *Azadirachta indica* and *Avicennia marina* was evaluated using the agar well diffusion method. *A. indica* extracts demonstrated strong activity against MDR bacteria, with methanol extracts achieving the highest inhibition zones. Conversely, *E. coli* exhibited resistance to all plant extracts. *A. marina* showed moderate activity against MDR with chloroform and methanol extracts yielding maximum inhibition.

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Microbiology

COLIFORM CONTENTS OF AIR CURRENTS GENERATED BY TRAINS AT LAHORE RAILWAY STATION

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The growth of coliform bacteria was observed. Samples of above bacteria were taken (Taiz Gham, Greenline and Jaffer Express) grown on Levine EMB agar plates in February of 2020 (08.2020, 10.2020 and 13.2020). Morphology of each colony was observed colony designation was also alone on nutrient agar, again morphology was observed. The final designation of pure culture of L-EMB agar vials as G+ive bacteria namely as Escherichia coli, klebsiella pneumonia and Bacillus cereus (colorless) and salmonella Typhimurium G +ive. The final designation of pure culture on (L-EMB agar G. vial's) named as 1Aia, 1Aa2, 1Aa3, 1B2b, 1 B2b, 1C1c, 1C3c, 2 Aia, 2 A2a, 2A3a, 2A4a, 2 B1b, 2B2b, 2B3b, 2C1c, 2C3c, 3A1a, 3B1b, 3B2b, 3C1c, 3C2c. Growth on slant is time. Antibiotic resistance / sensitively test was done (above 07) named as 1A1a, 2C3c, 2A3a, 3A1a, 2C1a, 3B1b and zone of inhibition were measured.

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Microbiology

GROWTH OF *LACTOBACILLUS FURFURICOLA* IN DIFFERENT INFANT MILK FORMULAE AND THEIR ANTIOXIDANT PROFILE

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Probiotics play a momentous task in a newborn's development by refining the microbial population of the gut, promoting digestion, and strengthening the immune system. However, numerous synthetic formulae milk has also been synthesized to nourish the infants. The principal objective of this study was to examine the growth of probiotic, *Lactobacillus furfuricola*, in diverse commercial baby milk utilized in Pakistan. Free radical scavenging efficacy of each artificial milk promote probiotic growth was also evaluated. The spread plate method was employed to attain the sustainable colonies of*L. furfuricola* in each fortified milk. DDPH assay protocol was followed to determine the free radical scavenging activity of one group of selected formula milk treated with *L. furfuricola* and the other group without treatment. This research disclosed that all infant formulae endorsed probiotic growth. Nevertheless, the probiotic growth varied in each synthetic milk. Meiji FM-T exhibited additional CFU./ml ($3.63X10^{15}$/ml of 2% suspension) than any other artificial milk utilized in this experiment. It happened maybe because the ingredients of each synthetic milk are dissimilar from the others. The DPPH analysis established that all synthetic milk revealed no anti-oxidant potential at all. The present research highlights that replacement for natural milk support probiotic growth however, these replacements still demand supplementary improvements to enhance the antioxidant potential of synthetic milk.

CBGP-70
Microbiology

BIOGAS SLURRY APPLICATION ON GROWTH, NUTRIENT UPTAKE STATUS AND HEAVY METALS CONCENTRATION IN COTTON (*BACILLUS THURINGIENSIS*)

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A field experiment was conducted to examine the influence of combined use of bioslurry and mineral fertilizer on physical parameters; plant height, root, shoot and leaf dry weight, number of flowers and fruits, biochemical parameters; heavy metal uptake and concentration in root, stem, leaf and fruit, of (*Bacillus thuringiensis*) cotton grown in five patches in Pattoki Campus of University of Veterinary and Animal Sciences. Results have indicated a significant increase in plant height, number of flowers and fruits, and dry weight of root, shoot and leaves of the cotton with the combined application of both chemical fertilizer and bioslurry. The analysis of metals (Ni, Cr, Mg, Ca, K, Na, Cu, Mn and Zn) in the bioslurry and the field soil has shown that both have contributed to the metal uptake and sequestration in the cotton crop. P-values have highlighted that the five treatments have performed with significant difference; 50% dose of the synthetic fertilizer accompanied by 50% bioslurry as the best in retaining toxic metals in lower and taking up higher concentrations of the essential metals. Cotton has acted as hyper-accumulator except for chromium; significantly different in root, stem, leaf and fruit.

CBGP-71
Microbiology

ENVIRONMENTAL ASSESSMENT OF PATHOGENIC BIOAEROSOLS IN LIVESTOCK FARMS THROUGH NASAL SWAB SAMPLING

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Agriculture, particularly livestock is the largest sector of Pakistan's economy. While there are on-

going efforts for further developments in this sector, there are limited studies on the environmental health particularly air quality of livestock farms and the related health hazards associated with pathogenic bioaerosols that might be present in the air of such facilities. The present study hence aimed to investigate the common microflora present in respiratory tracts of livestock animals in farms with a history of Bovine Respiratory Disease (BRD). Nasal swab samples were taken from 40 suspected cattle and ten healthy animals (control) from ten livestock farms and DNA extracted through the direct DNA extraction method. The amplicons obtained were sequenced through Sanger sequencing and the species identified were Pasteurella multocida, Staphylococcus aureus, Mannheimiahaemolytica, Histophilussomni, *Mycoplasma capricolum* and *Mycobacterium bovis*. The presence of these species in respiratory tracts of suspected animals suggests their potential contribution towards BRD in cattle and the possibility of transmitting these pathogens to healthy animals via air. This study has significant implications for the agricultural industry, as an early identification can help control the spread of these pathogens, leading to improved environment and well-being of livestock animals and farm workers.

CBGP-72
Microbiology

A LONGTERM STUDY ON CORROSION BEHAVIOUR OF MILD STEEL BY TWO BACTERIAL ANTAGONISTS

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The environment influences the metals and alloys decomposition in following ways. The metallic installments heavy losses are caused by microbiologically influenced corrosion (MIC). Before develop controlling strategies, it is very important to confirm experimentally role and ways through which microorganisms deteriorate metallic structures. The originally isolated from deterioration influenced soil and their co-culture in nutrient added and without added soils, now a day's study explain the fate of mild steel coupons exposed to species of bacteria. Finally, the corrosion accelerating bacterium is *Bacillus cereus*-SNB4. While the deterioration protecting bacterium *Bacillus thuringiensis*-SN8. Though, in case of the co-cultured exposure. Amazingly while in case of added nutrients, in all three bacterial inoculated experiments, values of corrosion rates as well as of AWPL reflecting effects of MIC become negative which confirmed corrosion protective role of nutrient broth solution. Thus, corrosive intensity of soils/ incorporating suitable biological molecules reduced other environments which might absorb/ absorb or make the corrosion accelerating abiotic/biotic factors less available to cause destroy to the metals.

CBGP-73
Microbiology

PREVALENCE OF FOOT AND MOUTH DISEASE IN CATTLE OF KHAIRPUR DISTRICT

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Foot and Mouth Disease (FMD) is a highly contagious viral infection affecting cattle, causing severe economic losses in the livestock industry. This study investigates the prevalence of FMD in cattle within Khairpur District, assessing the distribution, risk factors, and seasonal variations of the disease. A cross-sectional survey was conducted, including clinical examinations and laboratory confirmation of suspected cases from various farms and livestock markets. The results indicate a significant prevalence of FMD in the region, with higher infection rates observed during specific seasons, likely due to increased animal movement and environmental conditions favoring viral transmission. Risk factors such as herd density, inadequate vaccination coverage, and poor bio-security measures were identified as major contributors to disease spread. The study also highlights the impact of FMD on cattle health, productivity, and the economic stability of local farmers. This research underscores the urgent need for improved disease surveillance, vaccination programs, and bio-security practices to mitigate the spread of FMD in Khairpur District. Strengthening veterinary services and raising awareness among livestock owners can play a crucial role in controlling and preventing future outbreaks.

CBGP-74
Microbiology

EVALUATION OF PHYTOTOXICITY AND ETHNOMEDICINAL PRACTICES FOR HUMAN AND LIVESTOCK HEALTHCARE MANAGEMENT FROM DISTRICT HAVELI, AZAD JAMMU AND KASHMIR

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Ethno-medicinal plants are used quite extensively and are very effective for primary health care of human and maintaining production of animals. The economic threats posed by poisonous plants are deteriorating their health, deformed offspring, declining productivity and longevity. This comprehensive study was undertaken for the first time in district Haveli, Azad Kashmir which systematically documents the important ethno-medicinal applications of local plant species and phyto-toxicological effect and mode of action in livestock and human. Data was collected from 70 informants using structured and semi-

structured interviews. The data collected was analyzed statistically using ethno-botanical indices and validated by testing extracts of plants on wistar female albino rats by performing limit test and make comparison with cited literature. A total of 54 medicinal plant species and 3 species of poisonous plants from 32 families were documented. The findings demonstrated that most toxic plant part used were leaves (44%) and also used in therapeutic (33%). Family Rosaceae (12%) was the most dominant followed by Fabaceae (11%). Among all the species the most prevalent life form was herbs (38%) and shrubs (30%) and extraction was a commonly used method for herbalist. The most affected organs were CNS (21%), liver (18%) and kidney (16%). The most potentially hazardous plant was *A. belladonna* having LD_{50} of 4,000 mg/kg followed by *R. arboreum* 4,200 mg/kg. The major toxicity manifestation like motor activity, salivation, lacrimation, piloerection, and dullness. Plants having high UVs value were *B. ciliata* (2.01), *P. bistorta* (1.88) and *G. wallichianum* (1.73). The highest RFC value was calculated for *B. ciliata* (0.76) and *A. heterophyllum* (0.67). The maximum informant consensus factor was for hepatic muscular and urinary diseases (1.00). *B. ciliata* with FL (91%) used for cystitis, diuretic. *A. pindrow* was used for multipurpose and export (22.57%) was the highest threat in the area. Pearson correlation (0.319) showed positive between UVs and RFC. The study area is rich in biodiversity and could be applied in photochemical practices for medication. Consequently, detailed, explorative study is needed regarding awareness about medicinal flora and phytotoxicity of plants.

CBGP-75
Microbiology

IMPACT OF MULTISTRAIN PROBIOTICS ON GROWTH PERFORMANCE, IMMUNE RESPONSE AND GUT MORPHOMETRY IN BROILER CHICKENS *GALLUS GALLUS DOMESTICUS*

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The goal of this investigation was to examine the impacts of four lab-isolated probiotics *Enterococcus faecium* (OR563785.1), *Weissella confusa* (OR563786.1), *Weissella cibaria* (OQ543569.1), *Lactiplantibacillus plantarum* (OQ689085.1) in 1:1:1:1 of CFU dilution as multistrain probiotics (MSP) regarding growth performance, haemato-biochemical indices and immune function in broilers. Ninety uniformly weighed broilers were divided into five groups at random with (n=18/group). NC: negative control (basal diet); PC: commercial probiotic, G1: MSP supplemented, G2: MSP + vaccinated, G3: (vaccinated). Blood samples were collected at 42 days of age to assess immunological, haemato-biochemical parameters, and intestinal morphometry. Compared to the group of negative control, the broiler chicks' body weight was considerably ($p<0.05$) higher in MSP-treated groups (G1, G2). This study found that, as compared to the NC, there was a substantial rise ($p<0.05$) in RBC and hemoglobin in the probiotic-supplemented bird group. The results indicated that cholesterol and triglyceride remarkably decreased compared to control in probiotic-treated groups. There was no discernible change in the enzyme activity of ALT, AST, and ALP across the groups ($p>0.05$). The findings indicated higher levels of immunoglobulin and interleukins in the MSP group than in the control (NC). The villus's height to crypt's depth ratio was higher in the MSP groups (G1, G2) in contrast with the PC group ($p<0.05$). The haemagglutination inhibition test (HI) revealed that the probiotic-treated groups had greater NDV (New

Castle disease virus) antibodies than the other groups. The humoral response to live NDV vaccinations may be enhanced by multistrain probiotics. These results revealed MSP significantly affected growth performance, hematobiochemical parameters, and immunity through alteration in intestinal morphology which improves the nutrient uptake.

CBGP-76
Microbiology

EVALUATION OF ANTI-MICROBIAL, ANTI-BIOFILM AND WOUND HEALING PROPERTIES OF MICROBIAL BIOSURFACTANTS

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This study explored the antimicrobial, Anti-biofilm, and wound-healing potential of Microbial biosurfactants. These biosurfactants were extracted from the Catla Catla fish fats. This fishery byproduct, that were apparently of no use to any industry, came out as a cost-effective and sustainable source to develop biosurfactants. Initially, the biosurfactant-producing potential of bacterial strains was screened efficiently through hemolytic assay, hydrophobic tests, and emulsification potential. For composition analysis, extracted biosurfactants were tested through Fourier Transform Infrared Spectroscopy FTIR and Mass Spectrometry. The antioxidant potential was evaluated through DPPH radical scavenging and hydrogen peroxide assays, while antibacterial activity was assessed using the agar well diffusion technique against Gram-positive and Gram-negative pathogens. Anti-biofilm activity was tested using microtiter plate assays, and antifungal properties were investigated on Potato Dextrose Agar. A biosurfactant-based ointment was formulated and tested for its efficacy in wound healing using an animal model. Albino mice were divided into control, standard, and test groups, treated with varying biosurfactant concentrations, and monitored for wound closure, skin irritation, and histological healing. Results demonstrated significant antimicrobial, antioxidant, and anti-biofilm activity, along with accelerated wound healing and reduced scar formation in treated groups. This research highlights the dual benefit of converting fishery waste into high-value biosurfactants and addressing challenges like antimicrobial resistance, wound care, and sustainability. These findings have far-reaching implications for the pharmaceutical, cosmetic, and agricultural industries, offering eco-friendly and cost-effective alternatives to synthetic surfactants while promoting sustainable practices and economic growth in Pakistan.

CBGP-77
Microbiology

MORPHOLOGICAL AND MOLECULAR IDENTIFICATION OF TICK SPECIES INFESTING HEDGEHOGS IN PUNJAB, PAKISTAN

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Ticks are significant ectoparasites and vectors of various zoonotic pathogens. This study aimed to identify the tick species infesting different hedgehog species in the Punjab province of Pakistan. Factors such as climate change, water availability, land use, favorable environmental conditions, and the region's physiographic features influence the distribution of ticks. A total of 130 hedgehogs were collected from seven districts across Punjab. Of these, 125 were found to be infested with different tick species, indicating a tick infestation prevalence rate of over 95%. Tick species were initially identified at various developmental stages using standard morphological keys, which were later confirmed through molecular techniques. DNA was extracted from the ticks, and Polymerase Chain Reaction (PCR) was performed using LCO and HCO primers to amplify the mitochondrial cytochrome c oxidase subunit I (COI) gene, for tick species identification. Molecular analysis revealed the presence of *Rhipicephalus microplus* species infesting the hedgehogs. The prevalence and infestation rates of ticks varied across different districts. Additionally, variations in tick prevalence were observed based on host gender, habitat type, and life stage. This study offers valuable insights into the distribution of tick species on hedgehogs in Punjab and highlights the importance of molecular techniques for accurate tick identification.

CBGP-78
Microbiology

MOLECULAR CONFIRMATION AND ANTIBIOTIC RESISTANCE PATTERNS OF *AEROMONAS HYDROPHILA* FROM FRESHWATER FISH IN PAKISTAN

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Fish is a vital source of human nutrition and is also used in animal feed. To meet the growing demand

for human consumption, the freshwater fish farming industry is expanding. However, freshwater fish are susceptible to various diseases caused by microorganisms. To treat these diseases, different antibiotics are commonly added to fish feed. Excessive use of antibiotics can lead to the development of antibiotic resistance in disease-causing bacteria. When humans consume contaminated fish, these resistant bacteria can enter the human food chain, potentially causing infections. One such pathogen, *Aeromonas hydrophila*, is known to cause illnesses in humans, including meningitis and diarrhea. This study aimed to assess the antibiotic resistance profile of *Aeromonas hydrophila* isolated from diseased freshwater fish in Pakistan. A total of fifty infected fish samples—*Oreochromis niloticus* (17), *Ctenopharyngodon idella* (10), *Hypophthalmichthys molitrix* (10), and *Labeo rohita* (13)—showing signs of motile Aeromonas septicemia were collected from District Kasur, Punjab, Pakistan. These samples underwent isolation procedures to identify *Aeromonas hydrophila*. The isolates were confirmed through biochemical and molecular tests and then tested against thirteen antibiotics using the disc diffusion method to determine their antibiotic resistance profile. Final confirmation of all isolates was conducted using Polymerase Chain Reaction (PCR). Out of all samples, seven isolates were confirmed as *Aeromonas hydrophila*. These isolates exhibited 100% resistance to Ampicillin (10µg) and Cefuroxime (30µg). The resistance pattern for other antibiotics, in descending order, included Doxycycline (30µg) and Levofloxacin (5µg), followed by Ceftazidime (30µg) and Amikacin (30µg) (57.1% each), Streptomycin (10µg), Cefotaxime (30µg), and Tetracycline (30µg) (42.8% each), and lower resistance rates for Gentamicin (10µg) and Trimethoprim (25µg) (28.5% each), and Norfloxacin (10µg) and Tobramycin (10µg) (14.2% each). This study highlights the occurrence of antibiotic-resistant *Aeromonas hydrophila* in diseased fish from Pakistani aquaculture. Given that fish is a popular food choice in Pakistan, the presence of multidrug-resistant strains poses a significant public health risk. Therefore, it is crucial to implement effective prevention and control measures to regulate antibiotic use in aquaculture, reducing the risk of antibiotic resistance development.

CBGP-79
Microbiology

UTILIZATION OF ANIMAL PRODUCTS FOR THE CURE OF DISEASES IN THE AREA OF CHENAB

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Local communities have long depended on animals and plants and their mixture recipes for traditional healing methods to treat a wide range of diseases. This study sought to systematically document these traditional practices, specifically focusing on the recipes and methods used by local healers in the vicinity of Chenab riverine area. The study explores the local ethnobiological practices. The research included 100 individuals from the surrounding regions of Chenab River. This study systematically documented these traditional practices, focusing on the recipes and methods used by local healers. Fifty one animal species, including mammals (12), birds (21), arthropods (5), reptiles (1), fish (10), and annelids (2) were used as a medicinal treatment. *Capra hircus* had the highest citation frequency and fidelity levels, while *Apis cerana* and *Phasianus colchicus* also showed 100% fidelity level.

CBGP-80
Microbiology

THE POTENTIAL OF LEMONGRASS ESSENTIAL OIL NANOEMULSION IN RESISTANCE MODULATION OF MILK DERIVED *STAPHYLOCOCCUS AUREUS*

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Essential oils are secondary metabolites of plants, various essential oil have antibacterial properties and can be used to treat bacterial infections. Lemongrass essential oil is found to be effective against many bacterial strains. In this study, Lemongrass (*Cymbopogoncitratus*) essential oil based nanoemulsions was prepared by ultrasonic emulsification lemongrass oil (LG) and canola oil (CA) at different ratios as a core material, and aqueous solution of Tween80 as the surfactants. The GC-MS analysis revealed the chemical composition of the sample, with citral A (*geranial*) dominating at 32.4% and CitralB (*neral*) closely following at 31.41%. The nanoemulsions exhibited decreasing particle size with increasing concentration, with sizes ranging from 31.99 nm at 1% (w/v) to 40.3 nm at 2.5% (w/v). Turbidity analysis demonstrated the clarity of the nanoemulsion, with an absorbance value of 0.128 ± 0.05 at 600 nm. Milk derived *Staphylococcus aureus* was isolated from cow milk samples, Lemongrass nanoemulsion displayed a dose-dependent reduction in microbial count, with counts ranging from 10^8 CFU/mL in the control to 10^2 CFU/mL at 400ppm/2mL of treatment. Furthermore, the minimum inhibitory concentration (MIC) of 400 ppm against *Staphylococcus aureus* highlighted the significant antimicrobial properties of lemongrass essential oil. Time-kill dynamics revealed a dose-dependent inhibition of bacterial growth over varying time intervals, reinforcing the oil's antimicrobial potential. Overall, these findings contribute to a deeper understanding of the essential lemongrass oil's chemical composition and its efficacy as an antimicrobial agent with potential applications in food preservation and pharmaceutical industries.

CBGP-81
Microbiology

QUANTITATIVE BACTERIOLOGICAL ANALYSIS AND ANTIBIOTIC RESISTANCE CHARACTERIZATION IN POWDERED INFANT MILKS (PIFMS)

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Bacterial pathogen associated with severe lethal diseases such as meningitis, and septicemia are found to be in infants. Powdered Infants Milk Products (PIFM) has been concerned to be the main contaminated

sources of various pathogens. This study aimed to investigate the prevalence rate, and antibiotic resistance profile of *Cronobactersakazakii* and *Samonella*spp. In the present study 2 powdered infant milk brands were selected naming them C1 and C2 from the most consumed products. Samples were taken from different age groups. 10 g of each were dissolved into 90 mL of sterile normal saline and ten-fold serial dilutions were performed upto 10^{-6} dilutions. 1 ml sample from each dilution was cultivated on 20 mL of sterile nutrient agar and plates were incubated at 37ºC. Quantitative bacterial analysis was done by counting bacteria. Plates with over 200 colonies were usually counted by dividing the plates into equal sectors (from 1/2 up to 1/8). Each colony was sub cultivated to investigate microbial load. The bacterial isolates were subjected to Gram staining and biochemical tests like indole, VP, methyl red, citrate tests. Antibiotic susceptibility profiles of isolates were evaluated against amikacin, gentamicin, imipenem, moxifloxacin, cefoperazone, cefpodoxime, ceftazidime, and cefepime.

CBGP-82
Microbiology

GENOMIC EPIDEMIOLOGY AND CONTAMINATION COLISTIN-RESISTANT *KLEBSIELLA PNEUMONIAE'S* DEVELOPMENT IN LIVESTOCK AND POSSIBLE ZOONOTIC TRANSMISSION

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Increasing use of colistin for multidrug-resistant Gram-negative bacterial infections has led to the emergence of colistin resistance in *Klebsiella pneumoniae* in several countries worldwide, including Europe (especially Greece), and colistin resistance rates are continually increasing. treatment options for multidrug-resistant *K. pneumoniae* are actually limited to combination therapy with some aminoglycosides, tigecycline and to older antimicrobial agents. Unfortunately, the prevalence of colistin-resistant and tigecycline-resistant *K. pneumoniae* is increasing globally. Infection due to colistin-resistant *K. pneumoniae* represents an independent risk factor for mortality. The emergence of genetic mutations in chromosomal genes and the transmissible plasmid-mediated colistin resistance gene may have helped in the spread of colistin resistance among various *Klebsiella pneumoniae* (*K. pneumoniae*) isolates and other different bacteria. Several factors have been reported as being associated with colistin resistance, with improper use and patient-to-patient transmission being most often cited. Total infections and infection-related mortality from colistin-resistant *K. pneumoniae* are high, but currently there are no established treatment regimens. The emergence of transmissible, plasmid-mediated colistin resistance is an alarming finding. The absence of new agents effective against resistant Gram-negative pathogens means that enhanced surveillance, compliance with infection prevention procedures, and antimicrobial stewardship programs will be required to limit the spread of colistin-resistant *K. pneumoniae.*

CBGP-83
Microbiology

DEVELOPMENT AND ASSESSMENT OF AN INACTIVATED VACCINE FOR CONTROLLING LYMPHO DISEASE IN SMALL RUMINANTS

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Lympho disease, a significant health concern in small ruminants, leads to substantial economic losses in the livestock industry. The research establishes and evaluates an inactivated vaccine against lympho disease as a way of improving animal health and disease control. Optimized inactivation techniques were used during vaccine preparation to produce a stable vaccine agent that would promote immunological effectiveness. Small ruminant experimental test subjects received the vaccine to evaluate its immunogenic response together with safety and efficiency by performing clinical and serological diagnostic tests. Post-vaccination evaluations that combined antibody measurement tests with cellular immune response testing as well as challenge studies to evaluate protection quality. The research results established a strong immune response which shows promise for the inactivated vaccine as a preventive method against lympho disease. The research findings support the development of effective vaccination methods for reducing small ruminant disease frequency and promoting sustainable farming operations.

CBGP-84
Microbiology

INTEGRATING ADVANCED SOUND ANALYSIS, CELLULAR BIOLOGY, AND EPIGENETICS TO INVESTIGATE THE THERAPEUTIC EFFECTS OF QURANIC RECITATION FREQUENCIES ON HUMAN AND MICROBIAL SYSTEMS

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The Quran has long been recognized for its spiritual and therapeutic value, yet its effects on biological systems remain underexplored. This research investigates how the frequencies produced during Quranic recitation influence somatic cells, immune cells, and microbial systems through a multidisciplinary lens. Recitations from multiple individuals were recorded and analyzed for their amplitude, tone, and frequency patterns using tools like MATLAB and Audacity. Human somatic cells, including neurons and fibroblasts, immune cells including T-cells, B-cells, macrophages, and microbial

strains such as *Escherichia coli* and *Staphylococcus aureus* including antibiotic-resistant strains were cultured and exposed to these frequencies under controlled laboratory conditions. Cellular responses were evaluated using MTT assays for cell viability, cytokine profiling for immune modulation, and microbial growth assays to study inhibitory effects. Gene expression changes were analyzed using RT-PCR and RNA sequencing. This study connects ancient spiritual practices with modern scientific exploration, offering insights into Quranic recitation as a potential non-invasive therapeutic approach. By highlighting its impact on cellular behaviour and microbial resistance, this work lays the groundwork for integrating sound-based healing methods into contemporary medical treatments.

CBGP-85
Microbiology

MICROBIOME-TARGETED INTERVENTIONS FOR PREVENTING ZOONOTIC DISEASE TRANSMISSION IN ANIMAL POPULATIONS

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Food safety and world health are seriously threatened by zoonotic infections, which spread from animals to people. The transmission of these illnesses is significantly influenced by the animal microbiome, and altering the microbiome through focused therapies is a viable preventative approach. The purpose of this study is to examine how well microbiome-targeted therapies can stop the spread of zoonotic diseases in animal populations. We will provide a thorough analysis of the body of research on the animal microbiome and how it contributes to the spread of zoonotic diseases. The effectiveness of various microbiome-targeted therapies, such as probiotics, prebiotics, and dietary changes, will next be assessed using a mix of in vitro and in vivo studies. Three zoonotic pathogens—*Salmonella, E. Coli,* and *Campylobacter*—will be the subject of our investigation. We predict that therapies that target the microbiome will lessen the shedding of zoonotic infections in animal populations, which will lower the likelihood of human transmission. Our research will offer important information for creating microbiome-targeted treatments that effectively stop the spread of zoonotic diseases in animal populations. The following are the anticipated results of this study are a thorough comprehension of the animal microbiome and how it contributes to the spread of zoonotic diseases, assessment of the effectiveness of various microbiome-targeted therapies in stopping the spread of zoonotic diseases, determining the best microbiome-focused treatments to stop the spread of zoonotic diseases in animal communities. In order to lower the danger of zoonotic disease transmission to people, this study will greatly aid in the creation of innovative methods for stopping its spread in animal populations.

CBGP-86
Microbiology

MOLECULAR PROFILING OF *CORYNEBACTERIUM PSEUDOTUBERCULOSIS* ISOLATES AND VIRULENCE FACTORS ASSOCIATED WITH CASEOUS LYMPHADENITIS IN BAHAWALPUR

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Caseous lymphadenitis (CLA), a chronic and infectious disease that primarily affects sheep and goats, is caused by *Corynebacterium pseudotuberculosis*. While gene sequencing has been used to characterize *C. pseudotuberculosis* isolates from various settings, little molecular and phylogenetic analysis has been done on circulating strains and their virulence factors in Bahawalpur. Two hundred pus samples from infected sheep and goats were collected from Bahawalpur's rural and Cholistani regions. Standard bacteriological methods confirmed the bacterial isolates cultivated by blood sheep agar, and the genome extraction was done from purified bacterial colonies. Using qPCR, species-specific genes (16S rRNA and pld genes) and virulence-associated genes (hsp60, Fag A) were amplified for molecular identification. After sequencing the PCR results, the sequences were examined for genetic diversity. Based on the pld gene sequence, phylogenetic analysis was to determine the genetic connections between the Bahawalpur isolates and global strains. The bacterium's pathogenicity depends on virulence genes, such as Fag A and hsp60, which were found to be present in 98.2% of the isolates by qPCR analysis. The Bahawalpur isolates shared a significant degree of genetic similarity with strains from other countries, like Portugal and China, according to phylogenetic analysis based on the pld gene. The findings of this work emphasize the significance of targeted molecular surveillance by showing a significant incidence of virulence genes in the local isolates. Developing efficient diagnostic methods, immunogens, and preventative strategies to manage CLA in Pakistan, especially in high-risk regions like Bahawalpur, can be aided by these isolates' genotypic and phenotypic characterization.

CBGP-87
Microbiology

EPIGENETIC REPROGRAMMING OF IMMUNE CELLS BY EPSTEIN-BARR VIRUS–A NOVEL APPROACH

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Epstein-Barr virus is a persistent herpes virus which plays a role in immune modulation. Epstein-Barr virus uses the host machinery to regulate viral gene expression. EBV manipulation affects the epigenome

of host by reprogramming cells, mainly B-cells, in a way that leaves a long-lasting, oncogenic phenotypes. This virus-induces epigenetics is apparent in EBV associated cancers. B-cells serve as a critical area for EBV latent genes, the viral gene expression will be suppressed resulting in promoting viral genome maintenance and immune recognition evasion. It affects the host epigenome through reprogramming cells to oncogenic phenotypes which is conspicuous in malignancies. Genetic reprogramming in the latent infection is an assay mark of EBV as it establishes lifelong persistence in its host. DNA methylation is a prime epigenetic regulator of EBV genome. EBV modulates the genome accessibility by associating with its Histone modifications. Studies show that in B-cells, EBV acquires histones to make nucleosomes which is the DNA genomic characteristic of nucleus. The chromatin remodeling of latent EBV affects the viral promoter activity and limits the spread of histone modifications across the genome. Epigenetic control of EBV has incorporated an RNA based system to control gene expression and maintain the beneficial DNA genome methylation and histone modifications, system made up of miRNAs. In future, epigenetic therapies can reinstate the normal immune functions and provide long-lasting protection against EBV-driven diseases.

CBGP-88
Microbiology

COMPARATIVE EFFICACY OF ALUM-BASED ADJUVANTED VACCINE OF *CORYNEBACTERIUM PSEUDOTUBERCULOSIS* IN SMALL RUMINANTS

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A study was conducted to measure the effectiveness of alum-based vaccines to protect sheep and goats from *Corynebacterium pseudotuberculosis* in rural and Cholistani districts of Bahawalpur Pakistan. Diseased animals with symptoms of clear abscess were selected and 246 samples were collected from different areas using random sampling techniques. Samples were collected in sterile syringes and cotton swabs by maintaining sterile and cold conditions. All the samples were immediately transported to the microbiology laboratory, CUVAS, Bahawalpur. Samples were inoculated in nutrient broth and incubated for enrichment. After 24 hours of growth, gram staining was performed. Subculturing was done with one nutrient agar and then sheep blood agar to observe colony morphology and hemolysis, respectively. Catalase-positive colonies were isolated, purified, and preserved. This purified *C. pseudotuberculosis* were further confirmed through PCR. After this confirmation, the bacterium was used for vaccine preparation. Three types of vaccines were prepared, and tested for immune response measurements alongside protective effectiveness testing during the research period. Vaccine effectiveness was evaluated through measuring antibody titre by IHA. Research showed that the combined vaccine made from both killed bacteria and toxoids provided the most powerful immune response through elevated production of antibody levels above monoclonal vaccine formulations. The vaccine formulation with both components provided 80% protection to its vaccinated population, which proved superior to either single-component vaccine. The data indicated that antibody levels and protective measures changed significantly between study group populations. The highest immune response in test animals developed when researchers provided the vaccine at a dosage of 700 micrograms. Results showed that the combination vaccine offers

superior defense against *C. pseudotuberculosis* in small ruminants for improved livestock control and financial health of farms.

CBGP-89
Microbiology

PREVALENCE OF MALARIAL PARASITE IN BAHAWALPUR, PAKISTAN

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In many regions of Pakistan, including Bahawalpur, malaria is a serious vector-borne illness that persists due to climatic and environmental reasons. Through an analysis of risk variables, seasonal fluctuations, and Plasmodium species distribution, this study seeks to determine the prevalence of malaria in Bahawalpur. Hospital records, laboratory-confirmed cases, and epidemiological surveys carried out in both urban and rural regions were the sources of the data. According to research, malaria cases increase during and after the monsoon season, which is associated with a rise in mosquito reproduction because of the ideal humidity and temperature. *Plasmodium falciparum*, which has a greater risk of serious consequences, is the second most often reported species after *Plasmodium vivax.* Important risk factors are also identified by the study, such as inadequate healthcare facilities, stagnant water, poor sanitation, and a lack of knowledge about preventive measures. Due to inadequate malaria control initiatives and restricted access to medical treatment, rural communities are more at risk. Bahawalpur's high malaria incidence highlights the need for focused efforts, such as better diagnostic tools, vector control plans, and public awareness initiatives. This study offers important insights for policymakers, healthcare professionals, and public health authorities to develop region-specific strategies to combat malaria in Bahawalpur. It is possible to significantly reduce the transmission of malaria by strengthening healthcare infrastructure and putting effective public health policies into place.

CBGP-90
Microbiology

BIOFILMS IN PATHOGENESIS: A CRITICAL COMPONENT OF NEW AND EMERGING INFECTIOUS DISEASES

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Biofilms, complex communities of microorganisms embedded in a self-produced extracellular matrix,

play a crucial role in the pathogenesis of various infectious diseases. The ability of biofilms to evade the host immune system and resist antimicrobial therapies makes them a significant concern in the context of emerging infectious diseases. Recent studies have implicated biofilms in the development of chronic infections, such as those caused by methicillin-resistant Staphylococcus aureus (MRSA) and Pseudomonas aeruginosa. Furthermore, biofilms have been linked to the persistence of tuberculosis and the emergence of antimicrobial resistance. The formation of biofilms also facilitates the horizontal gene transfer of virulence factors, contributing to the evolution of more virulent strains. This abstract reviews the current understanding of biofilm-mediated pathogenesis, highlighting its significance in the development of new and emerging infectious diseases. Furthermore, discuss the molecular mechanisms underlying biofilm formation, the role of biofilms in antimicrobial resistance, and the potential therapeutic strategies targeting biofilm-associated infections. A deeper understanding of biofilm-mediated pathogenesis is essential for the development of effective treatments and prevention strategies against emerging infectious diseases.

CBGP-91
Microbiology

DETERMINING THE ABILITY OF THERMOSTABLE SERINE PROTEASE ENZYME ISOLATED FROM *BACILLUS SUBTILIS* FROM CHOLISTAN DESERT BAHAWALPUR

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Bacillus subtilis strain RT-5, isolated from the Cholistan desert soil in Pakistan, produces a thermostable serine protease capable of withstanding temperatures up to 55°C. This enzyme, identified as a subtilisin, exhibits 43 amino acid substitutions compared to subtilisin BPN', highlighting significant variability among subtilisin forms. The thermostable serine protease enzyme isolated from *Bacillus subtilis*, focusing on its ability to withstand high temperatures and its potential industrial applications. The enzyme was obtained through a systematic isolation process, followed by characterization to determine its thermal stability, optimal pH, and activity under various temperature conditions. The thermostable nature of the protease was assessed by incubating the enzyme at different temperatures ranging from 40°C to 80°C, and its stability was monitored by evaluating residual activity over time. The optimal pH for maximum enzyme activity was determined, and kinetic parameters such as Km and Vmax were estimated. Additionally, the enzyme's substrate specificity was examined using different protein substrates, providing insight into its broad industrial applicability. The results demonstrated that the *Bacillus subtilis*-derived serine protease exhibited remarkable thermal stability, retaining significant activity even at elevated temperatures, which is crucial for industrial processes such as food processing, detergent formulations, and leather industries. This study highlights the potential of thermostable serine proteases as valuable biocatalysts, emphasizing their versatility in high-temperature environments.

CBGP-92
Microbiology

PREVALENCE OF AVIAN INFLUENZA H9 VIRUSES IN COMMERCIAL BROILERS IN SOUTH PUNJAB, PAKISTAN

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Avian Influenza (AI) H9N2, a subtype of the avian influenza virus, poses a significant threat to poultry farming worldwide, particularly in regions like South Punjab, Pakistan. This study aimed to assess the prevalence of H9N2 in broiler chicken populations within this region. A cross-sectional survey was conducted on 200 broiler chicken farms across various districts in South Punjab. Blood samples were collected from 500 chickens and analyzed using serological tests to detect antibodies specific to H9N2. The results indicated a seroprevalence rate of 36.3%, suggesting that approximately one-third of the chickens had been exposed to the virus. Furthermore, viral detection in the samples confirmed a pooled virus prevalence of 2%, highlighting the circulation of the virus in poultry farms. The findings emphasize the widespread nature of H9N2 in the region and its potential economic and public health implications. In conclusion, H9 avian influenza viruses are circulating in broilers of South Punjab, Pakistan; moreover, the prevalence of H9 virus coinfections is common than other subtypes of AIV. The study recommends implementing enhanced biosecurity measures, regular surveillance, and vaccination strategies to mitigate the risks associated with H9N2 infection. Continued research and monitoring are essential to prevent outbreaks and ensure the health of poultry populations and minimize zoonotic risks to humans.

CBGP-93
Microbiology

INVESTIGATING THE ANTIMICROBIAL POTENTIAL OF ESSENTIAL OIL AGAINST MULTIDRUG RESISTANT BACTERIA

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The increasing prevalence of multidrug-resistant (MDR) bacteria has become a global public health crisis, diminishing the effectiveness of conventional antibiotics and complicating treatment options for bacterial infections. Essential oils (EO) derived from aromatic plants, have shown promising antimicrobial properties and are being explored as potential alternative to conventional antibiotics. This study

investigates the antimicrobial activity of selected essential oil against MDR bacterial stain including *Escherichia coli*, *Klebsiella pneumonia*. The Antibacterial effects of EO was assessed using agar well diffusion minimum inhibitory concentration (MIC), and minimum bactericidal concentration (MBC) assays. Gas chromatography-mass spectrometry (GC-MS) was employed to analyze the chemical composition of the most effective essential oils. The findings suggest that essential oils could serve as natural antimicrobial agents with potential applications in pharmaceutical and healthcare settings. Their mechanism of action may involve disruption of bacterial cell membranes, inhibition of enzyme activity, and interference with quorum sensing. However, further research is needed to explore their clinical efficacy, possible resistance development, toxicity profiles, and formulation for therapeutic use. This study highlights the potential of essential oils as a complementary approach in combating MDR bacterial infections, addressing the urgent need for novel antimicrobial strategies.

CBGP-94
Microbiology

PREVALENCE OF *TRICHOPHYTON VERRUCOSUM* INFECTION IN FARM ANIMALS OF THE CHOLISTAN DESERT OF DISTRICT BAHAWALPUR, PAKISTAN

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Trichophyton verrucosum belongs to the dermatophyte fungi, closely related organisms that cause skin infections in farm animals and humans. *T. verrucosum* infection has been reported in livestock and people in different countries from all continents. Human cases have been reported in different areas of Pakistan, but there is little information about the animal source of the fungus. Dermatological specimens collected from Cholistani livestock for a study on mange in small and large ruminants were retrospectively analyzed for the presence of *T. verrucosum*. In total, 6,873 animals (2,087 cows, 2,033 goats, and 2,753 sheep) were screened for evidence of dermatological lesions during two surveys performed in the summer and winter seasons. Skin scrapings collected from animals with lesions were analyzed by direct microscopic examination after digestion in sodium hydroxide and a real-time polymerase chain reaction (PCR) targeting pathogenic *Trichophyton* species. At microscopy, samples from 45 cows (2.15%), 37 sheep (1.34%), and 4 goats (0.2%) were positive for fungal elements consistent with *T. verrucosum*. PCR confirmed the microscopy results. The prevalence was lower than that reported in other countries in intensive breeding farms. Results agree with the literature regarding factors affecting *T. verrucosum* diffusion, i.e., infection was more prevalent in cattle, especially in younger animals during the winter season. In conclusions this study reports, for the first time, the presence of *T. verrucosum* in livestock in Pakistan. A better knowledge of the animal role in the spread of this fungus may allow the adoption of more efficient control measures and prophylaxis.

CBGP-95
Microbiology

RESPONSE TO COVID-19, RECENT DEVELOPMENTS, CHALLENGES AND A WAY OUT

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Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) rapidly became a global health epidemic, acting on millions in just a couple of months. As the pandemic grasped health experts concentrated on addressing the virus's unknown nature, categories both instant relief and long-term solutions. This research inspects the role of passive immunity in fighting COVID-19, set an examination for many vaccine platforms, including conventional recombinant protein vaccines, DNA and mRNA-based vaccines, as well as non-replicating and replicating viral vector vaccines. The paper reviews recent developments in vaccine development and focuses on the challenges in production, distribution, and accessibility. Besides, the socio-political and economic implications of the pandemic are discussed, highlighting the need for global collaboration across governments, academia, the healthcare sector, and civil society. Effective cooperation among these shareholders is essential to producing safety and efficacy data, increasing vaccine distribution, and preparing for future health challenges. Eventually, this research emphasizes the potential of biotechnology to address pressing global health issues while approving of a united approach to get the better of the ongoing pandemic.

CBGP-96
Microbiology

SEASONAL VARIATION IN NEMATODES ASSOCIATED WITH INTERTIDAL MARINE SPONGE *LIOSINA PARADOXA* INHABITING MANGROVES AT SANDSPIT, KARACHI COAST.

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Marine sponges are highly diversified group of invertebrates (phylum porifera) which inhabits different substrates in the coastal regions of the world. Among them *Liosina paradoxa* reported for the first time inhabiting mangroves in the intertidal region of Karachi (Pakistan; northern Arabian Sea). *Liosina paradoxa* provide habitat to diversified communities including nematodes. In present study seasonal variation (pre-monsoon, monsoon and post-monsoon) in diversity and distribution of nematode species were observed at four different stations located at Sandspit. A total of 341 individual belonging to 10 genera and 13 species were reported. Among them Paracanthonchus was the most dominated genus (3 species) followed by Monhystera (2 species). Overall highest percent abundance of *Paracanthonchus* sp.

was reported during all seasons followed by *Paracyatholaimus* sp. (20.9 and 17.3 %) and *Eleutherolaimus inglisi* (17.4 and 13.3 %) in monsoon and post-monsoon season, respectively. *Tricotheristus* sp. and *Dracograllus* sp. were recorded only in pre-monsoon season. In case of different stations maximum counts of species were observed at St1 and St2 (12, 12) followed by St4 (11) and St3 (9), respectively. Physicochemical variables also showed seasonal variation with highest concentration of DO in pre-monsoon followed by monsoon and post-monsoon whereas, salinity was high in postmonsoon season. Diversity indices showing maximum value of Shannon-Weiner index (2.14) in pre-monsoon, Simpson (0.85) and Evenness (0.73) during monsoon and Dominance (0.23) during post-monsoon. This study highlights the significant biodiversity of nematodes hosted by *Liosina paradoxa* in the mangroves of coastal region at Karachi. The findings endorse the need of further research to better understand the ecological roles of these nematodes and their interaction with associated sponges inhabiting mangroves.

CBGP-97
Microbiology

PROXIMATE ANALYSES OF SEVEN CYANOBACTERIAL STRAINS ISOLATED FROM KARACHI COAST

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The growing global population and climate change has imposed a major threat for the humanity like famine and hunger. This study focused to accomplish the UNO Sustainable Development Goal (SDG 2) for zero hunger, which emphasizes on the need for sustainable and nutritious new/alternate food sources for human. Therefore, the isolation, characterization, identification and biochemical analysis of seven cyanobacteria strains were successfully performed isolated from microbial consortium. These strains were mass cultured in ASN-III and MN media. The strains were identified as *Leptolyngbya tenuis*, *Leptolyngbya sp. 1*, *Leptolyngbya sp. 2*, *Limnolyngbya circumcreta*, *Stenomitos frigidus, Oxynema thaianum,* and *Phormidium breve.* Among them *Limnolyngbya circumcreta and Stenomitos frigidus* are reported for the first time from the Karachi coast (Pakistan).These seven strains were analyzed for three major nutrients i.e., carbohydrates, proteins and lipids. Among these the highest and lowest values for carbohydrate content were recorded in *L. circumcreta* (31%) and *P. breve* (6.4%), respectively. The highest protein was recorded in *Leptolyngbya sp. 1* (6.3 %) and lowest in *O. thaianum* (2.1%) and the highest lipid was analyzed in *P. breve* (20.7 %) and lowest in *Leptolyngbya sp.2*, (2.4%). The carbohydrate content of all these strains was found higher than lipids and proteins due to the fact that these strains were sampled from polluted backwaters where they secrete *Exopolysaccharides* (EPSs) to protect themselves. The biochemical values suggest that these strains could be further analyzed for their suitability for nutritional consumption.

CBGP-98
Microbiology

MODERN GENETIC STRATEGIES FOR MANAGEMENT OF DENGUE VECTOR MOSQUITOES

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Mosquitoes such as *Aedes agypti* and *Aedes albopictus* are responsible for transmitting many arthropod vector-bone viral infections including chikungunya, zika and dengue. According to the WHO, globally dengue fever is putting approximately half of the world's population at risk, where between 100 and 400 million cases of the disease occur annually. Existing control strategies have their limits, control programs simply do not possess the man-power or necessary financial resources. Furthermore, few tools available, economic restraints, community buy-in, regulatory restrictions, area wide effectiveness, and insecticide resistance increase challenges. Although quick and major advances have been made in the field of biology, ecology, genetics and virology, relatively little has changed in the field of mosquito control in recent decades. Genetic methods can potentially provide new and species-specific control strategies through the introduction of a heritable trait into the target population for area-wide suppression. These include the sterile insect technique (SIT), a variation of SIT called the release of insects carrying a dominant lethal (RIDL), and Wolbachia-induced cytoplasmic incompatibility (CI). SIT technique has been used successfully against several agricultural and veterinary pests, with varying degrees of success. It can be further enhanced by incorporating RIDL, which utilizes male mosquitoes to carry and transfer female acting transgenes into wild population. The RIDL technique may also be more improved by a female-killing system (fsRIDL), where offspring of released males homozygous for a female-specific lethal would inherit a copy of the female-killing gene to cause mortality in their daughter. And more importantly, Wolbachia infections with wMelPop have been shown to successfully reduce the life span of adult Ae. aegypti, thus limiting their vectorial potential because they may not live long enough to successfully transmit arboviruses such as dengue. Fortunately, a variety of mosquito abatement tools are being developed or are within the first phases of implementation, which provide a glimmer of hope to vector control officials tasked with the protection of public health and comfort. These tools range from community involvement and inter agency collaborations, to development of economically sound but efficacious lethal ovi-traps, and to new formulations and methods aimed at novel control techniques that will be necessary on an increasing scale in the very near future.

CBGP-99
Microbiology

GAUGING BIOREMEDIATION POTENTIAL OF KLEBSIELLA SPECIES TO COMBAT AMR IN ONE HEALTH PERSPECTIVE

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Antimicrobial Resistance (AMR) is an escalating one health and global health concern. Most recent

approved classes of antibiotics by FDA were in early 2000s. Earliest resistant bacteria were identified in 1928. Since then AMR has been incredibly outrageous in depleting available antibiotic options. The drug residues from pharmaceutical units, human plus veterinary healthcare systems, farms and wastewater reaches to main water bodies, soil and also become part of food chain when these residual drugs are present in food animal products. The residues or scarce amounts of antibiotic active ingredients are putting selection pressure on microbes causing them to develop resistance. Biotic methods are proven to have efficiency in cleansing drug residues, such as klebsiella spps can degrade antibiotic residues. Purified cultures of reference turbidity for particular non pathogenic strains of Klebsiella species are used. Culture can be prepared (growth on Simmon citrate agar supplemented with amoxicillin) and revived (BHA broth for 6-24hours incubation at 37 degrees Celsius) in laboratory or just use ATCC strains. Suspensions of required colony forming units or concentrations calculated in mg per Litre by nanodrop or spectrophotometer can are to be prepared. Biotic cleansers are eco-sustainable microbial machines to achieve a cleaned environment from drug residues resulting in decrease of resulting AMR. K. pneumonia strain YH43 has been proven to degrade cypermethrin in soil upto 87.5% at concentration of 100mg/L. Klebsiella pneumonia strain TN-1 at concentration of 300mg/L has proven 95.31% tylosin molecule degradation while using the drug metabolites as Carbon and Nitrogen sources. Drug residues of antibiotics sourcing from healthcare facilities, pharmaceutical industries are leaching to wastewater and soil. These environmental parts are habitats of bacteria (ubiquitous) where substantial exposure to these minute amounts of drugs leads bacterial resistance due to selection pressure. We may be able to gauge the intrinsic properties of Klebsiella species for degradation of these antibiotics residue and cleansing of environment consequently decreasing AMR causes.

CBGP-100
Microbiology

MILK BORNE BACTERIAL HAZARDS IN FIVE SHEEP BREEDS OF SINDH AND BALOCHISTAN

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Milk can serve as a source of bacterial contamination being a stable medium for different bacteria sheep milk improperly dealt using contaminated utensils or dirty hands can leads to severe health hazards. Infectious disease which occurs due to pathogenic bacteria are the most common and widespread in areas where sheep milk is consumed. Some of these pathogens can be life threatening, disseminated through contaminated sheep milk. Therefore, the objective of the study was to evaluate the prevalence of bacterial contamination and associated factors. The five breeds of sheep (*Ovis aries*) selected were Dumbi, Kochi, Kooka, Balochi and Mengali from fifteen locations of Sindh and nine locations of Balochistan, Pakistan. The pH of sheep milk ranged from 5.32 to 6.70. Dumbi and Kochi were observed to be most while Mengali least bacterial contaminated. In total three bacteria species were recorded two gram -ve and one gram +ve. The gram negative Bactria were *E.coli, Pseudomonas ap* and *Listeria* was the only Gram +ve. *Listeria* sp.can be severely dangerous in immunocompromised individual people older than 65, pregnant women and babies. It can survive freezing and refrigerated temperatures. People with high risk must avoid taking raw sheep milk.

CBGP-101
Microbiology

SEROPREVALENCE STUDY TO DETERMINE THE EFFECTIVENESS OF PESTE DES PETITS RUMINANTS (PPR) VACCINATION IN AZAD JAMMU AND KASHMIR

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Peste des Petits Ruminants (PPR) is an acute or sub-acute highly contagious viral disease affecting small ruminants, leading to significant mortality and morbidity in susceptible populations. It results in substantial economic losses, decreased production, and high control costs. Between 2022 and 2025, serological surveys were conducted across ten districts in Azad Jammu and Kashmir (AJK). Similar to other conflict-affected regions, AJK faces challenges in controlling PPR. In response, the Government of Pakistan, in collaboration with the Ministry of National Food Security and Research, initiated nationwide PPR vaccination campaigns. These campaigns utilized a public-private partnership approach, targeting approximately 1.57 million sheep and goats—about 60% of the estimated national small ruminant population—in AJK during 2022. The vaccine used was PestVac K (Nig75/1), a freeze-dried modified PPRV strain, with an overall unit cost of USD 0.28 per animal. Two serological surveys were conducted before and after the vaccination campaigns, employing a two-stage cluster sampling methodology to collect serum samples for analysis. A total of 837 pre-vaccination and 954 post-vaccination serum samples from sheep and goats were analyzed for PPR-specific antibodies using a competitive enzyme-linked immunosorbent assay (cELISA). The results indicated an increase in seroprevalence following the vaccination campaign, with overall seroprevalence rising from 36% (301/837) before vaccination to 61% (584/954) after vaccination ($p<0.0001$). Pre-vaccination seroprevalence was highest in District Muzaffarabad (47%) and lowest in District Haveli (18%), while post-vaccination seroprevalence was highest in District Bhimber (75%) and lowest in District Poonch (31%). This study primarily focuses on the feasibility of PPR control in AJK, a conflict-affected and fragile region, offering insights that can be applied to other countries facing similar challenges.

CBGP-102
Microbiology

OCCURRENCE OF SEASONAL POULTRY DISEASE AT KHAIRPUR MIR'S SINDH, PAKISTAN

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Poultry sector is a vibrant segment of Pakistan economy and is a viable source of animal origin protein source. Poultry sector has been transformed into one of the biggest industries in Pakistan,

comprising a large number of conventional and control farming systems. In conventional farming, there is no infrastructure for biosecurity, and poultry flocks are exposed to a string of environmental stresses resulting in huge economic losses to the farmers.The growth of this sector is badly affected by different devastating problem's in-term of mortality and morbidity. But the tremendous growth of the sector is adversely affected by lot of viral, bacterial, protozoan and metabolic disorders. Among the protozoan diseases coccidiosis, respiratory myco, and fowl typhphoid all these diseases are remains most of the expensive problem in-spite of intervention being made for prevention and control through management, nutrition and chemotherapy. All these diseases of broiler birds are the most economically important diseases of the poultry, around the globe. In order to assess seasonal and age-wise prevalence of coccidiosis, mycoplasm, fowl typhoid and with concurrent infections, this study was conducted on commercial poultry farms in and around Khairpur city, province of Sindh, Pakistan. Mycoplasma synoviae infections have been shown to affect broiler performance as determined by reduced body weight, poorer feed conversion, causing respiratory tract infection and infectious synovitis in chickens, Coccidiosis can cause concurrent infection with bacterial, fungal, and viral pathogens. The disease is characterized by dysentery, bloody diarrhea, enteritis, poor growth, drooping wings, emaciation, and decreased production Coccidiosis is a disease of hot and humid environments and is considered a disease of poor management. Fowltyphoid is characterized by Clinical signs in chicks and poults include anorexia, diarrhoea, dehydration, weakness and high mortality. .In present study diseases were diagnosis on the basis of external sign and symptoms and for confirmation of disease postmortem examination was conducted at the laboratory of department of zoology .To see the effects of seasonality, year long duration was divided into three Equal parts - Starting From Feb-March to Jun-July 2021 in broilers, the incidence Mycoplasma synovia, fowl typhoid, Cococodosis was equally distributes all the months. Highest no: of cases were observed in the month of June-July 35.1%, No. of affected birds due to disease Fowl typhoid in the month of June-July and highest birds died ratio 26.1% similar as month of June - July followed by Mycoplasma synovia the highest no. of affected birds were 22.5% recorded due to disease, lowest no.of affected broiler birds were seen in month of February-March 8.0% and also case of died birds 3.2% were recorded. In the present study the higher prevalence of infection during the rainy season of monsoon observed seasons cause major losses to Pakistani poultry industry especially in conventional poultry farming system with no or insufficient biosecurity measures. Additionally, these results highlight the importance of management and regular deworming in reducing the impact of these infections on the poultry production and farm profitability

CBGP-103
Microbiology

ISOLATION AND IDENTIFICATION OF PATHOGENIC BACTERIA FROM DRINKING WATER OF TEHSIL HAJIRA DISTRICT POONCH AZAD JAMMU AND KASHMIR

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Randomly 189 drinking water samples (DWS) were collected from various sources, including 21 spring water (SW), 21 boring water (BW) and 21 from well water (WW) in pre-rainfall season, rainfall season and post rainfall season of tehsil Hajira district Poonch AJK. The samples were collected from both urban and rural areas. During pre-rainfall season in SW Salmonella were present 4 (19.04%) samples,

Shigella present 7 (33.34%) samples and E. coli present 13 (61.90%) samples. In WW Salmonella were present 6 (28.56%) samples, Shigella present 9 (42.86%) samples and E. coli present 15 (71.43%) samples. In BW Salmonella were present 3 (14.28%) samples, Shigella present 6 (28.56%) samples and E. coli present 11 (52.38%) samples. During rainfall season in SW Salmonella were present 10 (47.62%) samples, Shigella present 14 (66.67%) samples and E. coli present 17 (80.95%) samples. In WW Salmonella were present 12 (57.14%) samples, Shigella present 16 (76.19%) samples and E. coli present 18 (85.71%) samples. In BW Salmonella were present 6 (28.56%) samples, Shigella present 12 (57.14%) samples and E. coli present 14 (66.67%) samples. During post rainfall season in SW Salmonella were present 4 (19.04%) samples, Shigella present 8 (38.09%) samples and E. coli present 14 (66.67%) samples. In WW Salmonella were present 7 (33.34%) samples, Shigella present 10 (47.62%) samples and E. coli present 16 (76.19%) samples. In BW Salmonella were present 3 (14.28%) samples, Shigella present 7 (33.34%) samples and E. coli present 12 (57.14%) samples. The Result is significant at P value 0.030 (chi-square test). The Salmonella, Shigella and E. coli contamination in drinking water (DW) were raised during rainfall season.

CBGP-104
Microbiology

ISOLATION, IDENTIFICATION AND ANTIMICROBIAL RESISTANCE PROFILE OF BACTERIA FROM PACKED FRUIT JUICES

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The packed fruit juices play a crucial role in satisfying nutritional need of purchaser at a price that is very reasonable. The consumption of these juices is built on conventional need of the consumers. The principle of formation depends on the conditions that are favorable like freezing and storage. These fruit juices may have both beneficial and detrimental effects on consumers' health. Antibiotic-resistant bacteria are becoming more and more common, which is a serious public health issue. The purpose of this study was to separate, characterize, and assess the antibiotic resistance profile of microbes found in juice samples that were packed. A total of 75 isolate of were obtained and examined for resistance to commonly used antibiotics. Among the isolates, the highest resistance was observed for Amoxicillin (43%) and Tetracycline (40%), whereas the lowest resistance was recorded for Azithromycin (2.85%) with no resistance observed against Ciprofloxacin and Vancomycin. Intermediate resistance was most frequently observed for Amoxicillin (46%) and Ciprofloxacin (40%) , while the lowest intermediate resistance was recorded for Azithromycin (28.57%) and Tetracycline (2.85%). Susceptibility testing revealed that Azithromycin (68.57%) and Vancomycin (68.57%) were the most effective antibiotics, followed by Ciprofloxacin (60%) and Tetracycline (11.42%). These findings highlight the significant resistance of bacterial isolates from packed fruit juices to certain antibiotics, particularly Amoxicillin and Tetracycline. This emphasizes the need for stringent quality control in packed fruit products and the exploration of alternative antimicrobial agents to mitigate the growing issue of antibiotic resistance.

CBGP-105
Microbiology

ISOLATION AND IDENTIFICATION OF BACTERIOCIN PRODUCING BACTERIA FROM HUMAN SALIVA AND THEIR ANTIMICROBIAL ACTIVITY

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Saliva is the most amazing fluid in the oral cavity, as it comes in contact with all surfaces of the oral cavity and represents a fingerprint of the composition of oral cavity. Human saliva consist a wide array of microorganisms, which also include bacteria that play important role in maintaining oral health. The greater number of bacterial species draws attention to oral cavity, especially saliva. Bacteria those are beneficial for oral health act as first line of defense against pathogenic bacteria. Maintaining a balance of salivary bacteria is essential for a healthy oral cavity. The salivary ecosystem is made up of microorganisms that are present on different surfaces of oral cavity. Saliva consists of greater than 100 million bacterial cells per ml of the saliva. The purpose of present study was isolation of bacteria from human saliva, screening of isolated bacteria for the formation of bacteriocin, identification and analysis of antimicrobial activity of bacteriocin producing bacteria against selected pathogens. Samples were collected from people of different age group. After screening of isolated bacteria three of them produced bacteriocin such as Micrococcus luteus, Lactobacillus spp. and Streptococcus salivarius. Antibacterial activity of bacteriocin producing bacteria was checked by the method called Agar spot method against harmful bacteria that involved Staphylococcus aureus, pseudomonas aeruginosa and Escherichia coli. Lactobacillus spp. showed highest antimicrobial activity with a mean inhibition zone of (1.46) among these three isolates, positive control in which antibiotic discs were used showed mean inhibition zone of (1.13), M. luteus (0.92) and S. salivarius (0.90). The negative control formed no zone (0.00). The most inhibited pathogen was S. aureus with a mean of (1.16), accompanied by P. aeruginosa (1.00) and E. coli (0.48).

CBGP-106
Microbiology

ANTIMICROBIAL ACTIVITY OF CHEMICALLY SYNTHESIZED AGNPS AND GREEN SYNTHESIZED AGNPS USING *SYZYGIUM CUMINI* AND *OCIMUM BASILICUM* LEAVES HEAT EXTRACT AGAINST DIFFERENT BACTERIAL STRAINS THAT INFECT YOUNG BIRDS IN HATCHERY OF ZOO

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Among modern technologies, nanotechnology is emerging and attention seeking technology. The

green manufacturing of metal nanoparticles and their use in the medical field is of great significance in nanotechnology. In this study Chemical synthesis and green synthesis of Ag nanoparticles using *Syzygium cumini* and *Ocimum basilicum* leaves aqueous heat extract was done. Modern techniques, such as Fourier Transform Infrared Spectroscopy (FTIR), Zeta Potential measurement, and Particle Size Analysis (PSA), were used to characterize C-AgNPs, S-AgNPs, and O-AgNPs. FTIR analysis showed different peaks(3697.5 cm^{-1}, 2117.1 cm^{-1}, 1528.2 cm^{-1}, 2087.3 cm^{-1}) which confirms the presence of AgNPs and functional groups that acts as reducing agents and stabilizing agents for that AgNPs. Zeta potential of C-AgNPs, S-AgNPs and O-AgNPs were -31.5 mV, -27.6 mV and -11.4 mV showed that all AgNPs are highly stable. Antimicrobial activity of chemically synthesized (C-AgNPs) and green synthesized Ag nanoparticles (S-AgNPs and O-AgNPs) against different bacterial species, *S. aureus, P. aeruginosa, K. pneumonie*, *Proteus mirabilis, and E. coli* isolated from hatchery of Zoo Safari, Lahore were also investigated by Kirby-Bauer disc diffusion method. Antimicrobial activity results of All AgNPs compared with antimicrobial activity results of commercially available antibiotics. Among all AgNPs, C-AgNPs and S-AgNPs gave high antimicrobial activity than O-AgNPs. MIC and MBC of C-AgNPs, S-AgNPs and O-AgNPs against bacterial strains were measured between 2 mg/ml to 0.25 mg/ml.

CBGP-107
Microbiology

ISOLATION,IDENTIFICATION AND ANTI MICROBIAL RESISTANCE PROFILE OF BACTERIA FROM PACKAGED DRINKING WATER

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Access to safe and clean drinking water is essential for human health and well-being, yet microbial contamination in packaged drinking water poses a significant public health risk. A random cross-sectional study was conducted on packaged drinking water obtained from markets in Rawalakot Azad Jammu and Kashmir. The objective of study was isolation, identification and antimicrobial resistance profiles of bacteria present in packaged drinking water. 45 water samples from various popular brands were collected and analyzed to determine the extent of microbial contamination. Out of 45 samples 50% samples were positive for *Shigella* and 70% samples were positive for *E. coli.* Standard microbiological techniques, including selective media culturing, morphological examination, and biochemical testing, were employed to identify bacterial species. Antimicrobial susceptibility was tested using disc diffusion methods to evaluate resistance to commonly used antibiotics. From each sample (35 for *E. coli* and 26 for *Shigella*) were taken for antimicrobial susceptibility test for *shigella* and *E. coli.* 5 most common antibiotics were used for disc diffusion methods. Out of The results indicated the presence of pathogenic bacteria in some samples, along with varying resistance patterns to multiple antibiotics. These findings highlight the potential health risks associated with microbial contamination in packaged drinking water and underscore the importance of stringent quality control measures. By identifying contaminated products and understanding bacterial resistance, this study contributes to promoting safer drinking water practices and supports the development of improved regulatory policies for public health protection.

CBGP-108
Microbiology

DETECTION AND MOLECULAR IDENTIFICATION OF *AEROMONAS* SPP. IN WASTEWATER FROM KASUR, PAKISTAN

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Aeromonas spp. are opportunistic pathogens associated with waterborne diseases in both humans and animals. Their widespread distribution in aquatic environments, particularly wastewater, poses a significant public health risk. This study aimed to investigate the presence of *Aeromonas* spp. in wastewater. A total of 50 wastewater samples were collected from various discharge sites in Kasur, Pakistan. Isolation of *Aeromonas* spp. was performed using Aeromonas Isolation Media Base supplemented with ampicillin. Morphological and biochemical characterization was conducted through Gram staining and the API-20E system. Molecular identification was carried out using *gyrB* gene sequencing. Three isolates that exhibited dark, green-centered colonies were tentatively identified as *Aeromonas* spp. based on manufacturer guidelines. Gram staining revealed that the isolates were Gram-negative, small coccobacillary rods. API-20E biochemical analysis confirmed the identification of all three isolates as *Aeromonas caviae*. Furthermore, *gyrB* sequencing followed by NCBI BLAST analysis documented the molecular identification of these isolates as *A. caviae*. The findings highlight the urgent need for effective wastewater treatment and management strategies to prevent the dissemination of *Aeromonas* species and mitigate the risk of waterborne disease transmission.

CBGP-109
Microbiology

BACTERIOCIDE ACTIVITY OF ESSENTIAL OILS FUMIGATION EXTRACTED FROM DIFFERENT MEDICINAL PLANTS TO REDUCE THE GROWTH OF INDOOR PATHOGENIC BACTERIA IN DIFFERENT OFFICES

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Majority of human beings spend over 90% of their time doing indoor activities rather than spending time outdoors. This highlights how important it is to address issues about the indoor environment in order to protect the general public's health. For this purpose, the bacteriocide activity of essential oils fumigation of medicinal plant seeds (*Trachyspermum ammi, Coriandrum sativum, Nigella sativa,* and *Foeniculum vulgare*) was investigated, in this study, on indoor pathogenic bacteria in different offices. The goal of this

research was to check in vitro and in vivo antibacterial activity of essential oils on indoor pathogenic bacteria. With regard to this objective, a total of 120 samples before and after essential oils fumigation by using aromatic diffusers were taken from different offices. It is concluded that fumigation with *Coriandrum sativum, Trachyspermum ammi*, Air Purifier, *Nigella sativa, Foeniculum vulgare* seeds, essential Oils showed P<0.0001, P=0.0002, P=0.04, P=0.0009 and P=0.02 respectively in vitro antibacterial activity on the growth of indoor bacteria by comparing results of Pre CFU Count (m-3) and Post CFU-Count (m-3) using Paired T-Test at α=0.05. Various biochemical assays were used to identify the most common gram-positive indoor pathogenic bacteria *Staphylococcus aureus, Staphylococcus epidermidis, Streptococcus pyogenes* that were present with the isolation frequency 54%, 46% and 42% respectively in offices. The in vivo antibacterial activity of *Trachyspermum ammi, Coriandrum sativum, Nigella sativa* and *Foeniculum vulgare* seed's essential oil checked by Kirby Bauer Disc Diffusion Method by using One Way ANOVA (Tukey's Test). All the Essential Oils were applied in different concentrations (25%, 50%, 75% and 100%). Upon evaluating the results, *Trachyspermum ammi, Nigella sativa* and *Coriandrum sativum* showed maximum (17mm DIZ, 18mm DIZ and 24mm DIZ, respectively) against *Staphylococcus aureus*. The *Staphylococcus aureus* showed resistant to *Foeniculum vulgare. T.ammi* and *C.sativum* showed same in vivo antimicrobial activity (20mmDIZ) against *Staphylococcus epidermidis.* While *N.sativa* and *Foeniculum vulgare* showed (14mm and 18mm, respectively) against *S.epidermidis. C.sativum, F.vulgare, N.sativa* and *T,ammi* showed (21mm DIZ, 17mm DIZ, 12mm DIZ and 10mm DIZ, respectively) against *S.pyogenes*. Overall, *Coriandrum sativum* showed greatest in vitro and in vivo antimicrobial activity against indoor Pathogenic bacteria in different offices.

CBGP-110
Microbiology

ISOLATION AND BIOCHEMICAL CHARACTERIZATION OF *SALMONELLA SPP* FROM MIGRATORY BIRDS OF LAHORE ZOOLOGICAL GARDENS

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A number of migratory birds being ecologically and aesthetically important are kept in captivity for conservation and entertainment, which increases the chances of being prone to infectious diseases. *Salmonella* spp. cause gastrointestinal infection in wild birds, resulting in serious outbreaks and mortalities. The current prospective study was conducted to determine the prevalence of *Salmonella* spp. in the wild birds kept in captivity and finding the suitable treatment. A total of 24 samples of 7 captive wild birds species and 3 samples of a local bird, crow were collected from the lake and aviary of the Lahore Zoological Garden. Sampling was carried out by cloacal swabbing and collecting fresh fecal droppings, followed by isolation, phenotypic and biochemical identification including catalase, citrate, urease, KIA, oxidase, motility and Indole tests. The 16S rRNA gene was amplified for molecular characterization using 1492/27 primer set, with resultant product size of greater than 1.2 KB. *Salmonella* spp. was isolated from 16 samples (66.6 %) and the highest prevalence of 100% was recorded in the Dalmatian pelican and surprisingly in crows, indicating the risk of zoonotic transmission to the captive birds and even the visitors. The *Salmonella* isolates from different bird species were found to susceptible to three types of conventional antibiotics viz. ceftriaxone (87.5 %), azithromycin (87.5 %) and ciprofloxacin (62.5 %) and resistant to streptomycin (87.5 %) and tetracycline (75%). The antimicrobial

ability of extracts and juices of natural edible agents were also examined to find the natural procurement of this severe organism. Honey and lemon-juice were found to be relatively better with intermediate antimicrobial activity with zone diameter of 15-16 mm than other agents like bitter-apple, grape fruit, papaya, pomegranate, ginger and Aloe Vera with negligible zone diameters. Based upon the findings of this study, captive wild waterfowls mostly harbor *Salmonella* organisms and serve as the important reservoirs and the crows are important carriers of the of theses pathogenic organisms. A comprehensive prevention, treatment and management plan at the zoo is needed to be set for the control of this infectious zoonotic disease.

CBGP-111
Microbiology

ESTIMATION OF PHYSICOCHEMICAL PARAMETERS AND ISOLATION OF FECAL COLIFORMS FROM POTABLE WATER SAMPLES COLLECTED FROM LAHORE ZOO, JALLO PARK AND SAFARI PARK, LAHORE

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The study was designed to evaluate the quality of drinking water at various zoos and wildlife parks in Lahore. To ascertain the quality of drinking water the physiochemical parameters, heavy metals concentration, and fecal coliforms were examined. For this purpose, 50 samples were collected from Lahore Zoo, Safari Park, and Jallo Park including filter and tap water. Physicochemical parameters such as color, odor, taste, total dissolved solids, pH, hardness, turbidity, heavy metals and chlorides were measured by using Standard Methods and results were compared with the guidelines of WHO. All the samples had physiochemical parameters within the permissible limits by WHO. The Atomic Absorption Spectrometric technique (AAS) detected heavy metals including mercury, chromium, cadmium, nickel, lead, and arsenic were found within the permissible limits of WHO. Bacterial species were isolated by multiple-tube fermentation technique and identified through phenotypic and biochemical characterization techniques. Among the identified species, more isolates were Gram-Negative .90% of drinking water samples were contaminated with fecal coliforms. The identified bacterial species were *Streptococcus aureus, Klebseilla pneumonia, Salmonella spp., Pseudomonas aeruginosa,* and *Proteus mirabilis*. The highest C.F.U. was found in samples of Jallo Park and lowest in Lahore Zoo. Different antimicrobial commercial discs showed effectiveness against the isolated strains whereas plant extracts gave no results. The highest antibiotic susceptibility was shown by *P. aeruginosa* against Ciprofloxin with zone diameter of 29mm.

CBGP-112
Microbiology

CONTROLLED SYNTHESIS OF WATER-SOLUBLE CARBON NANOPARTICLES BY GREENER APPROACH

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Recently, carbon nanoparticles (CNPs) gained much attention because of green precursors and easy synthesis techniques. In this study, we synthesized water soluble carbon nanoparticles from bread by using simple carbonization process. Here, by using carbonization process, we developed three synthesis methods with slight modification. The characterization of CNPs was performed by using UV-Vis spectroscopy. The results of UV-visible spectroscopy show that, the prepared carbon nanoparticles have strong absorption spectrum in ultraviolet-region while their tail extends to visible region. These CNP showed strong green light emission in ultraviolet irradiation. They also have good solubility in water as well as in other organic solvents. Furthermore, prepared CNPs were used as a fluorescent ink for drawing fluorescent patterns. The results indicated that, the prepared carbon nanoparticles can be utilized as good fluorescent ink in printing industry and in diverse biomedical field.

CBGP-113
Microbiology

SCREENING AND EVALUATION OF *BACILLUS SUBTILIS* FOR AMYLASE PRODUCTION FROM SOIL SAMPLES OF DISTRICT SIALKOT

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Current work was conducted to screen and evaluate the amylase producing *Bacillus subtilis* bacteria from soil samples of District Sialkot. A total of 50 soil samples were collected, out of these 25 samples harbored isolates of *Bacillus subtilis*. These bacterial isolates were characterized morphologically and biochemically by standard methods. Amylase producing potential of all isolates of *Bacillus subtilis* was evaluated and it was observed that all the isolates had potential of amylase production. Among these, isolates KGS19 and KGS20 having the strongest starch hydrolyzing potential based upon their most prominent zones of hydrolysis. The colonies of isolates were circular or irregular, rough, thick, opaque and color ranges from cream white to pale yellow. All isolates were gram positive rods with positive catalase, oxidase and motility tests. This study revealed that the collected soil samples from district Sialkot contained amylase producing *Bacillus subtilis* strains which are effective hydrolyzers of starch and can be a great deal of interest for their application in industrial and commercial starch hydrolysis.

CBGP-114
Microbiology

PREVALENCE AND MOLECULAR CHARACTERIZATION OF *ESCHERICHIA COLI* IN CAPTIVE BIRDS FROM DISTRICT KASUR

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The presence of *Escherichia coli* in captive birds poses significant public health concern due to its potential role in the dissemination of antibiotic resistance. This study aimed to assess the prevalence and characterize *E. coli* isolated from cloacal swabs of captive birds in Kasur district. A total of 100 cloacal swab samples were collected and processed under sterile conditions. The identification of *E. coli* isolates was performed using standard bacteriological techniques, including culture on MacConkey and Eosin Methylene Blue (EMB) agar, gram staining, and biochemical assays. Confirmation of *E. coli* was achieved through PCR targeting the 16S rRNA gene, followed by phylogenetic analysis using sequence data compared against GenBank references. The overall prevalence of *E. coli* was determined to be 10%, with isolates exhibiting characteristic pink colonies on MacConkey agar and a metallic green sheen on EMB agar. Molecular identification through 16S rRNA sequencing and NCBI BLAST analysis confirmed the ten isolates as *E. coli*. These findings highlight the prevalence of *E. coli* in captive birds and emphasize the need for continuous molecular surveillance and phylogenetic analysis to monitor bacterial evolution.

CBGP-115
Microbiology

ANTIMICROBIAL EFFECT OF HONEY AGAINTS *STAPHYLOCOCCUS AUREUS*

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Staphylococcus aureus is a Gram-positive bacterium widely distributed throughout the world. Nowadays, this microbe is one of the main causes of infections related to hospital care. The fact that this species is present in human this is supported by the skin and mucous membrane. *Staphylococcus aureus* is the most commonly bacteria chosed to test antimicrobial activity of honeys. Antibiotics are used to treat bacterial infections but in recent years, strains of various pathogenic bacteria show antibiotic resistant strain. However, natural antimicrobial agents such as honey have ancient remedy for therapeutic properties. The objective of this study to isolate identify *Staphylococcus aureus* from cuts and wounds.To

determine antimicrobial effect of honey againts *staphylococcus aureus*. All experiment will be performed in triplicate and data will be analyzed as by ANOVA. Agar well diffusion method was used with soft agar overlay method for honey susceptibility test. Minimum inhibitory concentration interpreted. Isolates of *S. aureus* was highest mean of inhibition showed at 75% (1.750) and 100% (2.100) and lower inhibition at lower concentration 25% (1.0000.0000) and 50% (1.1000. Honey concentrations is more effective at 100%. Mean of inhibition of Forest honey (1.550) while wildflower honey exhibited (1.425). The positive control demonstrated was highest mean of inhibition (1.700) while no activity observed in negative control. The (P= 0.000) confirming significance difference between treatment and negative control. Given all of these advantages, honey may be used in clinical settings to treat multidrug-resistant bacteria, mostly when useful locally, as part of combination antimicrobial therapy alternate to antibiotics Exploring underlying of honey's antimicrobial properties and its clinical applications.

CBGP-116
Microbiology

BIOPHYSICAL AND MOLECULAR INSIGHTS INTO SILVER NANOPARTICLE-ENHANCED AMNIOTIC MEMBRANE HYDROGELS FOR BURN WOUND HEALING AND ANTIMICROBIAL ACTION

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Silver nanoparticle-based hydrogels represent an innovative class of biomaterials with significant promises for wound healing due to their inherent antimicrobial, antioxidant, and biocompatible properties. This study investigates the formulation of seven hydrogels with varying concentrations of silver nanoparticles (4 mg, 7 mg, and 11 mg) combined with amniotic membrane powder, either alone or in combination. Silver nanoparticles were synthesized and characterized for size (15–20 nm), morphology, and colloidal stability, while the amniotic membrane was processed to generate bioactive powder. Physicochemical assessments of the hydrogels included analysis of pH, gel fraction, swelling ratio, water uptake, viscosity, and spreadability. Antimicrobial efficacy was tested against a range of clinically relevant bacterial and fungal pathogens, including *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Pseudomonas aeruginosa*, *Escherichia coli*, *Klebsiella pneumoniae*, *Candida albicans*, *Aspergillus fumigatus*, *Candida tropicalis*, and *Trichophyton mentagrophytes*. The hydrogel containing 11 mg of silver nanoparticles and amniotic membrane powder demonstrated superior wound healing in mice afflicted with burns, achieving complete closure within 20 days. Antioxidant assays revealed a significant reduction in malondialdehyde levels and an enhancement in catalase and superoxide dismutase activities. Histological analysis showed accelerated granulation, neovascularization, collagen synthesis, and re-epithelialization. RT-PCR results indicated upregulation of key tissue repair genes (VEGF, TGF-β1, HIF-1α, COL1A1, and IL-10), while pro-inflammatory markers (TNF-α and IL-6) were significantly reduced. These findings underscore the advanced therapeutic potential of silver nanoparticle-infused amniotic membrane hydrogels for effective burn wound management and infection control.

CBGP-117
Microbiology

OPTIMIZATION OF CULTURE CONDITIONS FOR PRODUCTION OF ANTIBIOTICS BY ACTINOMYCETES

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Actinomycetes are renowned for natural antibiotics production. The study objective was to optimize and assess the antimicrobial properties of soil actinomycetes. By using serial dilution and isolation method total 40 bacterial isolates were isolated from ten soil samples. The actinomycetes were identified by colony characterization, microscopy, and biochemical tests. Out of 40 isolates obtained from the 10 soil samples, 15 were identified as actinomycetes. Fifteen actinomycetes were subjected for production of antibiotics in liquid fermentation medium. Initial screening was done by using agar well diffusion method. *Escherichia coli*, and *Bacillus subtilis* were used as test organisms during antibiotics screening process. After screening process A5 was selected because highest zone of inhibition was observed in the presence of antimicrobial substances produced by this A5 isolate. Maximum 15 mm zone of inhibition was observed by using A5 isolate. This strain was further selected for optimization studies. To determine the optimal culture conditions, various physicochemical parameters were tested, including carbon source, nitrogen source, temperature, pH, incubation period and agitation rates. After optimization, a maximum of 22 mm zone of inhibition was observed by antibiotics produced in fermentation medium by A5 Actinomycete strain. It proves that optimization enhances the antibiotics amount produced by Actinomycetes.

CBGP-118
Microbiology

DEVELOPMENT OF METALLIC NANOHYBRIDS FOR MANAGEMENT OF *AEROMONAS HYDROPHILA-INDUCED* DAMAGE IN TILAPIA

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Currently fish aquaculture industry faces serious issues of mortality on account of prevailing bacterial infections leading to considerable economic loss. The current study aims to supplement the tilapia diet with novel material, silver-zinc nanohybrids (Ag-ZnNHs) to enable them to resist infections. For this purpose, we synthesized silver zinc nanohybrids (AgZn-NHs) by capping silver nanoparticles (AgNPs) with an essential nutrient, zinc, by chemical method and characterized them with UV- Visible spectroscopy and FTIR showing a peak at 350nm and Ag-O and Zn-O stretch ranging 3200-3500cm^{-1}

respectively. The same were tested for their efficacy as an infection-resistant agent in a twelve-week experimental trial in which tilapia fingerlings were randomly distributed into six groups, including one comprising of the control (basal diet subjected) only. Ag-Zn NHs supplementation was provided in varying concentrations in all the five experimental groups (D2= (AgNPs 20mgkg^{-1}), D3= (ZnNPs 20mgkg^{-1}), D4, D5, D6 (5,10,15 mgkg^{-1}AgZn-NHs)); the entire study was conducted in triplicates. Hematological, such as Hb, WBCs, RBCs, and HCT, renal markers, such as blood urea and serum creatinine level, and liver function-related Hepatic enzymes, such as CAT, SOD, and GST were studied. Significant variations were recorded ($P< 0.05$) in the supplemented groups as compared to the control for all the study parameters. In-vitro antioxidant studies, such as DPPH activity, FRP assay & H_2O_2 scavenging activity, proved that AgZn-NHs supplementation resulted in conservable antioxidation status at the concentration of 15 mgkg^{-1}. Similarly, the same concentrations enabled the least liver tissue damage, as was seen in the histological studies. Additionally, when challenged with *Aeromonas hydrophila,* the same supplementation was able to resist the infection to the maximum. Hence, 15mgkg^{-1} AgZn-NHs may be recommended to formulate the practical fish diet to boost health improvement, immunomodulation, and resistance to bacterial disease.

4. PHYSIOLOGY

CBGP-119
Physiology

EFFECT OF IRON NANOPARTICLE BY HEMATOLOGICAL PROFILING IN RABBIT

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Iron nanoparticles are applicable in the delivery of drugs, cancer treatment, and magnetic resonance imaging, all while demonstrating a non-toxic effect. A comprehensive assessment of the potential toxicity of iron nanoparticles is crucial to ensure the health of human patients as rabbit models. The study aims to assess the potential toxicity of Fe nanoparticles at various concentration levels (60 mg/kg, 40mg/kg, 60mg/kg, 80mg/kg, and 100mg/kg per body weight of rabbit) concerning their impact on blood parameters and histological characteristics in a rabbit (*Oryctolagus cuniculus)* model. This study thoroughly examines the effects of iron nanoparticles in hematological changes, urinary analysis, neural behavior by response to environment open field tests, and histo-pathological tests in male and female rabbits compared to each experimental group. Initial body weights were recorded before preparing the dosages. The rabbits were categorized into five random experimental groups denoted as E1, E2, E3, E4, and E5, with an additional randomly selected control group represented by E0. Iron nanoparticles of dosage (20, 40, 60, 80, and 100) mg/kg of rabbit body weight at five distinct concentrations were intravenously and orally administered to the rabbits within five weeks. Laboratory histological tests and blood assessments were performed throughout the trial period at equal intervals to evaluate the pattern of changes caused by the effect of iron nanoparticles on the physiology of the rabbits. Collected data was subjected to statistical analysis to validate the findings. In hematological profiling of WBC count, control values are around 6.4 x 10^9/L, but experimental groups show counts ranging from 5.8 to 16.75 x 10^9/L, indicating immune response variations. Neutrophils and lymphocyte counts also vary significantly among experimental groups, reflecting immune system modulation. Platelet counts in the control group are stable around 275 x 10^9/L, while experimental groups show a wider range, from 110 to 594 x 10^9/L, suggesting possible coagulation or platelet production issues under experimental conditions. Urine analysis results in significant immune, liver stress, renal damage, and metabolic disturbances in male and female rabbits. The behavioral analysis predicts more locomotion and movement in males concerning females. The histopathological study elucidates the pattern of toxicity among organs as lungs>liver>heart>kidney>brain>spleen. Overall, the study proves the potential toxicity of iron nanoparticles in the rabbit model.

CBGP-120
Physiology

NIGELLA SATIVA OIL (NSO) CAN PREVENT HYPERLIPIDEMIA INDUCED UPREGULATION OF VASCULAR ADHESION MOLECULES *IN VIVO*

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Nigella sativa oil (NSO) has long been used in traditional medicine to treat a variety of illnesses. In the following study the use of *Nigella sativa* oil was investigated for its protective role against the vascular inflammation induced by high fat diet (HFD) and it's potential to regulate the vascular cellular adhesion molecules (CAMs) in mice model of hyperlipidemia. Mice in control group were fed on normal standard diet while second group was given cholesterol rich high fat diet for 12 weeks to develop hyperlipidemia and third group was fed on high fat diet along with an oral dose (2ml/kg) of NSO. Lipid profile and serum level of vascular adhesion molecules i.e. intracellular adhesion molecule -1 (ICAM-1 or CD54), vascular cell adhesion molecule (VCAM-1 or CD106), and endothelial selectin (E-selectin or CD62) were measured and compared in all three groups. A significant increase in serum concentration of cholesterol, TG, LDL, VLDL, ICAM-1, VCAM-1, and E-Selectin and a significant decrease in concentration of HDL was observed in HFD group. Concomitant use of NSO prevented this increase in cholesterol, TG, LDL, VLDL, ICAM-1, VCAM-1, E-Selectin and precluded the decrease in HDL concentration. Our results suggest the protective role of NSO in precluding the HFD induced hyperlipidemia *in vivo* which prevented the resultant vascular inflammation by decreasing studied cellular adhesion molecules (ICAM-1, VCAM-1and E-Selectin) and thus remarkably contributed in preventing the HFD induced inflammation, endothelial dysfunction and the resultant atherosclerosis.

CBGP-121
Physiology

EFFECT OF DIETARY VITAMIN E ON SEMEN QUALITY OF JAPANESE QUAIL (*COTURNIX JAPONICA*)

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Japanese quail (*Coturnix japonica*) declared as near threatened according to IUCN red list of threatened species. This species needs immediate conservation planning through suitable means. In-situ conservation efforts are sometime insufficient for avian species, as habitat restoration is a long process and we need to combine all efforts of to reduce rate of extinction. Sperm cryopreservation is one of the suitable

techniques of Ex-situ conservation to safeguard the species genetic information. However, during the process of cryopreservation sperm cells get exposed to multiple stressors involving variation in temperature and osmotic shocks during the process of dilution chilling, icing, preservation and thawing. To mitigate the negative impacts of cryopreservation, antioxidants are added to semen extenders or given as dietary supplements. Vitamin E is naturally occurring antioxidant that inhibits lipid peroxidation at the level of plasma membrane by neutralizing hydroxyl free radicals and superoxide anions. When lipids are peroxided, vitamin E combines with the peroxide radical during lipid peroxidation to prevent it from attacking the polyunsaturated fatty acid (PUFAs). Lipids are an essential part of semen and play an important role in the spermatozoa's membrane structure, sperm cells metabolism, or their capacity to activate and fertilize the female gamete. Hence, the present study was designed to check the effect of dietary vitamin E on Japanese quail semen quality parameters. Japanese quail were divided into four experimental groups and were fed with poultry breeder feed supplemented with Vitamin E (0mg, 20mg, 40mg and 100mg) for three weeks before semen collection. Semen was collected from mature male quails by using teaser female, pooled, diluted with NaCl-TES extender and analyzed for semen quality assessment. Maximum sperm volume was obtained from experimental group fed with 40mg of Vitamin E and sperm concentration was recorded significantly higher in an experimental group fed with 100mg of vitamin E. Similarly, Sperm motility, plasma membrane integrity, sperm viability and DNA integrity were recorded higher in an experimental group given vitamin E 20mg in diet as compared to other concentrations of vitamin E and control (0mg). However, sperm acrosomal integrity was recorded higher in experimental group fed with Vitamin E 40 mg compared to other groups and control. In the current study, Vitamin E (40mg and 100mg) improves the sperm quality and showed a positive effect on quality parameters sperm DNA integrity, motility, volume, and sperm concentration. It is concluded that vitamin E (100mg) can be added to Japanese quail diet for effective captive propagation programs.

CBGP-122
Physiology

DEVELOPMENT OF SEMEN COLLECTION AND EVALUATION PROTOCOL FOR BLACK COBRA (*NAJA NAJA NAJA*)

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Black cobra has long been associated with humans due to their size and ease of capture, with parts like the liver, skin, fats and venom being used in traditional medicine. Black cobra experiencing significant decline in its native range due to illegal hunting, climate change, disease, habitat alteration, destruction, fragmentation, the impact of non-native species, increased UV radiation, and exposure to xenobiotic substances. Semen cryopreservation supports long-term genetic preservation in fluctuating population. This study was designed to evaluate semen collection methods, assessment of Seminal characteristics i.e. appearance, volume, concentration, sperm motility, sperm morphology for Black cobra. Semen sample collected from 7 males during breeding season (April-June) by following caudal third massage method. Semen volumes obtained from cobras (121.9-144.7cm body length) ranged from 10µL - 55µL. Most of the ejaculates were tan, with only a few being white. The spermatozoa concentration ranged

from $2x10^9$ to $9x10^9$ sperm per mL. Sperm motility recorded 72.85% at the time of semen collection in Black cobra. Sperm morphology was determined by using digital image evaluation program image j. Sperm were filliform following general snake sperm morphology. Sperm total length ranged from 37.74µm to 43.92µm with an average head length of 4.99µm and an average tail length of 36.13µm. It is concluded that caudal third massage is effective for semen collection in Black cobra. Development of semen evaluation protocols was found to be effective in semen volume, sperm motility and morphology assessment.

CBGP-123
Physiology

EFFECT OF SUMMER STRESS ON SEMEN QUALITY IN DIFFERENT CATTLE BREEDS

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Heat stress, characterized by excessive humidity and high ambient temperature, significantly impacts cattle reproduction, particularly semen quality. This study evaluates the effect of summer stress on semen quality in two indigenous Pakistani cattle breeds, Sahiwal and Cholistani, with a focus on post-thaw semen quality after cryopreservation. The objective was to compare breed-specific susceptibility to summer stress, assess semen quality in different seasons, and determine the extent of heat-induced damage using various post-thaw assays. Semen samples were collected from three bulls of each breed during the summer (July–August) and winter (December–January) seasons using an artificial vagina at 42°C under controlled conditions. Progressive motility of fresh semen was evaluated before dilution with an extender (500 million/ml). Semen was cryopreserved in French straws, cooled at 4°C for 2 hours, exposed to liquid nitrogen vapours (-120°C), and then stored in liquid nitrogen (-196°C). Post-thaw evaluation involved assessing sperm motility, plasma membrane integrity (PMI), sperm viability and livability using Trypan blue and Giemsa staining, and DNA integrity using toluidine blue staining. The thawing process was carried out in a 37°C water bath for 30 seconds before microscopic examination at 400x magnification. Results showed that for Sahiwal bulls, sperm motility, PMI, viability, and acrosome integrity were significantly ($p<0.05$) higher in winter compared to summer, while livability and DNA integrity remained unchanged. In Cholistani bulls, sperm motility and PMI were significantly higher ($p<0.05$) in winter, whereas viability, livability, and acrosome integrity showed no significant seasonal differences. DNA integrity was also significantly ($p<0.05$) higher in winter. These findings indicate that while both breeds experience reduced semen quality during humid summer conditions, Cholistani bulls exhibit greater heat tolerance, as three out of six parameters remained unaffected by seasonal variations. In conclusion, summer stress negatively impacts semen quality, but not all parameters are equally affected. Cholistani bulls demonstrated better resilience to heat stress compared to Sahiwal bulls. This study highlights the importance of breed-specific responses to climate conditions for improving reproductive efficiency in cattle. However, further research with a larger sample size is recommended for broader application in livestock management.

CBGP-124
Physiology

PERSISTENCE OF SCORPION (*HOTTENTOTTA TAMULUS*) VENOM IN PERIPHERAL NERVE COMPROMISES FUNCTIONAL REGAINS FOLLOWING SCIATIC NERVE INJURY IN MOUSE

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Diverse effects of animal toxins are reported on biological systems. However, little is known for its persistence in the nervous system and influence on regeneration of injured nerves. The current study investigated persistence of the scorpion (*Hottentotta tamulus*) venom in the sciatic nerves through high-performance liquid chromatography (HPLC) profiling, 30 days post injury (dpi) and motor functional assessments through beam walk, toe spread and sciatic functional index assays till 29th dpi. Adult Swiss albino mice were randomly assigned in three groups; control group (CL), single toxin exposure (STE) and multiple toxin exposure group (MTE). Mice in STE group received a single dose of venom (1mg/kg), while in MTE group received 4 doses (1mg/kg) on weekly bases for 4 consecutive weeks. HPLC analysis of crude venom and sciatic nerve homogenates of all the three groups (CL, STE and MTE) showed distinct venom component peaks, with frequent peaks display in the MTE group as compared to the STE and CL groups. The MTE group exhibited a delayed motor recovery, showing a compromised regain in toe spread width and low SFI scores over time. The STE group demonstrated moderate recovery, while the CL group maintained, baseline values earlier comparing to either STE or MTE groups. The HPLC data suggests that multiple toxin exposures may modulate nerve repair mechanisms, correlating with delayed but improved neuromuscular function. Collectively, current study reports the persistence of scorpion venom could be considered as a risk for delayed onset of functional recovery and could have novel insights on understanding of delayed regeneration through assessing interactions of key components of venom on regeneration process of injured peripheral nerve.

CBGP-125
Physiology

DIGESTIVE CHALLENGES FOR VERTEBRATE ANIMALS: MICROBIAL DIVERSITY, CARDIORESPIRATORY COUPLING, AND DIETARY SPECIALIZATION

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The digestive system is the interface between the supply of food for an animal and the demand for energy and nutrients to maintain the body, to grow, and to reproduce. Digestive systems are not

morphologically static but rather dynamically respond to changes in the physical and chemical characteristics of the diet and the level of food intake. In this article, we discuss three themes that affect the ability of an animal to alter digestive function in relation to novel substrates and changing food supply: (1) the fermentative digestion in herbivores, (2) the integration of cardiopulmonary and digestive functions, and (3) the evolution of dietary specialization. Herbivores consume, digest, and detoxify complex diets by using a wide variety of enzymes expressed by bacteria, predominantly in the phyla Firmicutes and Bacteroidetes. Carnivores, such as snakes that feed intermittently, sometimes process very large meals that require compensatory adjustments in blood flow, acid secretion, and regulation of acid-base homeostasis. Snakes and birds that specialize in simple diets of prey or nectar retain their ability to digest a wider selection of prey. The digestive system continues to be of interest to comparative physiologists because of its plasticity, both phenotypic and evolutionary, and because of its widespread integration with other physiological systems, including thermoregulation, circulation, ventilation homeostasis, immunity, and reproduction.

CBGP-126
Physiology

AMELIORATION OF SULFASALAZINE INDUCED INFERTILITY IN MALE WISTAR RAT BY LOCALLY ISOLATED PROBIOTICS

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Infertility effects about 15% individuals all over the globe, out of which 50% cases are of male infertility. In Pakistan, 3.5% cases are of primary infertility while 18.5% cases of secondary infertility. Sulfasalazine (SSZ) is a widely used drug for the treatment of inflammatory bowel disease (IBD). Male patients who are on sulfasalazine therapy, face reproductive impairments. Use of probiotics is an emerging field in the male infertility studies. Aim of this study was to investigate the ameliorative potential of probiotics against the sulfasalazine induced infertility in male rats. Three probiotics i.e. *L. plantarum, L. casei* and *L. fermentum* were locally isolated and were characterized through biochemical analysis and 16s rRNA gene sequencing. Male Wistar rats were divided into five groups, negative control group (NC), SSZ (600mg/kg) treated positive control group (PC), SSZ + *L. plantarum* (1×10^9 CFUs/ml) treated (LP) group, SSZ + *L. casei* (1×10^9 CFUs/ml) treated (LC) group and SSZ + *L. fermentum* (1×10^9 CFUs/ml) treated (LF) group. After 60 days of treatment, LFTs, RFTs, CBC, serum testosterone level, testicular oxidative stress analysis and sperm parameters (total count, motility, viability and morphology) studies were carried out. Results showed that SSZ caused reproductive damage in PC group. This group exhibited reduction in sperm count, motility and viability while abnormal sperm forms were raised. Increased testicular oxidative stress and reduced serum testosterone level were also noted. Probiotics treatment significantly ($p<0.05$) improved these parameters in all groups with highest improvements in LC group. Histological analysis of testes revealed that PC group have reduced tubular diameter and spermatogenic epithelium thickness. Scanty spermatozoa were seen in tubular lumen. Probiotics treatment improved the tubular diameter and epithelial thickness in all groups. Spermatogenesis and number of spermatozoa in lumen was also

enhanced. Results concluded that probiotics have ameliorated the SSZ induced infertility and have significantly improved the fertility status of rats. The *L. casei* administration resulted in highest improvements of all fertility parameters.

CBGP-127
Physiology

LIPASE ACTIVITY PROFILE IN THE VITAL ORGANS OF *CATLA CATLA* FINGERLINGS FED ON DIFFERENT FEED INGREDIENTS

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This experimental research determined the lipase activity levels in essential organs of *Catla catla* fingerlings that consumed different dietary ingredients. Two dietary treatments were used in V-shaped tanks, which included rice polish and corn gluten with three replicate groups each. The research contained ten fingerlings per tank that received daily feeding of 5% of their body weight. The study examined total body weight, fork length, and total length measurements as main parameters. Daily measurements of specific water parameters include pH and dissolved oxygen (DO) levels as well as temperature and carbon dioxide (CO_2) content and total hardness of water and calcium (Ca) and magnesium (Mg) concentrations ensured suitable rearing conditions. The research trial ended with fish dissection followed by lipase activity measurement in their digestive tract combined with liver evaluation. Fish fed with rice polish as their diet exhibited better growth results compared to fish fed with corn gluten. The digestive tract of fish receiving corn gluten showed higher lipase activity levels, but the liver activity remained negligible. ANOVA statistical analysis with Minitab 17 software showed weight gain together with total length variations between different treatment groups. Pearson's correlation determined a substantial connection between the three physicochemical factors of Ca, Mg, and total hardness across all experiment conditions. Lab results show that dietary composition determines where Lipase enzymes appear in *Catla catla* fingerlings by making the digestive tract more active after corn gluten intake. Research results demonstrate how *Catla catla* reacts metabolically to various feed ingredients because proper diet selection plays a vital role in enhancing enzyme performance and growth outcomes.

CBGP-128
Physiology

EFFECT OF ESTROGEN LEVELS ON MENTAL HEALTH OF UNMARRIED AND MARRIED FEMALES OF HYDERABAD CITY, SINDH, PAKISTAN

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The study examines the effects of estrogen levels on the mental health of unmarried and married females in Hyderabad, Sindh, Pakistan. Using a descriptive and correlational research approach, it involved 100 women aged 18-50 from various colleges, categorized by marital and menopausal status. Estrogen levels were measured through blood samples over three months, while mental health was assessed using the DASS-21 scale. The results showed that married women had more stable estrogen levels and better mental health outcomes, with higher estrogen linked to lower depression, anxiety, and stress. Socioeconomic status and age also influenced these relationships. The study highlights the need for tailored mental health interventions considering hormonal and demographic factors, especially in resource-limited settings.

CBGP-129
Physiology

EFFECT OF CRYOPRESERVATION ON SPERM SIZE OF COMMON QUAIL (*Coturnix coturnix)*

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Sperm cryopreservation is a highly effective technique for the cryo-banking of germplasm from valuable species that are threatened in their natural ecosystems. Common Quail (*Coturnix coturnix*) is a game bird across its distribution range, including Pakistan. However, its population is experiencing a steady decline due to habitat loss, hunting, long-term climatic changes, genetic hybridization, and the use of pesticides and herbicides. Semen cryo-banking is an effective technique of Ex Situ conservation and can be utilized for Common Quail. Avian species have elongated sperm head with minimal cytoplasm are highly susceptible to thermal shocks and results in reduced sperm size due to removal to intracellular contents during freezing. Therefore, it is essential to improve cryo-banking strategies for effective utilization in avian species. Hence, the current study was designed to compare the sperm size of the common quail before and after cryopreservation. For this purpose, semen was collected from 10 mature male quails using teaser female. Ejaculates with more than 60% motility were diluted (1:5) with NACL-TES diluent and cryopreserved. After 24 hours, the samples were thawed and assessed for post-thawed

perm motility and Various sperm morphometric parameters (head length (L1), head width (W), head perimeter (P= $2\pi r$), head area (A= πr^2), mid piece length (L2), tail length (L3), total sperm length(L=L1+L2+L3), head elongation (L-W) / (L+W) were recorded before and after cryopreservation. It was noted that sperm motility was significantly reduced from fresh collection to post-thaw analysis. Moreover, shrinkage was recorded in sperm length, sperm head, tail, mid-piece and other morphometric parameters from fresh collection to poast-thaw in Common quail. It is concluded that cryopreservation had detrimental effect on the sperm motility and results in reduced sperm size. This underscores the necessity for ongoing refinement of cryopreservation protocols to mitigate these adverse effects and enhance the efficacy of cryo-banking for conservation purposes.

CBGP-130
Physiology

PREVALENCE OF HYPOTHYROIDISM IN NEW BORN BABIES OF TALUKA PANO AQIL AND SUKKUR

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Congenital hypothyroidism (CH) is defined as thyroid hormone deficiency present at birth. Babies with CH who are not identified and treated promptly develop severe mental retardation. Studies show that lower neurocongnitive outcome may occur in infant started at the age of greater than 30 days. Most of the babies with CH don't manifest the typical known signs and symptoms of hypothyroidism. But common symptoms include decreased activity and increased sleep, feeding difficulty, constipation. This study aimed to determine the prevalence of congenital hypothyroidism among the children of Sukkur and Panoakil talukas. The blood samples were collected from Civil Hospital Sukkur and Sakhi Baba Hospital Panoakil for screening at laboratory during the months of January 2022 to Jun 2022. The samples were taken by heel prick. The 80 new born babies were screened randomly by measuring serum TSH level. In primarily diagnosed cases of Congenital Hypothyroidism neonates were considered hypothyroid if their TSH was > 6 mlU/ml. The prevalence at high risk of hypothyroidism was observed higher in children of Pano Akil Taluka. The prevalence of mild hypothyroidism was similar in females of both Talukas which was greater in females than in males. Similarly, the prevalence of Hypothyroidism was greater in females than in males and also it was greater in females of Pano Akil as compare to females of Sukkur Taluka. It is concluded that female patients of Pano Akil Taluka are more prevalent of Mild Hypothyroidism and Hypothyroidism but the situations are not alarming.

CBGP-131
Physiology

RENOPROTECTIVE EFFECTS OF OROBOL AGAINST ARSENIC-INDUCED NEPHROTOXICITY IN ALBINO RATS

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Arsenic (As), a naturally occurring metalloid, is capable of causing acute renal failure as well as chronic renal inadequacy. Arsenic is known to exert its toxicity through oxidative stress by generating reactive oxygen species (ROS). Orobol (ORO) is a rare isoflavone that occurs in soybeans and has many potential health benefits. Moreover, ORO has anti-inflammatory, anti-aging and anti-cancer properties. This study examines the renoprotective effects of ORO on As-induced nephrotoxicity in albino rats. A total of 24 rats were divided into 4 groups, including control, As-treated (10mg/kg), As + ORO (10mg/kg, 50mg/kg respectively) treated and ORO (50mg/kg) treated groups. After 30 days of trial, rats were dissected and antioxidant enzymes, renal damage markers, inflammatory markers and histopathology were observed. As exposure increased the levels of malondialdehyde (MDA), and ROS while reducing the activities of superoxide dismutase (SOD), catalase (CAT), glutathione (GSH), glutathione peroxidase (GPx), and glutathione S-transferase (GST). Moreover, the levels of inflammatory markers and histopathological damages were also elevated after As-intoxication. However, our findings confirmed that ORO protected renal tissues against As-induced damage. These results suggest that ORO exerts potent renoprotective effects, primarily through its antioxidant and anti-inflammatory properties, highlighting its potential as a therapeutic agent for As-induced nephrotoxicity.

CBGP-132
Physiology

EFFECTS OF EXOGENOUS ADMINISTRATION OF KISSPEPTIN ON VOCALIZATION OF A NON-PASSERINE BIRD (*COLUMBIA LIVIA*)

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Vocalization in birds is a multifaceted and crucial behavior, serving functions such as territory defense, social bonding, mate attraction and social cohesion. While Passerine birds have been extensively studied in the literature, the acoustic communication system of non-passerine species has received less attention. Even in non-passerine birds, the vocal learning ability varies such as rock pigeons (Columba livia), despite their non-Passerine status they display complex vocal behaviors and share grounds with vocal learners. Amidst this avian symphony, the neuropeptide kisspeptin takes a pivotal role. Kisspeptins is a key regulator of hypothalamic-pituitary-gonadal (HPG) axis, crucial for reproductive functions. Despite the unidentified status of Kp-10 receptors in birds some modulatory effects have been observed on

exogenous administration. Role of kisspeptins in acoustic behavior of non-passerine birds was never studied before current study. Six concentrations of Kp-10 were administered peripherally to sexually mature male rock pigeon and their acoustic behavior was observed. Recordings were made one hour pre- and post-injection by digital recorder connected to a directional microphone and blood samples were collected after one hour of administration. Serum was extracted for testosterone ELISA assay. Recordings were analyzed and adjusted in sound analysis software to generate a clear visualization of the vocalization. Spectrograms and waveforms of calls were inspected to study the change caused by Kp-10 in acoustic parameter. Dose dependent effect of Kp-10 on vocalization was observed. The acoustic analysis revealed administration of 1.5 and 3 µg of Kp-10 resulted in rapid inhibition of vocalization. But with the increase in the dose, change in values of some of the parameters such as intensity, pitch, pulse and period were observed but vocalization was not inhibited completely. 30 µg being the highest dose resulted in insensitivity of receptors as no change was observed. Testosterone ELISA assay revealed raised levels of testosterone on 1.5 and 3 µg of Kp-10 while at 30 µg levels of testosterone were similar to the control group.

CBGP-133
Physiology

A HEMATOLOGICAL, AND HISTOLOGICAL STUDY ON THE EFFECTS OF ASPARTAME IN COMMON CARP AND REMEDY WITH FOLIC ACID AND VITAMIN C

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Food additives are added to several food items such as artificial sweeteners or preservatives. Untoward effects of food additives have been reported in some studies. However, the data are scant. Since fish show quick responses if faced with chemical insults. In the present study, a local cyprinid fish, *Cyprinus carpio* was exposed to an artificial sweetener called aspartame in low (40 mg. L^{-1}) and high doses (120 mg. L^{-1}). High dose aspartame group was further supplemented with Vitamin C (2.3 g per 20 fish) and folic acid (2.2 g per 20 fish) and a combination of Vitamin C and folic acid (2.8 g per 20 fish) in fish feed. The experiment lasted for 28 days. Blood and tissues were recovered after 28 days. Results were analyzed statistically. The results demonstrated significantly ($P<0.001$) increased WBCs, decreased RBCs, HB, Ht and MID percent. Smear preparation showed increased heterophils, lymphocytes and related parameters. With respect to lipid profile, significant increase occurred in total cholesterol and triglycerides ($P<0.001$), but a decrease occurred in the HDL cholesterol ($P<0.001$). Total protein content was also altered. On the other, where fish were treated with either Vitamin C or folic acid most of the alterations reverted to normal. Histology of brain, heart, gills, liver, kidney and skin demonstrated cellular alterations, necrosis, significant damage to neurons, gill filaments, hepatocytes and kidney tissue. Cells demonstrated abnormalities of structure. In the blood, cells lost normal elliptical shape at high dose of aspartame, became ruptured or pear shaped. However, pronounced remedial effects were observed where a combination of Vitamin C and folic acid was administered to fish in some tissues but not in others. Vitamin C caused the restoration of normal morphology of blood cells. Folic acid also caused recovery, but cells became round. Vitamin C and folic acid in combination did not cause recovery but further damage was observed. Similarly, the hematological parameters and lipid concentrations became abnormal with vitamin C and folic acid. The skin tissue showed loss of epidermis and underlying dermal

musculature with aspartame. Vitamin C and folic acid treatment restored the skin tissue towards normal. In the brain, severe loss of neuron degeneration in the forebrain, midbrain and hindbrain at both doses. The tissue showed swelling. Treatment with vitamin C caused recovery of neurons and near normal occurrence of brain tissue. Similar recovery was found with folic acid, but vitamin C and folic acid in combination did not do much recovery but instead caused.

CBGP-134
Physiology

IN-SILICO INVESTIGATION OF NOVEL PHYTOACTIVE COMPOUNDS AS ESTROGEN RECEPTOR ALPHA INHIBITORS

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Breast cancer remains one of the most prevalent malignancies worldwide, significantly contributing to cancer-related mortality, particularly among women. It is categorized into various subtypes, with hormone-dependent breast cancer being one of the most challenging to treat. Estrogen receptor alpha (ERα) plays a crucial role in the proliferation and survival of breast cancer cells, making it a key therapeutic target. Molecular docking studies provide insights into binding affinities, which are crucial for evaluating the inhibitory potential of these compounds. Conventional treatments include selective estrogen receptor modulators (SERMs) and aromatase inhibitors, but these often come with resistance and adverse effects. Therefore, the search for natural, plant-derived inhibitors has gained considerable attention. This study explores the potential of plant-derived photoactive compounds, as ERα inhibitors through computational approaches. Molecular docking studies were conducted using AutoDock Vina to predict binding affinities between ERα (3ERT) and selected ligands. CASTp analysis was employed to identify potential binding pockets, providing insights into ligand-protein interactions. Visualization and structural analysis of ligand-protein complexes were performed using BIOVIA Discovery Studio, ensuring accurate evaluation of ligand stability and positioning within the receptor. Among the selected ligands, Butein and Genistein exhibit the lowest binding energies -8.7 kcal/mol and -7.8 kcal/mol, respectively indicative of high binding affinity. CASTp analysis confirmed that these ligands occupy critical binding pockets of ERα, suggesting their potential inhibitory role. ADMET predictions indicated favorable pharmacokinetic properties, supporting their drug-likeness. The computational findings highlight the potential of plant-derived photoactive compounds as ERα inhibitors, paving the way for future in vitro and in vivo validation.

CBGP-135
Physiology

MENOPAUSE (PREMATURE AND EARLY MENOPAUSE) ASSOCIATED RISK OF CARDIOVASCULAR DISEASE AMONG THE FEMALE PATIENTS FROM THE HOSPITALS OF HYDERABAD

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Menopause has a significant impact on risk factors for cardiovascular disease (CVD). One of the key changes is the increase in total serum cholesterol, which can rise by 2 to 20%, and triglycerides, which may increase by 7 to 35%. These changes occur regardless of the woman's age. Cardiovascular disease (CVD) is indeed the leading cause of death among women, accounting for approximately 50% of all cases. Within this statistic, 20% of deaths are attributed to ischemic heart disease (IHD) and 13% to stroke. This trend holds true even for women younger than 65 years, where 26% of deaths are assigned to CVD. The methods used for collecting the sample size primarily relied on a survey approach, which is a recognized method for obtaining comprehensive data in medical research. in this study, data was carefully gathered through structured questionnaires that were developed following the world health organization (who) guidelines. These questionnaires were designed to collect not only demographic details of the participants but also in-depth information about their medical histories, lifestyle choices, and specific symptoms related to heart issues. Early menopause appears to have some impact on cardiovascular health. Most of the women die from coronary illness and stroke. Vasomotor manifestations influence 80 % of women, may require treatment if serious, and are related to subclinical atherosclerosis and more regrettable Cardio Vascular risk factors. In this study the prevalence and the risk factor of cardiovascular with effect of menopause was done by a case study of 34 patient examined by taking to collect information about the cardiovascular menace with effect of menopause from civil hospital (National institute of cardiovascular disease) NCID Hyderabad. Liaquat national hospital (Department of obstetrics and gynecology) district Hyderabad. During the month of April 2024 to February 2025, the data has been collected and total ratios of 34 patients were examined. Out of a total of 34 patient 30 patients were diagnosed with CVD most of the patients with coronary artery disease had the age of early menopause. 7 % out of 34 were pre mature menopause and 27 % out of 34 patients were of early, In which the Percentage of Kidney Problem patients is 23% (8). Percentage of tuberculosis (T.B) patients is 12%(4). Percentage of Diabetes patients is 12%(4). Percentage of Thyroid patients is 6%(2). Most patients have diabetes, high blood pressure, and high cholesterol, while some may also have thyroid and kidney problems, which are examined after menopause (ages 35 to 40). Additionally, data shows signs and symptoms of coronary artery disease in patients, including shortness of breath, chest pain, pressure, fatigue, increased heart rate, indigestion, vomiting, weakness, and general discomfort. Here are some symptoms of coronary artery disease presented in percentage form: shortness of breath occurs in about 70% of patients, while chest pain is reported in approximately 65%. Pressure in the chest is experienced by around 60% of patients, and fatigue affects about 55%. An increased heart rate is noted in 50% of cases, with indigestion occurring in about 40%. Vomiting is seen in roughly 30%, weakness affects around 45%, and general discomfort is reported by about 50% of patients. These percentages give a general idea of how frequently these symptoms may manifest in individuals. The effect of early menopause may be more important at younger ages. In order to create personalized guidelines, it is essential to take into account the diversity among women. Additionally, more research is necessary to determine if the link between early or premature menopause and the occurrence of cardiovascular disease varies by ethnicity. It

can be concluded that menopausal patients face an increased risk of heart diseases, particularly CAD, alongside various other health issues such as kidney problems, diabetes, thyroid disorders, anemia, sleep issue, bladder stone, and more. The impact of early menopause appears to be particularly significant at younger ages. To enhance this conclusion, it's important to emphasize the hormonal changes that accompany menopause, which can lead to increased cardiovascular risks. The decline in estrogen levels can contribute to the development of atherosclerosis, making women more susceptible to heart disease.

5. TOXICOLOGY

CBGP-136
Toxicology

WAKE-UP CALL: CHROMIUM POISONING THREATENS TANNERY WORKERS IN KASUR, PAKISTAN

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This study was conducted to assess the health status of tannery workers exposed specifically and/or predominately to chromium. The collected data of the surveyed workers were divided into three age groups (A = ≤ 25, B = 25-40, C = ≥ 40) on the basis of working experience. Hematological and serological tests were applied to investigate any change in normal values of blood cells and liver functional parameters. The order of suffering from ailments / disorders of workers belonging to these three groups appeared as C>B >A. The most commonly occurring disorders among tannery workers included skin itching/ irritation (90%), dry skin (85%), hypertension (83%), depression (79%), occupational fatigue (74%), dry and productive cough (49%), dizziness (42%), headache (29%), confusion (27%), eyes' irritation (18%), sleeplessness (17%) and sore throat (11%). The overall trend of disorders increased with increase in age and working experience. This alarming situation needs attention of public health welfare authorities.

CBGP-137
Toxicology

NEUROPROTECTIVE EFFECTS OF *CASSIA FISTULA* RESCUE MOTOR DEFICITS IN ROTENONE-CHALLENGED MOUSE MODEL OF PARKINSON'S DISEASE THROUGH ANTIOXIDANT CAPACITIES

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Parkinson's disease (PD) is prevalent neurodegenerative disease affecting the dopamine (DA) producing neurons of substantia nigra, leading to motor impairments in affecting population. *Cassia fistula*

(Amaltas) is widely used in folk medicine practices for its health-related benefits. Current study aims to investigate the neuroprotective effect of seed and pod extract of *Cassia fistula* (CF) against the rotenone induced Parkinsonian mouse model. 36 adult mald Swiss albino mice were segregated into 6 groups; vehicle control (2.5% DMSO in sunflower oil), rotenone group (2.5mg/kg), *Cassia fistula* Pod extract (CFPE) (100mg+rotenone), *Cassia fistula* Pod extract (CFPE) (200mg+rotenone), *Cassia fistula* seed extract (CFSE)(200mg+rotenone) and Sinemet (20mg/kg)+rotenone group. Subcutaneous injections (2.5mg/kg) of rotenone were given for 3 weeks to induce PD. The phytochemical composition of extract was determined by gas chromatogramphy-mass spectrometry (GC-MS) analysis and revealed the presence of multiple biologically active constituents. Motor activity was accessed through the 6 behavioral tests (including the open field test, narrow beam walk test, pole climb down, stepping test, stride length and tail suspension test). Antioxidant levels of brain homogenate were assessed through lipid peroxidation (LPO), catalase (CAT), glutathione-S-transferase (GST) and reduced glutathione (GSH) levels estimation. Histological examination was carried out to look for the neuronal morphology of substantia nigra of midbrain stained with Hematoxylin and Eosin. Results demonstrated that mice in 200mg/kg of pod and seed extract treated groups showed significantly better behavioral performance in comparison with the 100mg/kg dose of pods and the rotenone treated groups. Antioxidant levels of extract administered groups differed non-significantly in comparison with the control group but importantly partially rescued the mice comparing to rotenone challenged group. A significant reduction in mid-brain neuronal degeneration of DA producing neurons in extract administered mice was observed comparing to marked degeneration of the rotenone treated mice. Taken together, the CF extract treatment showed anti-oxidant mediated neuroprotection and rescued the motor deficits in rotenone induced Parkinsonism, and it may have significant clinical applications following further studies on individual biologically active ingredient of CF seed and pod extracts.

CBGP-138
Toxicology

PROTECTIVE EFFECT OF ARQ E MEHZAL AGAINST HIGH FAT DIET INDUCED NAFLD IN MICE

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Nonalcoholic fatty liver disease (NAFLD) mainly caused by bad dietary choices is a widespread liver disease causing morbidity and mortality worldwide. Herbal treatments are gaining popularity in treating diseases like malaria, dengue, diarrhea, and liver-related diseases. In our research Arq e mehzal manufactured by Lasani Pharma is a treatment agent which is a polyherbal combination that is commercially available to treat obesity. This study aims to evaluate the protective effects of Arq e mehzal against high-fat diet (HFD) induced non-alcoholic fatty liver disease in the mice model. Mice were fed on a normal feed in the control group and the HFD group was fed a HFD rich in cholesterol for 12 weeks. In the third and fourth groups mice were fed a HFD along with a low (0.6ml/kg/bw) and standard (1.2ml/kg/bw) dose of Arq e mehzal respectively. Changes in body weight, liver weight, lipid profile,

LFTs, RFT, oxidative stress (catalase and total antioxidant capacity), and liver histology were compared in all four groups. High-fat diet successfully caused NAFLD by significant changes in the lipid profile, LFTs, RFTs, oxidative stress, and liver histology. Administration of Arq e mehzal effectively prevented the HFD-induced NAFLD *in vivo* by increasing the HDL while decreasing the cholesterol, triglycerides, LDL, VLDL, GPT, GOT, ALP, creatinine, and uric acid. Moreover, it remarkably contributes in preventing HFD-induced hepatocyte damage, fat deposits, and the resultant NAFLD. Our data strongly support the preventive role of Arq e mehzal in development of NAFLD in mice model.

CBGP-139
Toxicology

ASSESSMENT OF DNA DAMAGE IN PERIPHERAL BLOOD OF CHLORPYRIFOS EXPOSED FISH, *CYPRINUS CARPIO* L

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The significant utilization of pesticides in agricultural fields leads to the addition of harmful chemicals in ecosystem. These pesticides find their way into the aquatic environment and have an impact on aquatic species. Among the environmentally hazardous pesticides, chlorpyrifos is a major contaminant adversely affecting the fish. This study was carried out to evaluate the effects of sub-lethal chlorpyrifos toxicity (1/3rd & 1/5th) on growth performance and DNA damage in *Cyprinus carpio* erythrocytes. The 96-hour LC_{50} of chlorpyrifos was 0.96 µg/L determined by probit analysis. Based on LC_{50} value, two sub-lethal concentrations (1/3rd LC_{50}: 0.32 µg/L and 1/5th LC_{50}: 0.19 µg/L) were prepared and given to experimental groups. Water parameters, including temperature (29º), pH (7.5) and total hardness (299 mg/L) were constant throughout the experiment. The control group showed the highest growth performance than exposed groups. Fish in the 1/3rd treated group showed lowest growth of fish with respect to weight gain, total length gain, fork length gain, feed intake, specific growth rate, and feed efficiency ratio. However, FCR was minimum in control group (0.64±0.08) as compared to 1/5th LC_{50} (0.74±0.11) and 1/3rd LC_{50} (0.93±0.18). Genotoxic effects were evident, with the control group showing the greater number of undamaged nuclei and minimum number of micronuclei. Among the exposed groups 1/3rd LC_{50} group showed highest nuclear anomalies in the following order: micronuclei > de-shaped nuclei > notched nuclei > undamaged nuclei respectively. The findings demonstrated that chlorpyrifos reduced growth performance and induces genotoxic effect on *C. carpio*. These results highlight the need to minimize chlorpyrifos application to preserve aquatic ecosystems and protect aquatic organisms.

CBGP-140
Toxicology

BIFENTHRIN-INDUCED TOXICITY AND DNA DAMAGE IN *CYPRINUS CARPIO*: AN EXPERIMENTAL STUDY

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The extensive use of fertilizers, insecticides, and pesticides notably contributes to water pollution, severely threatened aquatic life. Among these, pesticides are of great concern due to their genotoxic and carcinogenic effects, affecting both aquatic and terrestrial organisms. Bifenthrin, a pyrethroid pesticide that is commonly used, contaminates water bodies through runoff, drift, and percolation processes. The study was planned to evaluate the acute toxicity and sub-lethal genotoxic effects of bifenthrin on the freshwater fish, *Cyprinus carpio*. The 96-h LC_{50} of bifenthrin was calculated as 0.8 µg/L. To determine the sub lethal effect of bifenthrin, fish were exposed to two sub lethal concentrations of bifenthrin ($1/3^{rd}$ and $1/5^{th}$ of LC_{50}). Growth performance and genotoxic effect of bifenthrin were evaluated by monitoring changes in growth rates and determining nuclear abnormalities in erythrocytes. Results exhibited a significant reduction in growth performance in both $1/3^{rd}$ and $1/5^{th}$ bifenthrin exposed groups compared to the control. In addition, bifenthrin exposed groups of *Cyprinus carpio* showed nuclear abnormalities including micronuclei, deshaped nuclei and notched nuclei in their erythrocytes. Nuclear abnormalities were higher in $1/3^{rd}$ bifenthrin exposed fish group as compared to $1/5^{th}$ exposed fish group. Physicochemical parameters of water were measured on regular basis throughout the experiment. The results showed that bifenthrin has toxic effect on growth and can cause genotoxicity in fish. The result findings showed that in *Cyprinus carpio*, bifenthrin negatively impacted growth and induces genotoxicity. Thus, highlighting potential ecological risk of bifenthrin to aquatic ecosystems. These results emphasize the necessity for strict regulations on use of pesticide to safe aquatic life.

CBGP-141
Toxicology

ASSESSMENT OF BIOACCUMULATION OF HEAVY METALS IN FEATHERS AND INTERNAL ORGANS OF PASSER DOMESTICUS FROM DIFFERENT LOCALITIES OF DISTRICT POONCH

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Numerous heavy metals, such as cadmium (Cd), lead (Pb), and arsenic (As), have negative effects on both wildlife and humans, even at low exposure. The current study aimed to assess the bioaccumulation of heavy metals (Cd, Pb, As, and Hg) in different organs of a House sparrow (*Passer domesticus*) across

various regions of district Poonch. Using atomic absorption spectroscopy, among all metals, the highest concentration of arsenic (As) was observed in the heart (16.80±7.35 ppm) and lungs (19.62±2.96 ppm) of the *Passer domesticus* from the Hajira site, and significant accumulation of As (12.06±3.01ppm) was found in feathers collected from Rawalakot region. The lowest concentration of all metals (Cd, Pb, As, and Hg) was observed in all organs from the Thorar site. Across all regions, samples collected from Hajira and Rawalakot showed significant histopathological alterations in the liver, kidneys, lungs, and brain. The activity of antioxidant defense enzymes such as superoxide dismutase (SOD), Catalase (CAT), and Glutathione peroxidase (GSHpx) in the liver of *Passer domesticus* from various sites were assessed to the impact of pollutant exposure. Highest significant reduction was recorded in SOD levels (0.8 ± 0.1 U/mg protein), and CAT 0.94±0.1U/mg protein) from samples collected from the Rawalakot region. Similarly, a significant elevation ($p<0.05$) was observed in serum biochemical parameters (ALT, ALP, and Creatinine) in samples of Rawalakot and Hajira. Based on the results obtained from the bioaccumulation study, histopathological examination, and biochemical parameters, Rawalakot and Hajira are considered to have a worse environmental quality than other sites.

CBGP-142
Toxicology

IMPACT OF MICROPLASTICS ON BIOACCUMULATION, HEMATOLOGY AND HISTOLOGY IN NILE TILAPIA (*OREOCHROMIS NILOTICUS*)

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Experimental trials were carried out to investigate the hazardous effect of Microplastics (MPs) on the bioaccumulation, haematological and haematology of Nile Tilapia (*Oreochromis niloticus*) (50±15g). Fishes were randomly stocked in three experimental groups (15 fish/aquarium) having MPs inclusion levels of 15 mg/kg of MPs (T1), 30 mg/kg of MPs (T2), and 45 mg/kg of MPs (T3) mixed with commercial feed respectively for one month and one control group. The haematological parameters WBCs, blood Platelets, Differential WBCs, RBC's, Hemoglobin (Hb), Haematorit (HCT), Mean corpuscular volume (MCV), mean corpuscular haemoglobin concentration (MCHC) and mean corpuscular haemoglobin (MCH), were studied using standard procedures Hematological parameters showed significant variation in RBCs (1.8±0.02, to 1.6±0.03 Million/mm3), haemoglobin (8.1±0.02 to 7.5±0.1g/dl), platelets (311.0±0.5 to 297.0±3.5 thousands/mm3) and WBCs (835±0.5 to 815±2.0 thousands/mm3) showed a significant decrease to the increasing level of MPs in different experimental groups. At the same time, MCV (142.0±2.5 to 145.5±0.9 mm3), MCH (47.8±0.6 to 51.5±0.3 pg) and MCHC (34.2±0.2 to 35.7±0.2%) showed an increase to the increasing level of MPs ($p<0.005$). At the end of the trial organs of interest i.e. liver, intestines and brain were removed and preserved in 10% formalin solution for histopathological analysis. The accumulation increased gradually with the increasing concentration of MPs in different organs (intestines, liver and brain). The highest accumulation was seen in the intestines (52.1±3.5) followed by the liver (20.6±1.0) and brain (8.5±0.6). Histopathology of the brain showed no degeneration in control while inflammation, necrosis and edema were reported due to MPs inclusion in three treatments. In liver samples necrosis, cell swelling or dilation of sinusoids was absent but mild necrosis, cell swelling and dilation of sinusoids in T1 and T2. Strong necrosis, cell

swelling and dilation of sinusoids were observed in T3. The intestines of tilapia in control showed no degeneration of epithelium, villi destruction and necrosis. Mild degeneration of epithelium, no villi deconstruction and mild necrosis in T1 and T2 but moderate degeneration of epithelium, mild villi destruction and strong necrosis (T3). The MPs have adverse effects on the overall health of fish which include damage to organs and alteration in hematological values.

CBGP-143
Toxicology

MULTIPLE BIOMARKER BASED ASSESSMENT OF MICROPLASTICS-INDUCED TOXICITY IN FRESHWATER FISH GOLDEN MAHSHEER (*Tor putitora*)

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Microplastics (MPs) in freshwater ecosystem pose significant ecological risks yet their toxicological effects on endemic fish species remain unknown. The purpose of this study was to evaluate the toxic effects of polyethylene microplastics (PE-MPs) on freshwater fish *Tor putitora* through a comprehensive assessment of multiple biomarkers. Fingerlings of selected fish species were exposed to PE-MPs at concentration of 0g/kg (control), 1g/kg (T_1), 2g/kg (T_2), and 4g/kg (T_3) of body weight over 15^{th} and 30^{th} days period. The results indicate time and dose dependent significant alterations in hemato-biochemical, antioxidant and neurotoxic biomarkers of PE-MPs exposed fish. RBCs, Hb, HCT and platelets showed a significant ($p < 0.05$) decrease, whereas WBCs showed a significant ($p < 0.05$) increase in PE-MPs exposed fish. Additionally, total protein, triglyceride, Fe, Na and Cl levels decreased whereas, glucose, urea, creatinine, Ca, K and liver enzymes (AST, ALP, ALT, LDH) increased in the treated groups. The increase in cortisol and TSH levels along with decrease in T3, T4 and insulin levels indicated that PE-MPs induced stress in the fish. PE MPs-induced oxidative stress is evident from reduced CAT and SOD activities, as well as increased MDA and GSH activities in both gills and liver tissues. The immunological response of exposed fish was enhanced by inducing NO, lysozyme and respiratory burst activity. MPs exposure also led to reduction in AChE activity highlighted the neurotoxic effects of MPs on the fish nervous systems. These findings provide comprehensive evidence of PE MPs-induced toxicity in *Tor putitora*, emphasizing the detrimental impacts of microplastic pollution on aquatic health. The study underscores the urgent need for stringent environmental policies and effective waste management strategies to mitigate microplastic contamination in freshwater ecosystems.

CBGP-144
Toxicology

EMBRYOTOXICITY OF CARBAMAZEPINE (CBZ) IN MICE (*MUS MUSCULUS*)

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Birth is a natural process but sometimes is linked with congenital abnormalities to some extent. A drug "Carbamazepine/CBZ" is used to treat epilepsy during pregnancy. To observe the toxicity, experiments were conducted using female albino mice. In total, 30 albino mice (10 ♂ and 20 ♀) were procured from UVAS, Lahore. They were divided into 4 treatment groups of CBZ under two different regimes (days 8 and 12). Two exposure doses were assessed using 5 mice for each exposure design. The proposed study was conducted at the Department of Wildlife & Ecology, Ravi Campus UVAS. Total duration of study was of 12 months till the compilation of results. Mice were caged in 1:2 ratio of male and female respectively for mating purposes. They were given their adaptation period. They were offered mice pelleted feed and drinking water at ad-libitum basis. Pregnant mice were then housed in different cages. In total, 20 pregnant mice were randomly distributed into 4 treatment groups (Control, A, B, C and D). At the end of day 18, mice were dissected by ethereal anesthesia. Fetuses and internal organs were fixed in Bouin's fixative for 48 hours and then preserved in 70% alcohol for pathological studies. Data was compiled using ANOVA technique in statistical analysis software (SAS) 9.1 package. The results of this drug exposed the toxicity levels. This research revealed that CBZ during pregnancy induce morphological and histological complications including organ toxicity and fetal abnormalities in mice.

CBGP-145
Toxicology

EFFECT OF CONSUMPTION OF NICOTINE POUCHES THROUGH ORAL ROUTE ON THE MORPHOMETRY OF BONE AND HISTOMORPHOMETRY OF CARTILAGE AND MUSCLE OF RATS

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The present study investigates the effects of short-term nicotine consumption on an animal model using *Rattus norvegicus*. The objective was to assess the impact of two weeks of heightened oral nicotine intake on bone biometry and the histomorphometry of cartilage and muscle in rats. Over a period of two weeks, the rats were housed under optimal conditions and provided with food, along with nicotine pouches dissolved in their drinking water four times a day, each containing 14mg of nicotine. After the experimental period, the rats were euthanized, and samples were collected, including tibia and femur bones, articular cartilages, epiphyseal plates, and quadriceps and pectoral muscles. Histological slides of

bone articular cartilage, epiphyseal plates, and muscles were prepared using the H&E staining method. The study focused on measuring articular cartilage and epiphyseal plate thickness, muscle fiber diameter, fascicle diameter, and fiber density per unit area. Tissue sections were examined using a LABOMED® USA bright field microscope at magnifications of 4x and 10x. Image analysis was performed with LABOMED PixelPro and Image J software. Data analysis was conducted using SPSS Inc. Version 20.0, and a 2x2 factorial design was employed, with interactions between age and treatment analyzed via independent samples T-test. The findings indicated that per-acute nicotine consumption significantly affected the morphometry of the femur and tibia bones as well as the histomorphometry of the pectoral and quadriceps muscles. However, it had no significant impact on the histomorphometry of articular cartilage and growth plates in femur and tibia. Additionally, ash and phosphorus content in the femur and tibia decreased in the treated group compared to the control group, with results deemed statistically significant at $P < 0.05$. In conclusion, nicotine consumption did not influence the histomorphometry of cartilage, but it did affect the biometry of femur and tibia bones and the histomorphometry of pectoral and quadriceps muscles, as well as reducing phosphorus and ash content in those bones.

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Toxicology

ACUTE TOXICITY AND BIOACCUMULATION OF METALS IN ECONOMICALLY IMPORTANT CARNIVOROUS FISH SPECIES OF PAKISTAN

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It is of dire need to determine tolerance limits of economically important carnivorous fish species that are on the verge of extinction in natural rivers of Pakistan toward common aquatic xenobiotics, for their sustainable conservation. Therefore, research was planned to determine acute toxicity (96 h LC_{50} and lethal concentrations) of metals viz. cobalt (Co) and nickel (Ni) to three commercially significant carnivorous fish species viz. *Channa marulius*, *Mystus seenghala* and *Wallago attu* and their bioaccumulation in organs (gills, gut, liver, muscles and skin) of fish during acute concentrations exposure. The trials were conducted under controlled laboratory conditions. There existed statistically significant differences at $p<0.05$ among the three fish species for their tolerance limits to the metals. *C. marulius* was significantly more tolerant to both Co and Ni toxicities, followed by *W. attu* and *Mystus seenghala*. Regarding 96 h LC_{50}, Co was found significantly more toxic to the fish than Ni, while Ni was found significantly more toxic than Co to the carnivorous fish species with respect to 96 h lethal concentration values. Overall, during acute concentrations exposure, significantly higher accumulation of metals was recorded in the liver followed by gills, gut, skin and muscles of the three carnivorous fish species.

CBGP-147
Toxicology

THERAPEUTIC POTENTIAL OF OROBOL TO MITIGATE LEAD INDUCED HEPATOTOXICITY IN MALE ALBINO RATS

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Lead (Pb) is a highly toxic heavy metal is found frequently in environment and exerts harmful effects on both human and animal health. Orobol (OB) is a flavone, extracted from Glycine max (soybeans) and other legumes, and has been reported to exhibit remarkable pharmacological properties. The present investigation was planned to evaluate the protective role of OB against Pb-prompted hepatotoxicity in rats. 24 male rats were divided into 4 groups viz. control, Pb-induced group (50 mg/kg), Pb + OB-treated group (50 mg/kg + 30 mg/kg), and OB-treated group (30 mg/kg). After 30 days of treatment, it was indicated that Pb escalated the level of liver function enzymes namely alanine transaminase (ALT), aspartate aminotransferase (AST) and alkaline phosphatase (ALP) as well as total bilirubin. Whereas the levels of albumin and total proteins were decreased in the rats. Additionally, it reduced the enzymatic activities of catalase (CAT), superoxide dismutase (SOD), glutathione peroxidase (GPx), glutathione reductase (GSR) and glutathione-S-transferase (GST), in addition to glutathione (GSH) content, whereas levels of malondialdehyde (MDA) and reactive oxygen species (ROS) were escalated. Furthermore, level of nuclear factor-kappa B (NF-κB), tumor necrosis factor-alpha (TNF-α), interleukin-1 beta (IL-1β) and interleukin-6 (IL-6) as well as the activity of cyclooxygenase-2 (COX-2) were increased. Besides, the level of Bax, and caspase-3 were elevated, while the Bcl-2 level was reduced following the Pb intoxication. Histopathological observation revealed significant hepatic tissue damage in Pb-administered rats. However, treatment of rats with OB significantly improved the Pb-induced disruptions in biochemical parameters as well as histological damages. Therefore, it is concluded that OB could be used as a therapeutic agent to counter the Pb-generated hepatic toxicity in rats owing to its anti-oxidant, anti-apoptotic and anti-inflammatory potential.

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Toxicology

AMELIORATIVE EFFECTS OF OROBOL AGAINST ENDOSULFAN-INDUCED TESTICULAR TOXICITY: INSIGHTS INTO BIOCHEMICAL, HORMONAL, AND HISTOPATHOLOGICAL ASSESSMENT

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Endosulfan (EDS), a widely used organochlorine pesticide, is well recognized for its severe toxic effects on reproductive health, particularly testicular function. Its bioaccumulative nature leads to oxidative stress, inflammation, apoptosis, and endocrine disruption, ultimately impairing male fertility. Orobol (ORB), a naturally occurring flavonoid, possesses potent antioxidant, anti-inflammatory and cytoprotective properties. This study

aimed to evaluate the protective efficacy of orobol against endosulfan-induced testicular toxicity in Sprague-Dawley rats. For this, 48 rats were randomly assigned to four groups: control, EDS (5 mg/kg) intoxicated, EDS + ORB (5 mg/kg + 30 mg/kg respectively) co-treated, and ORB (30 mg/kg) only treated group. The experiment was conducted for 56 days. EDS exposure significantly reduced the activities of catalase (CAT), glutathione reductase (GSR), superoxide dismutase (SOD) and glutathione peroxidase (GPx), while increasing reactive oxygen species (ROS) and malondialdehyde (MDA) levels, indicating oxidative stress. Moreover, EDS-intoxication led to a notable decline in sperm viability, motility and epididymal sperm count, whereas, increased abnormalities in the sperm head, mid-piece, and tail. Additionally, EDS-exposure resulted in reduced levels of luteinizing hormone (LH), follicle-stimulating hormone (FSH), and plasma testosterone as well as significant histopathological damage in testicular tissue. However, ORB co-treatment effectively mitigated all the illustrated impairments in testes. Therefore, the current investigation demonstrated that ORB possesses a significant potential to avert EDS-induced testicular dysfunction due to its anti-apoptotic, androgenic, anti-oxidant and anti-inflammatory nature.

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Toxicology

PHARMACOTHERAPEUTIC EFFECTS OF LEPTOSIDIN AGAINST BISPHENOL A INSTIGATED TESTICULAR DAMAGE: A BIOCHEMICAL, SPERMATOGENIC AND HISTOLOGICAL STUDY

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Bisphenol A (BPA) is a toxic endocrine-disrupting chemical that is released into the environment through modern manufacturing practices and is associated with generating various organ toxicities including testicular damage. Leptosidin (LTD) is one of the natural flavonoids, which was isolated from *Perilla frutescens* and displays diverse pharmacological properties, including anti-inflammatory, antioxidant, anti-osteoporosis, anti-tumor effects, and hepatoprotective effects. Therefore, the current study was designed to determine the mitigative role of LTD against bisphenol A(BPA) induced reproductive damage. Forty-eight male rats were distributed into 4 equal groups: vehicle control, BPA (10 mg/kg) administrated, BPA+LTD (10 mg/kg and 25 mg/kg respectively) co-administrated, and only the LTD (25 mg/kg) supplemented group. The results revealed that BPA intoxication significantly reduced the activities of antioxidant enzymes, i.e., glutathione peroxidase (GPx), catalase (CAT), glutathione reductase (GSR), and superoxide dismutase (SOD), whereas the levels of reactive oxygen species (ROS) and malondialdehyde (MDA) were increased. BPA exposure increased the levels of inflammatory markers (TNF-α, 1L-1β, NF-κβ, IL-6 & COX-2). Additionally, a considerable increase was observed in dead sperm number, and abnormality of sperms (tail, midpiece, and head), while a potential decrease was noticed in sperm motility in BPA-treated rats. The expressions of steroidogenic enzymes were also decreased in BPA administrated group. The levels of plasma testosterone, luteinizing & follicle stimulating hormones were decreased in BPA treated group. Moreover, Bax and Caspase-3 expressions were increased, whereas Bcl-2 expressions were reduced. Furthermore, histopathological analysis showed that BPA exposure considerably damaged the testicular tissues. However, LTD supplementation potentially decreased all the adverse effects induced by BPA. Our findings indicated that LTD holds significant potential to avert BPA-induced testicular damage due to its androgenic, anti-apoptotic, antioxidant, and anti-inflammatory potential.

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Toxicology

THERAPEUTIC EFFECT OF OROBOL AGAINST DOXORUBICIN-INDUCED CARDIAC DAMAGE IN RATS: A HISTOLOGICAL AND BIOCHEMICAL ASSESSMENT

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Doxorubicin (DOX) is an effective chemotherapeutic agent prescribed to treat solid tumors (e.g., ovary, breast, and gastrointestinal cancers). This anti-cancer drug has various side effects, such as allergic reactions, cardiac damage, hair loss, bone marrow suppression, vomiting, and bladder irritation. The most dangerous side effect of doxorubicin is cardiomyopathy, leading to congestive heart failure. Orobol (ORO) is a natural dietary isoflavone possessing diverse pharmacological potential. Twenty-four rats were apportioned into 4 equal groups which were designated as control, DOX-treated group (3 $mgkg^{-1}$), Co-treated (DOX 3 $mgkg^{-1}$ + ORO 30 $mgkg^{-1}$) and ORO (30 $mgkg^{-1}$) treated group. After 30 days of treatment, DOX intoxication resulted in a remarkable reduction in antioxidant enzymes including, glutathione reductase (GSH), glutathione S-transferase (GST), catalase (CAT), glutathione peroxidase (GPx), superoxide dismutase (SOD), and glutathione disulfide reductase (GSR) activities, whereas an elevation was observed in reactive oxygen species (ROS), and malondialdehyde (MDA) levels. Furthermore, concentrations of cardiac injury markers, creatinine phosphokinase (CPK), creatine kinase-myoglobin binding (CK-MB), & lactate dehydrogenase (LDH), as well as troponin I were increased in response to DOX treatment. Moreover, inflammatory cytokines such as tumour necrosis factor alpha (TNF-α), nuclear factor-kappa B (NF-κB), and interleukin-6 (IL-6), interleukin-1 beta (lL-1β), and cyclooxygenase-2 (COX-2) levels were augmented in DOX intoxicated group. DOX exposure reduced the gene expression of cardiac anti-apoptotic markers (Bcl-2), but the gene expression of apoptotic marker (caspase-9, caspase-3 and Bax) was increased. Histopathological damages were also observed in toxicant (DOX) exposed group. However, the administration of ORO significantly palliated DOX induced aforementioned disruptions. The current study manifested that orobol is a potential flavonoid that could be used as a therapeutic drug to ameliorate cardiac damages instigated DOX.

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Toxicology

NEPHROPROTECTIVE EFFECT OF AUREUSIDIN AGAINST LEAD-INDUCED NEPHROTOXICITY IN RATS BY MODULATING OXIDATIVE STRESS, INFLAMMATION AND APOPTOSIS

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Lead (Pb) exposure is a global environmental problem that can lead to serious renal damage. Aureusidin (AUR), a naturally occurring flavonoid, is found in various plants of Cyperaceae such as

Heleocharis dulcis (Burm. f.) Trin. Moreover, (AUR) is an aurone with high antioxidant, anti-inflammatory and lipoxygenase inhibitory activity. Therefore, this study was planned to evaluate the therapeutic effects of AUR against Pb-induced nephrotoxicity in rats. 24 male albino rats were distributed into four equal groups, i.e., control, Pb-intoxicated group (50 mg/kg), Pb + AUR-treated group (50 mg/kg + 50 mg/kg), and AUR-only treated group (50 mg/kg). The results of the current study revealed that Pb exposure decreased the activities of antioxidant enzymes, whereas increased the levels of malondialdehyde (MDA) and reactive oxygen species (ROS). Additionally, it increased the levels of renal function markers, such as urea, creatinine, kidney injury molecule-1 (KIM-1), and neutrophil gelatinase-associated lipocalin (NGAL) while reducing the level of creatinine clearance. Furthermore, Pb exposure increased the levels of inflammatory markers in the kidneys. Besides, Pb significantly increased the expressions of Bax and caspase-3, whereas decreasing Bcl-2 expressions. Moreover, adverse histoarchitectural changes were observed following the Pb exposure. However, treatment with AUR significantly restored all the damage in the kidneys of the rats. Our findings highlight the potential of AUR as a novel therapeutic candidate against Pb-induced nephrotoxicity in rats.

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Toxicology

PROTECTIVE EFFECTS ALPINUMISOFLAVONE TO COMBAT CISPLATIN INDUCED HEPATOTOXICITY IN MALE ALBINO RATS

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Cisplatin (CP) is a widely used anticancer drug, but at high dose, it can cause undesirable side effects such as hepatotoxicity. Alpinumisoflavone (AIF) is a natural compound found in various plant species. It belongs to a class of compounds known as coumarins. AIF has been studied for its potential therapeutic effects, including its anti-inflammatory, antioxidant, and anticancer properties. Therefore, this study was designed to ascertain the possible protective effects of AIF against cisplatin-induced hepatotoxicity in rats. Male albino rats (n = 48) were separated into 4 equal groups i.e., Group 1st was designated as control group while the 2nd group was treated with CP (10 mg/kg) only, group 3rd received CP (10 mg/kg) + AIF (50 mg/kg) and designated as a co-treated group while group 4th was administered with AIF (50 mg/kg) only. Our results revealed CP administration reduced the activity of catalase (CAT), glutathione peroxidase (GPx), superoxide dismutase (SOD), glutathione-disulfide reductase (GSR), glutathione S-transferase (GST) as well as glutathione (GSH) while elevating the levels of ROS and MDA. CP administration raised the levels of AST, ALT and ALP. Whereas CP treatment substantially elevated the expressions of caspase-3 and Bax while reducing the expressions of Bcl-2. CP administration significantly elevated the levels of nuclear factor kappa-B (NF-kB), interleukin 6 (IL-6), interleukin 1 beta (IL-1β) as well as tumor necrosis factor α (TNF-α), and instigated histopathological damages in hepatic tissues. However, Co-treatment of CP + AIF showed protective effects against CP-induced liver damage. The current study manifested that AIF is a potential flavonoid that could be used as a therapeutic drug to ameliorate hepatic damages instigated by CP.

CBGP-153
Toxicology

LEPTOSIDIN PREVENTS PARAQUAT-INDUCED RENAL DAMAGE IN RATS THROUGH THE INHIBITION OF OXIDATIVE STRESS, INFLAMMATION AND APOPTOSIS

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Paraquat (PQ) poisoning is an emerging public health threat, and its high mortality rate is responsible for a significant number of deaths. This study was planned to investigate the protective effects of leptosidin on PQ-induced kidney damage in rats. Leptosidin (LTD) is a flavonoid extracted from *Coreopsis lanceolata* flowers that exhibit strong antioxidant activity. 48 male albino rats were distributed into four groups such as control group, PQ-treated group (5 mg/kg), PQ (5 mg/kg) + LTD (25 mg/kg) co-treated group and LTD (25 mg/kg) only treated group. Our results showed that PQ exposure decreased the activities of antioxidant enzymes such as glutathione peroxidase (GPx), superoxide dismutase (SOD), glutathione reductase (GSR), catalase (CAT), glutathione-S-transferase (GST) as well as glutathione (GSH) while elevating the levels of reactive oxygen species (ROS) as well as malondialdehyde (MDA). Additionally, PQ intoxication promoted escalation in the urea, kidney injury molecule-1 (KIM-1), creatinine, as well as neutrophil gelatinase-associated lipocalin (NGAL) level, while decreasing the level of creatinine clearance. PQ induction brought a considerable escalation in interleukin-6 (IL-6), tumor necrosis factor-α (TNF-α), interleukin-1β (IL-1β), nuclear factor kappa-B (NF-κB) as well as cyclooxygenase-2 (COX-2). In addition, PQ administration depicted a considerable increase in the expressions of Bax and Caspase-3, while lowering Bcl-2 expressions. PQ treatment also prompted histopathological impairment. However, PQ + LTD co-treatment ameliorated all the above-stated damages in the kidneys. In conclusion, LTD can effectively mitigate the renal impairments induced by PQ-prompted nephrotoxicity.

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Toxicology

PROTECTIVE EFFECTS OF AUREUSIDIN TO COMBAT CADMIUM INDUCED HEPATOTOXICITY IN MALE ALBINO RATS

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Cadmium (Cd) is an environmental and industrial toxicant that possess the ability to cause severe health issues to humans and animals. Aureusidin (AUR), a naturally occurring flavonoid, is found in various plants of *Fabaceae* such as *Glycyrrhiza glabra* (L.). AUR has been studied for its potential therapeutic impacts including its anti-inflammatory, antioxidant, and anticancer properties. Therefore, this study was designed to ascertain the possible protective effects of AUR against cadmium-induced hepatotoxicity in rats. Male albino rats (n = 48) were separated into 4 equal groups i.e., Group 1st was

designated as control group while the 2nd group was treated with Cd (5 mg/kg) only, group 3rd received Cd (5 mg/kg) + AUR (50 mg/kg) and designated as a co-treated group while group 4th was administered with AIF (50 mg/kg) only. Our results revealed Cd administration reduced the activity of catalase (CAT), glutathione peroxidase (GPx), superoxide dismutase (SOD), glutathione-disulfide reductase (GSR), glutathione S-transferase (GST) as well as glutathione (GSH) while elevating the levels of ROS and MDA. Cd administration raised the levels of AST, ALT and ALP. Whereas Cd treatment substantially elevated the expressions of caspase-3 and Bax while reducing the expressions of Bcl-2. Cd administration significantly elevated the levels of nuclear factor kappa-B (NF-kB), interleukin 6 (IL-6), interleukin 1 beta (IL-1β) as well as tumor necrosis factor α (TNF-α), and instigated histopathological damages in hepatic tissues. However, Co-treatment of Cd + AUR showed protective effects against Cd-induced liver damage. The current study manifested that AUR is a potential flavonoid that could be used as a therapeutic drug to ameliorate hepatic damages instigated by Cd.

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Toxicology

AMELIORATIVE EFFECTS OF AUREUSIDIN AGAINST PARAQUAT INSTIGATED TESTICULAR DAMAGE VIA ATTENUATION OF APOPTOSIS, INFLAMMATION AND OXIDATIVE STRESS

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Paraquat (PQ) is a ubiquitous and water-soluble herbicide which has potential to cause systematic poisoning. PQ intoxication is known to be associated with various clinical complications including hepatotoxicity. Aureusidin (AUR), a naturally occurring flavonoid, is found in various plants of Cyperaceae such as *Heleocharis dulcis* (Burm. f.) Trin. Moreover, (AUR) is an aurone with high antioxidant, anti-inflammatory and lipoxygenase inhibitory activity. Therefore, the present study was designed to evaluate the mitigative potential of AUR against PQ prompted testicular toxicity in rats. Forty-eight adult male albino rats were randomly distributed into 4 groups: control, PQ administered (5 mgkg-1), PQ (5 mgkg-1) + AUR (50 mgkg-1) co-treated and AUR (50 mgkg-1) only treated group. After 56 days of treatment, it was revealed that the activities of anti-oxidants i.e., catalase (CAT), superoxide dismutase (SOD), glutathione reductase (GSR), hemeoxygene-1 (HO-1) and glutathione peroxidase (GPx) were reduced, besides malondialdehyde (MDA) and reactive oxygen species (ROS) contents were increased significantly following the PQ exposure. Moreover, PQ exposure significantly reduced the sperm motility, viability and count, whereas considerably increased the dead sperm number and sperm structural anomalies. Furthermore, PQ remarkably decreased steroidogenic enzymes and Bcl-2 expression, while increasing the expression of Caspase-3 and Bax. PQ exposure significantly reduced the levels of follicle-stimulating hormone (FSH), luteinizing hormone (LH) and testosterone, whereas inflammatory indices were increased. PQ exposure also induced significant histopathological damages in the testes. Nevertheless, AUR supplementation significantly abrogated all the damages induced by PQ. The findings of our study demonstrated that AUR could significantly attenuate PQ instigated OS and testicular toxicity, due to its anti-oxidant, anti-inflammatory, androgenic and anti-apoptotic potential.

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Toxicology

PROTECTIVE EFFECTS OF ALPINUMISOFLAVONE AGAINST OXIDATIVE DAMAGE, APOPTOSIS, INFLAMMATION, AND HISTOPATHOLOGIC DISORDERS IN THE TESTICULAR TISSUE OF RATS INDUCED BY MERCURY

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Mercury (Hg) is one of the most toxic heavy metals that damage testicular tissue. Alpinumisoflavone (ALP) is a natural compound found in various plant species. Therefore, this study was performed to evaluate the ameliorative effects of ALP against Hg-induced testicular toxicity. Forty-eight male albino rats were divided into four groups including control, Hg (50 μg/kg), Hg + ALP (50 μg/kg + 15 mg/kg), and ALP (15 mg/kg) only treated group. Our findings elucidated that Hg exposure reduced the activities of superoxide dismutase (SOD), catalase (CAT), glutathione reductase (GSR) and glutathione peroxidase (GPx). Additionally, it increased the levels of reactive oxygen species (ROS), and malondialdehyde (MDA). Furthermore, Hg intoxication upregulated the expressions of steroidogenic enzymes such as 3β-HSD, 17β-HSD, and StAR. Moreover, sperm anomalies were increased following the exposure to Hg. Besides, Hg exposure decreased the levels of plasma testosterone, luteinizing hormone (LH), and follicle stimulating hormone (FSH) while increasing the levels of interleukin-6 (IL-6), tumor necrosis factor-alpha (TNF-α), nuclear factor-kappa B (NF-κB), interleukin-1beta (IL-1β), and cyclooxygenase-2 (COX-2). Moreover, it adversely affected the apoptotic profile by up-regulating the expressions of Bax and Caspase-3, while down-regulating the Bcl-2 expression. Besides, Hg significantly damaged histopathological structure of testicular tissues of rats. However, ALP significantly abrogated Hg-induced damages in the testicular tissues of rats. In conclusion, the results of the study indicate that ALP can effectively alleviate the AFB1-prompted testicular damages due to its antioxidant and free radical scavenging properties.

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Toxicology

ATTENUATIVE EFFECTS OF LEPTOSIDIN AGAINST CYCLOPHOSPHAMIDE-INDUCED HEPATOTOXICITY IN RATS

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Cyclophosphamide (CYC) is used as one of the leading drugs for the medication of cancer, but it can damage different organs of the body including liver. Leptosidin (LEP) is a plant-derived flavonoid with various pharmacological and therapeutic properties. Therefore, the present research was designed to evaluate the palliative role of LEP against CYC instigated liver dysfunction in rats. 24 male albino rats were divided into four groups including control, CYC (150 mg/kg), CYC + LEP (150 mg/kg + 25 mg/kg) and LEP (25 mg/kg). CYC exposed rats exhibited considerably ($p < .05$) higher alkaline phosphatase

(ALP), aspartate aminotransferase (AST) as well as alanine aminotransferase (ALT) contents. Additionally, CYC treatment resulted in a notable decrease in anti-oxidants activity, that is, glutathione S-transferase (GST), superoxide dismutase (SOD), heme oxygenase-1 (HO-1), glutathione reductase (GSR), glutathione peroxidase (GPx), catalase (CAT) and glutathione (GSH) content, whereas upregulating reactive oxygen species (ROS) and malondialdehyde (MDA) contents. Moreover, CYC intoxication noticeably increased ($p < .05$) the levels of inflammatory indices (interleukin-1β [IL-1β], nuclear factor kappa B [NF-κB], interleukin-6 [IL-6], tumor necrosis factor-α [TNF-α], and cyclooxygenase-2 [COX-2]). Besides, Caspase-3 and Bax levels were upregulated and Bcl-2 was decreased after CYP exposure. Additionally, the histomorphological examination revealed notable hepatic damage in CYP treated group. However, LEP treatment substantially ($p < .05$) recovered all the CYP-induced damages and histopathological changes. Taken together, it can be deduced that LEP might be used as a pharmacological agent to ameliorate hepatic damage.

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ALLEVIATIVE EFFECTS OF AUREUSIDIN AGAINST CADMIUM-INDUCED CARDIOTOXICITY IN RATS BY REDUCING OXIDATIVE STRESS, APOPTOSIS, INFLAMMATION, AND HISTOPATHOLOGICAL DAMAGES

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Cadmium (Cd) is a toxic heavy metal present in environment that has potential to instigate cardiotoxicity. Aureusidin (AUR) is a natural flavonoid, which shows anti-oxidant, anti-inflammatory and antiapoptotic nature. Therefore, the current study was formulated to appraise attenuative potential of AUR against Cd instigated cardiotoxicity. Forty-eight albino rats were divided into four equal groups, including control, Cd (5 mg/kg) inebriated group, Cd + AUR (5 mg/kg + 50 mg/kg) concurrent-treated group, as well as AUR (50 mg/kg) alone treated group. The trial was conducted for 30 days and then the rats were anesthetized, decapitated and further analyses were performed. Cd intoxication resulted in a remarkable reduction in antioxidant enzymes activities which include, GSH, GST, CAT, GPx, SOD, and GSR, whereas an elevation was observed in ROS, and MDA. Furthermore, concentrations of cardiac injury markers, creatinine phosphokinase (CPK), creatine kinase-myoglobin binding (CK-MB), & lactate dehydrogenase (LDH), as well as troponin I were increased in response to Cd treatment. Moreover, inflammatory cytokines such as tumour necrosis factor alpha (TNF-α), nuclear factor-kappa B (NF-κB), and interleukin-6 (IL-6), interleukin-1 beta (lL-1β), and cyclooxygenase-2 (COX-2) levels were augmented in Cd intoxicated group. Cd exposure reduced the gene expression of cardiac anti-apoptotic markers (Bcl-2), but the gene expression of apoptotic marker (caspase-9, caspase-3 and Bax) was increased. Histopathological damages were also observed in Cd exposed group. However, the administration of AUR significantly palliated Cd induced aforementioned disruptions. In the light of these findings, it is concluded that AUR is a promising bioactive compound that may be used as a curative agent against Cd instigated cardiac damage.

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Toxicology

PREVALENCE OF COVID-19 IN RELATION TO BLOOD GROUPS AND RH FACTOR IN DISTRICT JHANG, PAKISTAN

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The outbreak of the novel coronavirus (SARS-CoV-2) in December 2019 led to a devastating respiratory disorder, significantly impacting global health. This research aims to assess the prevalence of COVID-19 in District Jhang, Pakistan which spans 6,166 square kilometers and consists of four tehsils: Ahmadpur Sial, Athara Hazari, Jhang and Shorkot. Jhang District is part of the Faisalabad division in Punjab province. The study focuses on determining COVID-19 prevalence in relation to ABO blood groups and Rh factor, identifying which blood type is most susceptible to infection. Data on confirmed COVID-19 patients was obtained from the District Headquarters Hospital (DHQ) Jhang, with official confirmation from the Chief Executive Officer of the hospital. Patients were contacted via phone, and blood samples were collected using medical syringes at their respective locations. A structured questionnaire was also used to gather additional patient information. Blood group testing was performed using an anti-serum test kit. The results revealed that individuals with the B+ blood group were the most susceptible to COVID-19, with males being disproportionately affected. The highest number of cases (165 out of 652, 25.3%) was recorded in the 31–40-year age group. Among the four tehsils, Tehsil Jhang reported the highest incidence of COVID-19 cases.

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Toxicology

INVESTIGATING THE AMELIORATION POTENTIAL OF RAW AND POWDERED GARLIC AGAINST EMAMECTIN BENZOATE INDUCED TOXICITY IN COMMON CARP (*CYPRINUS CARPIO*)

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Emamectin benzoate is a potent neurotoxin applied extensively for controlling ectoparasites in aquaculture; however, its toxicological implications have not been reported in Cyprinus carpio. Therefore, this study was designed to measure the 96-hour LC_{50}, and two sub-lethal concentrations 30% of LC_{50} (0.89 mg/L) and 60% of LC_{50} (1.78 mg/L) were tried upon hematological, biochemical, and histological parameters in C. carpio (mean weight 25.54 ±

2.3 g, length 10.35 ± 2.4 cm) for 15 days and ameliorative effect of Allium sativum for next 15 days against it. LC_{50} of EMB for C. carpio was calculated to be 2.97 mg/L. Red blood cells, hemoglobin, hematocrit, mean corpuscular volume, mean corpuscular hemoglobin, and mean corpuscular hemoglobin concentration were found to be reduced significantly ($p < 0.05$) in the treated fish. Lymphocytes, monocytes, eosinophils, and platelets showed a significant increase ($p < 0.05$). The biochemical assessment indicated that there was an elevation of serum cholesterol, triglycerides, LDL, VLDL, ALT, AST, urea and creatinine but the levels of HDL drastically reduced ($p < 0.05$). Histopathological alterations in the soft tissues like the liver, kidney, and gills showed degenerative effects caused due to exposure to EMB. The dietary incorporation of both raw and powdered Allium sativum for next 15 days resulted in significant elevation of EMB-induced adverse effects, restoring hematological, biochemical, and histological parameters to near-normal values. The results show that raw garlic is more effective as compared to powdered garlic as a remedy against EMB. The results clearly indicate that even sub-lethal concentrations of EMB caused considerable physiological alterations in C.carpio. The present study establishes the possibility of natural mitigation by Allium sativum and underlines the importance of avoiding contamination with EMB in aquatic ecosystems

CBGP-161
Toxicology

EFFECT OF GROUND WATER CONTAMINATED WITH SUGAR MILL EFFLUENTS IN MANDI BAHAUDDIN AREA, PAKISTAN: A STUDY IN LABORATORY ANIMAL MODELS

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Groundwater contamination from industrial effluents is a major environmental and public health concern. In Pakistan, the sugar industry significantly contributes to water pollution by discharging untreated wastewater containing hazardous chemicals and heavy metals. Sugar mill effluents degrade water quality, disrupt ecosystems, and reduce soil fertility. In Mandi Bahauddin, discharges from Shahtaj Sugar Mills have severely impacted local water resources, affecting both aquatic life and human health. This study investigates the toxicological effects of sugar mill effluents using Cyprinus carpio as a bioindicator. By analyzing histopathological and biochemical changes, the research aims to assess environmental risks and support sustainable water management strategies. Groundwater samples were collected near Shahtaj Sugar Mills, Mandi Bahauddin, and analyzed for physical and chemical contaminants. Cyprinus carpio was used as a model organism, exposed to varying effluent concentrations in LC50 and subacute toxicity studies. Histological analysis of liver, heart, kidney, and gills was performed using hematoxylin and eosin staining. Biochemical assessments included oxidative stress markers such as reactive oxygen species (ROS), lipid peroxidation (TBARS), and antioxidant enzyme activity such as Superoxide Dismutase Assay (SOD) and Peroxidase Assay (POD) were conducted to assess the toxicological impact of sugar mill effluents on aquatic life and environmental health. Water quality analysis from NIH and PCRWR confirmed severe contamination in groundwater near Shahtaj Sugar Mill, with high TDS, iron, chromium, and arsenic exceeding permissible limits. Biochemical analysis showed increased

oxidative stress in liver, kidney, and gill tissues, marked by high ROS and TBARS levels and a decline in SOD and POD activity, indicating organ damage. The findings confirm that exposure to sugar mill effluents leads to oxidative stress, antioxidant depletion, and organ dysfunction, making the water unsafe for animal consumption.

CBGP-162
Toxicology

A COMPARATIVE ANALYSIS OF BUPROFEZIN-INDUCED HEPATORENAL TOXICITY IN ALBINO MALE AND FEMALE MICE

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Buprofezin (BPFN) functions as an insect growth regulator by disrupting the biosynthesis of chitin, an essential structural component of insects' exoskeletons. This disruption hinders the process of ecdysis in insects, mimics their hormonal balance, and ultimately prevents nymphs from molting successfully, leading to mortality among the targeted insect population. While Buprofezin is typically deemed safe for human use, its tendency to persist in the environment raises concerns about potential health risks with extended exposure. However, there remains a lack of comprehensive research on the specific effects of Buprofezin on mammals. This study aimed to assess the impact of Buprofezin (BPFN) on liver and kidney tissues in male and female mice, investigating the protective effects of curcumin and vitamin C (100 mg/kg body weight each) using in vivo methodologies. Mice were exposed to BPFN doses equivalent to 30% (low dose) and 60% (high dose) of the lethal dose (LD_{50}, 18 mg/kg body weight) determined for pure-grade BPFN over a 28-day period. Oral administration of vitamin C, curcumin, and their combination was adjusted based on average body weight. Results indicated that vitamin C and curcumin attenuated BPFN-induced damage. Statistical analysis revealed a significant decrease ($p < 0.05$) in female body weight but no significant difference in male body weight. Elevated serum levels of alanine aminotransferase (ALT), aspartate aminotransferase (AST), creatinine, urea, reactive oxygen species (ROS), and thiobarbituric acid reactive substances (TBARS) were observed in the experimental groups. Additionally, antioxidant enzymes (superoxide dismutase, catalase, and peroxidase) and non-enzymatic reduced glutathione levels in liver and kidney tissues significantly decreased. Histomorphological analysis indicated substantial tissue damage in the liver and kidneys of both male and female mice. These findings underscore the potential hepatotoxic and nephrotoxic effects of BPFN, highlighting the mitigating influence of vitamin C and curcumin against BPFN-induced oxidative stress and tissue damage in mice.

CBGP-163
Toxicology

AN EXPERIMENTAL APPROACH TO COMPARATIVE ANALYSIS OF TOXIC IMPACTS OF THREE ENDOCRINE DISRUPTOR CHEMICALS—ATRAZINE, BENZO (A) PYRENE, AND CARBENDAZIM—IN COMMON CARP *(Cyprinus carpio)*

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Endocrine disruptors, particularly pesticides, are harmful to fish, aquatic ecosystems, and human health. This study examined the effects of atrazine, benzo(a)pyrene, and carbendazim on common carp (*Cyprinus carpio*) at four concentrations (5, 15, 25, and 45µl/l) over 5, 15, and 30 days. Genotoxicity was assessed using comet and micronucleus assays. Blood samples were prepared for cellular and nuclear anomaly analysis, stained with giemsa, and examined under a microscope. Histopathological analysis involved preserving tissues in formalin, embedding them in paraffin, and staining with hematoxylin and eosin for microscopic evaluation. DNA damage was most evident after 5 days of exposure to 15µl/l of benzo(a)pyrene and carbendazim, and 25µl/l of atrazine ($P=0.001$). The micronucleus assay revealed concentration- and exposure-dependent DNA damage. Blood smears showed significant cellular damage, including distorted red blood cells and various nuclear abnormalities. Histological examination revealed tissue changes, with atrazine being more toxic than the other chemicals. Atrazine exhibited higher toxicity than benzo(a)pyrene and carbendazim, with greater effects at specific concentrations and exposure times.

CBGP-164
Toxicology

A COMPARATIVE ASSESSMENT ON THE TOXICOLOGICAL IMPACTS OF TWO SELECTED PESTICIDES (LUFENURON AND PYRIPROXYFEN) ALONE AND COMBINED ON NILE TILAPIA (*Oreochromis niloticus*) FISH: INSIGHT INTO HEMATO-BIOCHEMISTRY AND HISTOLOGY

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Lufenuron and pyriproxyfen are insecticide-based pesticides used in agricultural fields worldwide to increase the production of crops. Exposure to these compounds not only affects

the target but also has harmful effects on non-target organisms. The current study aimed to evaluate the harmful impacts of lufenuron and pyriproxyfen on fish health regarding hematobiochemical changes and histological alterations in *Oreochromis niloticus* exposure to environmental-related concentrations. Active fish were divided into four groups; one control, one lufenuron-exposed group, one pyriproxyfen-exposed group, and one group exposed to equal concentrations of both insecticides for 28 days. Hematological results revealed a significant rise in white blood cells, MCV, MCH, neutrophils, MPV, PCT, lymphocytes, monocytes, and eosinophils levels. In contrast, reduced hemoglobin, red blood cells, hematocrit, RDW-SD, and platelets were recorded. After alone and combined exposure to lufenuron and pyriproxyfen, biochemical analysis indicated that values of cholesterol, LDL, triglycerides, VLDL, blood glucose, ALT, ALP, AST, creatinine, TSH, and urea were increased and HDL, T3, T4, globulin, total protein, and globulin values were significantly dropped when compared with unexposed fish. Histological analysis indicated various changes such as edema, degeneration of gill lamellae, bone cell deformities, hyperplasia, necrosis, sinusoidal spaces, cluster nuclei formation, and melanomacrophage in examined tissues of exposed fish. It is concluded that the uncontrolled use of such insecticides poses health risks to non-target animals, especially fish, and threatens ecosystem and human health.

CBGP-165
Toxicology

EVALUATION OF SELENIUM NANOPARTICLES TO ASSESS THE AMELIORATIVE EFFECT OF SILVER NANOPARTICLES INDUCED TOXICITY

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Over the past few decades, the excessive use and high levels of occupational exposure to metal-based nanoparticles have raised significant concerns about their potential toxic effects. This scenario necessitates the employment of safer nanomaterials. We aim to introduce safer silver nanoparticles (AgNPs) by capping the same with Selenium, an essential nutrient for health, and designing silver and selenium nanohybrids (Se-Ag NHs) via chemical reduction method; the same were characterized using UV-visible spectroscopy and FTIR showing the peaks 360nm and Se-O and Ag-O stretch ranging 400-600cm^{-1} respectively. The subject material was tested against albino mice. Six groups of mice, each comprising 5 albino mice, one of which was a control while the others were treatments with the test material in varying concentrations. Antioxidant status was elevated by monitoring liver enzymes. It was found that NHs-treated groups showed significantly elevated ($p<0.05$) levels of SOD and CAT as compared to the AgNPs-treated group and high bilirubin (3.3) and SGOT (695) levels were recorded in AgNPs-treated group as compared to selenium nanoparticles (SeNPs) and NHs treated groups ($p<0.05$) Renal markers study reveals that Se-Ag NHs showed less blood urea (35) and serum creatinine (0.3) as compared to AgNPs ($p<0.05$). In-vitro antioxidation studies reveal that Se-Ag NHs significantly increased DPPH scavenging activity and ferric-reducing power assay ($p<0.05$). The histology of the liver, kidney, and intestine

depicts mitigated damage in Se-Ag NHs as compared to AgNPs showing low stress. The current study suggests that Se-Ag NHs are safer and eco-friendly, without compromising their biomedical efficacy as compared to the AgNPs. We also recommend that the Se-Ag NHs may be employed as a preference for biomedical applications.

SECTION – I I

PESTS AND PEST CONTROL

PC-1

ROLE OF LADYBIRD BEETLE (COLEOPTERA: COCCINELLIDAE) IN BIOLOGICAL CONTROL AND CLIMATE CHANGE

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The current study was conducted on the role of Ladybird Beetle (Coleoptera: Coccinellidae) in biological control and Climate Change of Pakistan A total 2715 specimens of family Coccinellidae were collected from the study area. During the study 34 different species of Ladybird beetle under twenty-one genera and 3 Subfamilies such as subfamily Coccinellinae, Epilachninae and Chilocorinae were collected. The reported species are 27 species belonging to subfamily Coccinelidae, 4 species are Epilachninae and 3 species are subfamily Chilocorinae.

PC-2

SUSCEPTIBILITY OF WINTER VEGETABLES UNDER THE GREEN MARKET CONDITIONS OF SINDH, PAKISTAN

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Insect pests pose a heavy threat to vegetable crops worldwide. The study was carried out on Insect-infested vegetables in winter under the green market conditions of Sindh, Pakistan during January and February months in 2025. The objective of this study is to assess some insect pests in vegetables in winter, their identification, occurrence, and damage in winter under green market conditions. Vegetables like Bitter gourd (*Momordica charantia*), Brinjal/Eggplant (*Solanum melongena*), Cabbage/Cauliflower (*Brassica oleracea*), Carrot (Daucas carota), Chilies (Capsicum annuum), Cucumber (Cucumis sativas), Garlic (*Allium sativum*), Ginger *(Zingiber officinale*), Lady Fingers/Okra (*Abelmoschus esculentus*), Onion (*Allium cepa*), Peas (*Pisum sativum*), Potatoes (*Solanum tubersum*), Radish (*Raphanus sativus*), Spinach (*Spinacia oleracea*) leaves, Sponge gourd/ Tori (*Luffa aegyptiaca*), Tinda Gourd (*Citrullus vulgaris*), Tomatoes (*Lycopersican esculentum*) and Turnip (*Brassica rapa*) were inspected from 40

vegetable vendors' shops randomly in Hyderabad and Its vicinity towns and infested vegetables were also recorded. Various insects were damaged to vegetable fruits. This research has shown that in the cold conditions the maximum insect-infested Spinach (*Spinacia oleracea*) 757 leaves, Tomatoes (*Lycopersican esculentum*) 554 fruits, and the minimum Bitter gourd (*Momordica charantia*) 21 vegetables were recorded. These three items were infested by numerous insect pests, i.e, eggplant fruit borer, tomato fruit borer, and melon fruit flies. While in the green markets of these two cities, cabbage, carrots, green chilies, cucumbers, garlic, ginger, onions, potatoes, radishes, tinda gourd, and turnip no insect-infested fruits were found under market conditions. Compared to Hyderabad, the insect-infested vegetables in Shahdadkot are sold in bulk quantities.

PC-3

INSECT PEST ASSOCIATED WITH TOMATO IN LOCAL VEGETABLE MARKETS OF SINDH, PAKISTAN

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The study was carried out on "Insect pests associated with tomato in local vegetable markets of Sindh, Pakistan" during November and December 2018. The insect pests' infested-tomatoes are also sold in local vegetable markets and consume by people in Sindh, Pakistan. In present study was seen that the tomato fruit borer (caterpillar) fed symptoms, it had holed and bored, starting where the stem is attached to the fruit and these were ripped tomatoes and red colour.Insect infested tomatoes were collected; the thickness, length, the holes and inner fruit (interior) portions of the fruit damaged by the larvae were also measured and examined. A random selection of 30 vegetable vendor shops was selected in each city of Sindh. The largest pest infested tomato fruit was 30,120, the minimum was 2, 2 from the stock of 5, 5 kg, and 4, 7 green vegetable vendor shops there no pests found in tomato fruits. Overall, 243,995 insect-infested tomatoes were found in 305,515 kg, 30, 30 vegetable vender shops in Qasimabad and Shahdadkot. The maximum and minimum mean thicknesses and lengths of tomato fruits recorded from Qasimabad and Shahdadkot were 3.73, 3.31cm, 3.06, 2.82 cm and 5.19, 4.75 cm, and 2.98, 3.7, respectively. The overall maximum and minimum thickness and tomato fruit length were 2.77, 3.83 cm and 2.47, 3.51 cm, respectively. The maximum and minimum mean of tomato fruit hole and depth (internal feeding part) infested by insects were 0.73, 0.94 cm 2nd 0.43, 0.61 cm 2nd 1.07, 1.01 cm 2nd 0.4, 0.38 cm2, respectively. While, the Overall total average hole diameter depth of the insect-infested tomato fruit was 0.51, 1.12 cm2and the total depth was 0.75, 0.55 cm2of the Qasimabad and Shahdadkot recorded respectively.

PC-4

UNVEILING THE BIOCONTROL POTENTIAL OF SCELIO (PLATYGASTRIDAE) IN THE THAR DESERT, SINDH, PAKISTAN

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This study investigates the diversity and distribution of *Scelio* wasps in the Thar Desert, Pakistan. *Scelio* is a genus of parasitoid wasps that prey on eggs of acridids. A total of 15 species were collected from various locations in the Thar Desert. During field surveys, 337 specimens of *Scelio* and 30 affected egg pods of locusts and grasshoppers were collected. *Scelio* species were identified as *Scelio aegyptiacus* (Priesner 1951), *Scelio hieroglyphi* (Timberlake 1932) and *Scelio mauritanicus* (Risbec 1950). While egg pods of 12 grasshopper species i.e. *Schistocerca gregaria, Acrida exaltata, Poekilocerus pictus, Acrotylus humbertianus, Hilethera aelopoides, Chrotogonus trachypterus trachypterus, Sphingonotus (Sphingonotus) rubescens rubescens, Heteracris littoralis, Anacridium aegyptium, Pyrgomorpha bispinosa deserti, Tenuitarsus orientalis and Trilophidia annulata* were also found affected. The most abundant species were *Scelio aegyptiacus*. The parasitic wasps were found to be active throughout the year, with peak activity during the summer months. The study reveals the importance of *Scelio* wasps as biocontrol agents in the Thar Desert ecosystem. The findings of this study contribute to our understanding of the diversity and ecology of *Scelio* wasps in arid regions. Further research is needed to explore the potential of *Scelio* wasps as biocontrol agents in integrated pest management programs. The study highlights the need for conservation efforts to protect the *Scelio* wasp populations and their habitats in the Thar Desert.

PC-5

EFFECTIVENESS OF *METARHIZIUM ANISOPLIAE* IN CONTROLLING *SCHISTOCERCA GREGARIA*, THE DESERT LOCUST

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Locusts can cause significant damage to crops and foliage, leading to economic losses for farmers. This study evaluated the effectiveness of Metarhizium anisopliae as a biological control agent against *Schistocerca gregaria*, a species of desert locust. The results showed a higher mortality rate in the group treated with M. anisopliae compared to the untreated group. Specifically, the mortality rate was 96% in the treated group and 52% in the untreated group. These findings demonstrate that M. anisopliae has a strong impact on *S. gregaria*. Additionally, mortality increased over a seven-day period, suggesting the efficacy of fungal infection in controlling locust populations. Worldwide, the use of biological control methods is becoming increasingly common due to their potential and promising effects against pests. This study was conducted on adult Schistocerca gregaria (Forsskål, 1775) captured from various locations in the Hyderabad district, with further studies currently underway. Importantly, M. anisopliae does not have harmful effects on crops or humans, making it a safe and effective choice for biological control.

PC-6

PARASITISM OF LOCUST EGG PODS BY SCELIO IN SINDH: POTENTIAL FOR SUSTAINABLE PEST MANAGEMENT

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The species of the genus *Scelio* are exclusively parasitoids of Orthoptera eggs in many countries, including Pakistan. In the present study, information is provided on the general morphology, along with measurements of different body parameters, distribution, and host specificity of this genus in Sindh. As part of this research, an extensive survey was conducted to document locust emergence, including the presence of the egg-parasitoid wasp *Scelio*, with the goal of developing future control strategies. These pests cause significant damage to cash crops, including wheat, cotton, sugarcane, and millet. Egg pods were collected from the arid regions of Sindh, with some found to be fully parasitized by *Scelio*, while others showed partial parasitism. A large number of *Scelio* specimens were collected from various areas in Sindh, including Mithi, Tharparkar, Khairpur, and Tandojam. These collections were made during weekly visits throughout 2023–2024, focusing on egg pods of both grasshoppers and locusts. A detailed study on this biocontrol agent is currently underway. Biological control methods, such as the use of *Scelio*, are not only effective but also environmentally friendly. With the increasing *Scelio* population, there is potential for a significant reduction in the number of viable desert locust eggs. The use of *Scelio*, a genus of wasps that parasitize the eggs of locusts and grasshoppers, including the desert locust, is considered an environmentally sustainable alternative to chemical pesticides. Extensive field surveys have yielded three species of *Scelio* from the collected egg pods: *Scelio hieroglyphi* (Timberlake), *S. aegypticus* Priesner, and *S. mauritanicus* Risbec. Observations indicate that 39.25% of egg pods were undamaged, 13.98% were partially parasitized, and 46.77% were fully parasitized, with a significantly higher parasitism rate observed during the rainy season. These findings suggest that *Scelio* is a promising biocontrol candidate for addressing the locust issue, complementing conventional and chemical control methods. This research provides valuable insights into managing destructive desert locust populations through parasitoids, particularly *Scelio*. It was financially supported by the Higher Education Commission (HEC), Islamabad, under the Research Project (HEC NRPU Research Project No. 14787).

PC-7

PRELIMINARY STUDY ON PARENTAL BEHAVIOR AND DUAL ROLE IN GRAIN CROPS OF EARWIGS (FORFICULIDAE: DERMAPTERA) FROM SINDH, PAKISTAN

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Dermaptera (earwigs) is an order of hemimetabolous insects containing approximately 2,000 described species. They show remarkable uniformity, with several specialized features, such as short

tegminous forewings, underneath which the fan-shaped hindwings are uniquely and compactly folded in winged forms, the presence of two penises, and cerci that are modified into the form of claspers. Parent and young relations are far from being unvarying and simple, even within a group as homogeneous and modest in number species as Dermaptera. Care of the eggs by a female and the contacts she maintains with her larvae are neither established nor developed in an automatic way, but are to important regulations in which behaviour itself is implied. The living conditions adopted by each species or population (Labidura riparia, (Pallas, 1773), Forficula auricularia, (Linnaeus, 1758),) on the other. Depositing eggs in an area with adequate temperature is often crucial for mothers and their offspring, as the eggs are immobile and therefore cannot avoid exposure to sub-optimal temperatures. However, the importance of temperature on oviposition site selection is less clear when mothers can avoid these potential adverse effects by both moving their eggs after oviposition and providing other forms of egg care. The European earwig, an insect in which mothers care for the eggs during several months in winter, frequently moving them during this period. More generally, it is also observed that egg care and egg transport do not prevent behavioural thermoregulation via oviposition site selection and highlights the diversity of behaviours that insects can adopt to enhance their tolerance to global or regional climate change. On the other hand Earwigs have been observed as an irregular pest of increasing concern to farmers. *F. auricularia* (Linnaeus, 1758), caused considerable damage to canola seedlings and readily consumed aphids. *Forficula auricularia* also caused feeding damage to canola seedlings early in the winter growing season in the field trial. However, by the end of the season, *F. auricularia* presence was associated with increased canola biomass. Furthermore, *F. auricularia* did not damage canola until all nearby aphids were consumed. Together, our field and laboratory studies suggest *F. auricularia* can be an important predator of aphid pests in canola, indicating a dual role of this species as both a pest and a beneficial species in winter grain systems. It can be useful for understanding the development of Dermapteran maternal behaviour. We concluded that these species are unlikely to cause significant economic levels of pest damage in a agricultural field environment.

PC-8

STUDIES ON THE EPIPHALLUS, SPERMATHECA AND DAMAGE IN CROPS BY SPECIES *OEDALEUS SENEGALENSIS* KRAUSS (ACRIDIDAE:ORTHOPTERA) FROM SINDH, PAKISTAN

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The genus Oedaleus Fieber, is considered as economically important pest. During the present study fair numbers of female *Oedaleus senegalensis* Krauss were collected and dissected and following observation on spermatheca were noted down. Spermatheca is a coiled duct of ectodermal origin it is with pre – apical diverticulum finger like, slightly larger, laterally placed, obtusely rounded at apex. Apical diverticulum sac like, broadened, elongated with rounded process at base. It is of varying sizes and shapes. Beside this, It was noted that this species is often associated with mesoxerophilic habitats and can be categorized as graminivorous In addition of this, it has a certain importance because of the damage that it causes loss to consumer crops i-e (maize, bajra, rice, wheat etc), almost seedlings or nursery and un-ripe stages in fields. O.*senegalensis* prefer fields of maize, Wheat, grasses, shrub and millet.(Jago etal,1993 and Colvin and Holt, 1996; Maiga et al 2008);report the damage and population of this grasshopper.

Ecological conditions play key role to promote invasion of this pest. This species was considered as pest because it causes damage on valuable crops in various parts of Pakistan. In this research paper, the morphological characteristics of this species and their habitats was focused, besides this the important features of the Epiphallus and spermatheca were sorted out. It is an mesoxerophilic in habitats and called as major pests of grasslands and crops throughout the country.

PC-9

TRANSGENERATIONAL EFFECTS OF DIAFENTHIURON ON WHEAT APHIDS *RHOPALOSIPHUM PADI*

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Rhopalosiphum padi is a destructive species of aphid capable of reducing yield by up to 80%. Insecticide diafenthiuron belongs to class thiourea, is effectively used to kill wheat aphids including, *Rhopalosiphum padi*. In this study, the age stage, two-sex life table approach was used to investigate the transgenerational effects of diafenthiuron on fecundity, oviposition and longevity of *R. padi*. Bioassay results showed that diafenthiuron exhibit high toxicity (LC_{50} of 144.6 mgL^{-1} after 24 hours exposure) against adult *R. padi*. To study the effect of diafenthiuron on progeny generation (F1), R. *padi* were exposed to the sublethal concentration (LC_{30} of 74.3 mgL^{-1}). The results showed delayed development of larval stages and decrease in total pre-oviposition days and fecundity in insecticide treated group as compared to the control group. This study reported that the diafenthiuron also affect the population dynamics of aphids in long term. In the treated group, decrease in net reproductive rate (R0), intrinsic rate of increase (r) and finite rate of increase (λ) was observed as compared to the control group. Whereas, the mean generation time of the treated group was higher than that of control group. Population projections showed lower population size in the treated group compared to the control group over a 30-day period. These results indicated that even the sublethal concentrations of diafenthiuron negatively affect the demographic parameters leading to the decrease in population size. This study also highlights that the understanding of transgenerational impact of insecticides on pest populations is equally important in evaluating the pest management practices.

PC-10

EFFICACY OF DIFFERENT BOTANICALS AGAINST APHID (*APHIS GOSSYPII)* ON BRINJAL

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Brinjal is a main vegetable crop of Pakistan, liked by rich and poor alike; because of its multifaceted utilization in a variety of ways. Insect pest infestation, particularly the Aphid *Aphis gossypii* infestation has

shown devastating effects on production and quality of this vegetable. Generally, synthetic pesticides are used to combat this insect, but human health and environmental concerns have impelled to adopt alternate means to control insect pests. Hence, some botanical extracts (Neem, Eucalyptus, Conocarpus and trooh) were sprayed against aphid on brinjal relative efficacy was compared with Matoi (Pyrifluquinazon). The research was conducted at the experimental fields of Agriculture Research Centre, Tandojam using RCBD in three replicates. After pre-treatment data collection, the insect mortality was determined after 24, 48 and 72 hrs of spray, employing Abbot's method (% population reduction); thereafter, the data were analysed statistically to know the significance of treatment effect (ANOVA). The results showed that both the spray applications caused a significant reduction in aphid population when recorded at different time intervals. The 1st and 2nd spray results showed that among botanicals, Bitter apple (Trooh) leaf extracts caused maximum reduction in insect populations (74.34 and 89.14%); followed by Neem leaf extract (53.72% and 88.96%), Eucalyptus (52.64 and 85.85%) and Conocarpus leaf extracts (42.60 and 82.20%), respectively; against 91.39 and 94.3% pest reduction recorded in plots sprayed with Pyrifluquinazon (Matoi) after 1st and 2nd spray, respectively. The pest reduction was markedly higher after 2nd spray compared to 1st spray ($P < 0.05$). The treatment effectiveness has suggested quite encouraging results of botanical extracts and aphid population remained below economic threshold level. Moreover, Trooh and Neem leaf extracts resulted in a marvelous pest reduction, suggesting their recommendation for general adoption at growers' fields. Additionally, the supplication of Conocarpus leaf extract also showed reassuring results to combat brinjal aphid.

PC-11

EFFICIENCY OF INSECTICIDES ON THRIPS AND WHITE FLY IN COTTON VARIETIES ACROSS MUZAFFARGARH DISTRICT

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Muzaffargarh District, located in the southern part of Punjab, Pakistan, is a predominantly agricultural region with cotton being one of the key crops cultivated. The area's climate and soil conditions are favorable for cotton farming but also support the proliferation of various pests such as Thrips and White Flies, which can significantly impact crop yield and quality. This study investigates the efficiency of various insecticides in controlling these pests on different cotton varieties within the district. Employing a randomized complete block design, the experiment was conducted at these locations: chak No. 651 TDA, chowk sarwar Shaheed Tehsil Kot Addu. The cotton varieties tested were FH 333, CS 200, and CKC 6, which were treated with six different insecticides: Pyriproxyfen, Acetamaprid, Flonicamid, Aspirotetramate, Chlorfenapyr and Abamectin. Insecticide efficacy was evaluated through pre-treatment and post-treatment assessments at 3, 7, and 14 days to monitor the temporal dynamics of pest populations. Data on pest counts per plant were rigorously collected and analyzed using ANOVA, with further testing by the Least Significant Difference method to ascertain the statistical significance of the results. Initial findings indicate a varied response to insecticide treatments among the cotton varieties and suggest differential pest control efficiencies, which are likely influenced by both the type of insecticide used and the environmental conditions prevailing during the experimental period. The study provides crucial

insights into the optimal strategies for pest management in cotton cultivation, aiming to enhance yield and quality by effectively managing pest populations in Muzaffargarh District.

PC-12

OPTIMIZING FUNGAL BIOLOGICAL CONTROL FOR SUSTAINABLE MANAGEMENT OF ORTHOPTERA PESTS IN PAKISTAN

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Rice and wheat are among the most important staple crops in Pakistan, playing a crucial role in the country's economy, food security, and agricultural sector. However, these crops are severely affected by various pests, including those from the Orthoptera order, leading to significant yield losses. Due to growing environmental concerns and the limitations of chemical pesticides, alternative pest management strategies, such as biological control, have become increasingly important. Among these alternatives, fungal-based treatments, particularly *Beauveria bassiana*, have demonstrated high effectiveness and cost efficiency. Managing insect pests and the diseases they transmit over extended periods remains a considerable challenge. The seasonal increase in pest populations can lead to a gradual decline in crop productivity and, in severe cases, total crop loss. Traditional pest management programs heavily rely on synthetic chemical pesticides, but their overuse has resulted in decreased efficacy due to resistance development in target pests. Furthermore, regulatory agencies are increasingly advocating for the reduction or restriction of synthetic pesticides due to environmental and human health concerns. The high costs associated with developing new, safer synthetic pesticides have further contributed to the limited availability of chemical control options. As a result, an increasing number of growers are shifting toward non-synthetic pesticides and organic farming practices to meet the demands of a growing market. This study aimed to evaluate the efficacy of *Beauveria bassiana* as a biological control agent for Orthoptera pests in rice and wheat crops during their respective growing seasons. The findings revealed significant pest suppression, supporting the potential of fungal biological control as a sustainable alternative to chemical pesticides. This research provides valuable insights into enhancing the effectiveness and long-term sustainability of fungal-based pest management strategies in rice and wheat production systems in Pakistan.

PC-13

BEYOND LADYBIRDS: THE RISE OF A VORACIOUS PREDATORY BEETLE IN CHOLISTAN'S DESERT

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Predatory beetles play a critical role in maintaining ecosystem balance, particularly in arid regions like the Cholistan Desert. This study documents the behavior and ecological significance of a newly

observed predatory beetle, identified as *Eussattus sp.*, which exhibits extraordinary voracity and unique reproductive habits. Unlike ladybird beetles, this species preys on insects and larvae both day and night, suggesting a key role in natural pest control. Field observations were conducted over six months using standard ecological methods, including visual surveys, pitfall trapping, and direct behavioral monitoring. Specimens were collected and taxonomically identified as *Eussattus sp.*, a genus not previously recognized for its predatory dominance in this region. Data on feeding patterns, activity cycles, and mating frequency were systematically recorded, revealing that *Eussattus sp.* thrives in harsh desert conditions, with frequent mating contributing to its high population density. These findings highlight the ecological importance of *Eussattus sp.* in maintaining desert ecosystem balance and provide new insights into the adaptability of predatory beetles in arid environments. Further research is recommended to explore its life cycle, taxonomic classification, and potential applications in sustainable pest management strategies.

PC-14

INFLUENCE OF RICE GENOTYPES ON FOLDING AND SPINNING BEHAVIOUR OF RICE LEAF FOLDER (*Cnaphalocrocis medinalis* G.) AND IT'S INTERACTION WITH LEAF DAMAGE

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Morphological factors of resistance were evaluated in the selected rice genotypes against Rice Leaf Folder *(Cnaphalocrocis medinalis* Guenee). Both Folding and spinning characters of Rice Leaf Folder were evaluated on the selected genotypes. The results proved significant different response of the herbivore on tested host plants. Among the tested genotypes comparatively maximum number of head swings per bind and per primary fold, along with longer leaf selection time and leaf folding time per primary fold were observed on less damaged cultivars compared with the standard susceptible cultivar 'TN-1'. While length of primary fold, length of leaf fold after 24hours, number of binds per primary fold and number of binds per fold were also recorded minimum on less damaged cultivars compare to known susceptible cultivar 'TN-1'. The correlation analysis showed that leaf folding parameters along with leaf selection time were positively correlated to the Rice Leaf Folder damage, while leaf spinning characters were negatively correlated. The morphological characters further varied significantly among selected cultivars based on correlation analysis which proved that numbers of productive tillers per hill and leaf width are positive correlated to the Rice Leaf Folder damage. While, plant height, number of green leaves, leaf length, trichome density, trichome length, leaf thickness and chlorophyll contents in the host plants are negatively correlated to the damage caused by Rice leaf Folder. These findings show that morphology of the host plant may play a key role in resistance against Rice Leaf Folder.

PC-15

VARIABILITY OF FRUIT FLIES (DIPTERA: TEPHRITOIDEA) IN THE HOST ORCHARDS AND VEGETABLE CROPS THEY INHABIT IN SINDH PAKISTAN

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Phytophagous insects that feed on fruits and vegetables include fruit flies (Diptera: Tephritidae). Fruit harvest is harmed because their larvae feed on fruit pulp or seeds to finish developing, which encourages pathogen infiltration and early fruit fall. Determining the diversity of fruit fly species and their relationships to their host fruits in the Larkana, Naushahro Feroze, and Mirpur Khas regions of Sindh Pakistan and its environs were the goals of this study. Fruit collections were done every month in order to collect the fruit fly species from their hosts. Botanists prepared and identified leaf samples. After being collected, the fruits were taken to the workshops Frugívoros for weighing and counting. Fruit fly species were determined, and the trophic relationships between them and their hosts were examined. A total of 31 plant families and 40 plant species were gathered. Fruit fly larvae were found in twelve different fruit species. 1172 adult fruit flies and 2,684 larvae were recovered as a result of the survey. There were 979 Tephritidae among the adults. It was possible to get nine species from the genus Anastrepha (Diptera: Tephritidae). It was first time recorded from Sindh from different vegetables and fruits.

PC-16

REARING AND BIOLOGY OF PEACH FRUIT FLY *BACTROCERA ZONATA* (DIPTERA: TEPHRITIDAE) ON ARTIFICIAL DIET FOR LARVA AND ADULT UNDER LABORATORY CONDITIONS

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Fruit fly is one of the important major pests of world tropical regions including Pakistan having a wide feeding host range. Favorable environmental conditions and availability of feeding substrate make the pest population higher. To improve our understanding on the host preference and fecundity of the pest, an experiment was conducted to study the host stimuli at controlled conditions of 26 ± 1ºC and 65 ± 5% relative humidity with a 14:10 light-dark cycle. Adult flies were provided an artificial diet of hydrolyzed yeast and sugar. Eggs were collected using a guava juice-water mixture and then transferred to an artificial larval diet containing wheat bran, sugar, yeast, and other additives. The larvae passed through three instars before pupating in a sawdust medium. Our result showed that the eggs incubation period was 1.5±0.5day and developmental duration of total larval and pupal duration was observed of *Bactrocera zonata* recorded, 2± 0.9, 3± 1, 4±1 and 8.5± 1.053 days, respectively. The complete life cycle from egg to adult took approximately 17 days, with adult females beginning to lay eggs 14-15 days post-emergence. This

study provides valuable insights into the life cycle and rearing methodologies for effective management of *B. zonata.*

PC-17

EVALUATION OF NON-BT COTTON REFUGE CULTIVATION FOR MANAGING BT COTTON RESISTANCE IN *PECTINOPHORA GOSSYPIELLA*

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Transgenic cotton, specifically Bt cotton, has revolutionized pest management in the USA and China, controlling pink bollworm populations. In India, practical resistance has emerged due to the widespread cultivation of Bt cotton, accelerating the development of resistance in *Pectinophora gossypiella* (Saunders). Scientists recommend the refuge strategy as an effective insect resistance management approach. The current study was conducted to evaluate the cultivation of refuge (20% non-Bt) in different layouts, including row (Ro), border (Bo), block (BL), and seed mix (SM) with transgenic cotton. The results showed that *P. gossypiella* incidence significantly decreased in treatments with refuge cultivation compared to treatments without refuge. The average range of infestation to flowers, green bolls, and open bolls in treatments with refuge was 1-1.40%, 4-68%, and 9-22%, respectively, compared to treatments without refuge. The infestation remained less in July and August in both cultivars than in September and October. But statistically, Bt was found more resistant as compared to non-Bt. The yield (Kg per ha) in treatments without refuge was lower and declined in the following year compared to the refuge treatments. These findings indicate that refugia treatment resulted in the lowest *P. gossypiella* infection in treatments (i.e. ROBt, BOBt, BLBt, and SMBt) having refuge compared to non-refugia plants. Sowing methods (ROBt and SMBt) have minimized the PBW existence and its damage in cotton crop. Results concluded that both sowing methods have high yield as compared to BOBt and BLBt. This study emphasizes the significance of refuge cultivation in controlling PBW to Bt cotton. Treatments with refuges effectively minimized pest infestation and preserved higher yields compared to non-refuge approaches. The results underscore the necessity of refuge strategies for sustainable pest management in transgenic cotton farming.

PC-18

X RAY IRRADIATION OF *BACTROCERA ZONATA* AND *BACTROCERA DORSALIS* PUPAE AND THE SUBSEQUENT DEVELOPMENT OF ADULTS UNDER LABORATORY CONDITIONS

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The studies were performed to check the effect of X-ray doses such as 20, 40, 60, 80 and 100 Gy on the *Bactrocera zonata* (Saunders) and *Bactrocera dorsalis* (Hendel) pupae reared on different diets. The

laboratory strains of the peach fruit fly and oriental fruit fly reared on guava, mango and artificial diets. Results showed a significantly ($P<0.05$) greater number of deformed adults (males and females) of *B. zonata* at 100 Gy dose of X-ray irradiation followed by *B. dorsalis* obtained from artificial diets. Less deformity in adults of both fruit fly species was found at the same dosage of irradiation when maggots tended on mango. Similarly, a reduced number of normal adults of both fruit flies were recorded at 100 Gy dose of X-rays reared on an artificial diet. Reduced pupal emergence was recorded on an artificial diet. From the above results, it is determined that *B. zonata* is more tolerant to different irradiation doses. Results of the present investigation would be useful to control or target fruit fly pupae in fruits of trade commodities as these pests are universally regulated as quarantine pests.

PC-19

EVIDENCE OF FIELD-EVOLVED RESISTANCE TO INSECTICIDES IN *SPODOPTERA FRUGIPERDA* (LEPIDOPTERA: NOCTUIDAE) FROM PUNJAB, PAKISTAN

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The fall armyworm, *Spodoptera frugiperda*, is one of the major destructive pests of agriculture in Pakistan. The widespread use of insecticides for the management of *S. frugiperda* has resulted in the field-evolved resistance to insecticides in different strains worldwide. However, field-evolved resistance to insecticides has not yet been reported in *S. frugiperda* from Pakistan. Following reports of control failure of *S. frugiperda* in Punjab, Pakistan, a study was planned to investigate resistance to insecticides from different classes in field strains of *S. frugiperda* to confirm whether the resistance was indeed evolving. Here, we explored resistance to spinetoram, emamectin benzoate, indoxacarb, diflubenzuron, methoxyfenozide, chlorpyrifos and cypermethrin in seven field strains and compared them with a laboratory susceptible reference (Lab-SF) strain of *S. frugiperda*. Compared with the Lab-SF strain at the LC_{50} levels, the field strains exhibited 24.8-142.7 (spinetoram), 33.4-91.4 (emamectin benzoate), 30.1-90.6 (indoxacarb), 16.1-38.4 (diflubenzuron), 18.4-51.8 (methoxyfenozide), 37.1-222.9 (chlorpyrifos), and 61.9-540.6 (cypermethrin) fold resistance ratios (RRs). In the presence of detoxification enzyme inhibitors [piperonyl butoxide (PBO) and S,S,S-tributyl phosphorotrithioate (DEF)], the toxicity of all the insecticides, with the exception of spinetoram, was significantly enhanced in the tested field strains of *S. frugiperda*, providing insight into the metabolic mechanism of resistance. Additionally, compared with the Lab-SF strain, the resistant field strains exhibited elevated activities of detoxification enzymes such as glutathione S-transferases (GST), carboxylesterases (CarE) and mixed-function oxidases (MFO). Overall, the findings of the present study provide robust evidence of field-evolved resistance to insecticides in *S. frugiperda*, which needs to be managed to minimize yield losses of different crops caused by this global pest.

PC-20

EFFECTIVENESS OF *ASPERGILLUS NIDULANS* AND *ASPERGILLUS FUMIGATUS* AGAINST THREE MAJOR INSECT PESTS OF STORED GRAIN

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Entomopathogenic fungi could be helpful in the management of stored insects and to reduce the use of synthetic broad-spectrum pesticides. Identifying the most virulent isolates of entomopathogenic fungi is important before any potential application for the control of stored products insect pests. This research aimed to assess the effectiveness of six isolates of *Aspergillus nidulans* (FCBP-EPF-1551, -1555 and -1579) and *A. fumigatus* (FCBP-EPF-1549, -1580 and -1605) in causing mortality and progeny suppression of three major storage insects, *Rhyzopertha dominica* (F.) (Coleoptera: Bostrychidae) (the lesser grain borer), *Tribolium castaneum* (Herbst) (Coleoptera: Tenebrionidae) (the red flour beetle) and *Trogoderma granarium* Everts (Coleoptera: Dermestidae) (the khapra beetle), under controlled environment. Each fungal isolate was evaluated at four different dose levels: 1×10^4, 1×10^6, 1×10^8 or 1×10^{10} conidia kg^{-1} wheat grains, and at three time intervals: 7, 14 and 21 d. Mortality count data of all insect species exhibited an increasing trend with increase in dose level and time interval. Generally, the isolates of *A. fumigatus* resulted in the highest mortality of all insect species along with a remarkable effect on progeny suppression in the next generation. Mortality and progeny suppression data revealed that *R. dominica* was the most susceptible species followed by *T. castaneum* and *T. granarium*. To sum up, the data of the present study clearly indicate the potential of *A. nidulans* and *A. fumigatus* isolates as biocontrol agents against tested insect species of stored grains.

PC-21

EFFECT OF NEONICOTINOID INSECTICIDES ON OLFACTORY LEARNING BEHAVIOUR IN HONEYBEE (*Apis mellifera*)

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Pollinators play a vital role in most terrestrial ecosystems and agricultural areas, as they contribute a significant portion of the ecosystem services, required for plant community maintenance and agricultural productivity. However, the number of honeybees is decreasing day by day due to the abuse of insecticides.

About 2.8 million tons of insecticides are used worldwide each year including synthetic neonicotinoids. They can be applied as seed dressings, sprays or soil treatments. Foragers collect food outside the hive and frequently come into contact with insecticides. The study was conducted to find out the adverse effects of neonicotinoid insecticides on *Apis mellifera* under controlled laboratory conditions. Three different neonicotinoid insecticides acetamiprid, nitenpyram and clothianidin were used individually and in mixture form with each other using a technique known as Proboscis Extension Reflex. Forager bees of *Apis mellifera* were selected to perform this study. Worker bees were collected from the colony using a 50 milliliter falcon tube and then harnessed on a bottom removed tube. After harnessing, bees were treated with different concentrations of selected neonicotinoid insecticides and then starved for two hours. After two and four hours of fasting, the proboscis response was tested by giving non-contaminated glucose syrup to every bee. As revealed by the test result, when these insecticides were used individually, acetamiprid seemed to be more toxic as compared to clothianidin and nitenpyram. Acetamiprid caused the lowest proboscis reaction at field dose with average values of (5.6±0.4) and (3.0±0.45) after 2 and 4 hours of exposure whereas nitenpyram induced the highest proboscis response at field dose, with overall mean of (9.4±0.50) and (8.4±0.4) after two and four hours of experiment. In mixture form the higher proboscis response was observed for the mixture of acetamiprid + nitenpyram and clothianidin + nitenpyram with mean of (12.9) and (13.2) after two hours while lower response was observed for acetamiprid + clothianidin mixture with average value of (5.6) after 2 hours at recommended dose. A relatable pattern was noted after four hours, and as interaction time period increased, the damaging impact also increased with time.

PC-22

PREVALENCE AND PATHOGEN CHARACTERIZATION OF BACTERIAL PATHOGENS IN POST-HARVEST TOMATOES USING MOLECULAR TOOLS

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Tomato (*Solanum lycopersicum*) belongs to family Solanaceae, is a widely cultivated vegetable worldwide. Tomatoes contain high water content, making them more prone to spoilage caused by various microorganisms. The prevalence and identification of bacterial pathogens in post-harvest tomatoes sold in various shops in Rawalakot remain unknown. No studies have been conducted on tomatoes in this region, creating a knowledge gap that limits our understanding of the potential pathogens associated with tomatoes. Therefore, this study was designed to determine the prevalence and molecular identification of bacterial pathogens in post-harvest tomatoes using biochemical and molecular tools. 25 post-harvest tomato samples were collected randomly from domestic shops in Rawalakot. Nutrient agar was used for growth of Pathogenic bacteria and they were isolated using spread plate method followed by purification and preservation. For confirmation of pathogenicity, pathogenicity test was done on healthy tomatoes indicated 21 isolates were pathogenic. Molecular characterization using 16s RNA primer indicated 12 isolates had 97-100% identity with sequence deposited in public database including *Pectobacterium carotovorum* and remaining nine isolates seemed similar to reference strain *Clavibacter michiganensis*. There was 84% prevalence of pathogenic bacteria *P. carotovorum* (46%) and *C. michiganensis* (36%)

observed in post-harvest rotten tomatoes. Furthermore, to identify the consumer behavior on contributing to foodborne illnesses linked to tomato consumption a cross-sectional questionnaire-based study was conducted. This study gives insight into the food safety awareness, hygiene practice and consumption patterns especially concerning tomatoes. The demographic profile has significant representation of the younger female population aged 19-35, and the findings should have applicability to the diet and safety behavior of this population group.

PC-23

EVALUATION OF DIFFERENT BAIT FORMULATIONS OF COUMATETRALYL FOR RODENT CONTROL IN WHEAT CROP

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Rodents pose a significant threat to wheat crop, leading to substantial yield losses in agricultural systems. Therefore, there is a need of effective methods for the control of field rats by using chronic poisons. This study aimed to evaluate the preferred bait base at each stage of wheat crop (initial, heading and maturity) and its effectiveness by adding chronic poison. Overall, screening of 4 bait bases (wheat, rice, maize and millet) all in cracked form were carried out in multi-choice feed preference tests. Millet was used as control while (millet + maize), (millet + wheat) and (millet + rice) in 50:50 ratios were used as treatments. Screening of three bait additives (peanut butter, eggshell and cooking oil) was carried out by adding in the top ranked bait base in the 4% ratio. Evaluation of poison bait was carried out by adding developed bait at each stage and millet (control) with coumatetralyl (0.0375%). Bait base and additives test were carried out at each stage while poison test was carried out at maturity stage of wheat crop. Results showed that millet, wheat and peanut butter were effective for poison baiting at initial stage of wheat crop while millet, rice, peanut butter and racumin are the effective combinations for controlling field rats at maturity stage of wheat crop. It is recommended that rodent control strategies should be adapted based on the growth stage of the wheat crop, with bait base preferences shifting from millet and wheat to millet and rice as the crop matures.

PC-24

BIODIVERSITY OF MAJOR SUCKING PESTS ON CITRUS AND ADJACENT WEEDS IN MULTAN.

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Citrus is one of the most important fruit crops, which is grown in various tropical and subtropical regions of the world. Punjab's Sargodha district holds significance as Pakistan is rated sixth globally in

terms of citrus production. Due to its high content of organic acids, minerals, and vitamins, it has nutritional value in the diet for humans. The diversity of sucking pests that affect citrus in Pakistan is evidence of the complex and dynamic interactions that exist between various species and crops they attack. In citrus orchards, sucking pests like aphids, citrus psylla, whiteflies, and thrips are major pests that significantly pose a serious threat to the quality and productivity of fruits. Citrus aphid causes Citrus Tristeza Virus, while psylla is a carrier of the deadly citrus greening disease. A study was conducted at MNS-University of Agriculture to check the diversity of major sucking pests; collected samples by the beating method from different fields were identified up to species level, and population density was observed. To reduce the need for chemical pesticides, safeguard the future sustainability of the citrus industry, and protect the environment, long-lasting and effective pest management strategies that take into account the biodiversity of these pests were developed. In citrus orchards, weeds are thought to offer a safe haven for pests, and getting rid of weeds helps control these pests throughout the flowering seasons. The information gathered was provided to be taken into consideration while developing control strategies for these notorious insect pests.

SECTION – I I I

E N T O M O L O G Y

ENT-1

MOLECULAR PHYLOGENETIC ANALYSIS OF MEXICAN BEETLE *Zygograma bicolorata* PALLISTER (Coleoptera: Chrysomelidae) SPECIES OF MALAKAND REGION PAKISTAN

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Zygogramma bicolorata Pallister (Coleoptera: Chrysomelidae), commonly known as Mexican parthenium beetle, is a probable global biocontrol agent against *Parthenium hysterophorus. Zygogramma bicolorata* was first introduced to Australia from Mexico in 1980 (McFadyen and McClay, 1981). An accurate identification at the species level is often the first step in successfully controlling, mitigating and managing of insect pests. Species identification utilizing molecular approaches can complement morphological identification, often resulting more accurate result. *Zygogramma bicolorata* Pallister species can be identified quickly using DNA barcoding technology. During the active seasons of *Zygogramma bicolorata* Pallister (Coleoptera: Chrysomelidae), from April 2022 to April 2023, a total of 167 samples of *Zygogramma bicolorata* were collected from Malakand region Pakistan. The collected specimens were preserved in insect boxes and tagged. DNA extraction was performed from the legs of *Zygogramma bicolorata,* followed by PCR amplification using the primers LCO1490 and HCO2198. Sanger sequencing was carried out using BioEdit software (version 7.2), and phylogenetic analysis were performed using MEGA 11 software to construct a phylogenetic tree. This study supports *Zygogramma bicolorata* as a sustainable, ecofriendly substitute to chemical herbicides for weed management (*Parthenium hysterophorus*) and accurate, authentic molecular taxonomy of *Zygogramma bicolorata* Pallister.

ENT-2

MORPHOLOGICAL CHARACTERS OF ELEVEN SPOTTED LADY BIRD BEETLE (COLEOPTERA, COCCINELLIDAE) A KEY BIOCONTROL AGENT OF DISTRICT HYDERABAD, SINDH, PAKISTAN

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Coccinella undecimpunctata, commonly known as the eleven-spotted ladybird beetle, is a significant predatory beetle belonging to the family *Coccinellidae*. It plays a crucial role in biological control by

preying on aphids and other soft-bodied pests. Morphologically, this species exhibits a compact, convex, and shiny body, typically measuring between 4–6 mm in length. The elytra are reddish-orange with eleven distinct black spots, which serve as a key identification feature. The head is small with white markings on either side, and the pronotum is predominantly black with pale lateral edges. The underside of the beetle is generally dark, contrasting with its brightly colored dorsal surface. It possesses short, segmented antennae and well-developed legs, adapted for efficient movement across plant surfaces. The characteristic coloration and spot pattern of *Coccinella undecimpunctata* provide not only a means of identification but also serve as an aposematic signal to potential predators. Its widespread distribution and adaptability further emphasize its ecological importance in integrated pest management strategies.The antennae are short and segmented, well-suited for detecting prey, while its legs are adapted for agile movement on plant surfaces. *Coccinella undecimpunctata* exhibits high adaptability and is widely distributed across various habitats, including agricultural fields, grasslands, and gardens. This species demonstrates seasonal variations in abundance, influenced by environmental factors such as temperature and food availability.As both larvae and adults are voracious aphid predators, *Coccinella* The antennae are short and segmented, well-suited for detecting prey, while its legs are adapted for agile movement on plant surfaces. *Coccinella undecimpunctata* exhibits high adaptability and is widely distributed across various habitats, including agricultural fields, grasslands, and gardens. This species demonstrates seasonal variations in abundance, influenced by environmental factors such as temperature and food availability.

ENT-3

MOLECULAR PHYLOGENETIC STUDY OF SUBFAMILY EPILACHNINAE (COLEOPTERA: COCCINELLIDAE: EPILACHNINAE) OF MALAKAND REGION PAKISTAN

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The current study was conducted on the Molecular phylogenetic analysis of Subfamily Epilachninae fauna of Malakand region Pakistan during April 2022 to April 2023. Malakand region consists of seven districts namely, District Buner, Swat, Shangla, Malakand, Lower Dir, Upper Dir and Chitral. A total 510 specimens of Subfamily Epilachninae were collected from the study area. During the study two different species of Ladybird beetle under two genera and Subfamily Epilachninae, were collected. These species are *Henosepilachna vigintioctopunctata* (Fabricius, 1755), *Henosepilachna septima* (Dieke, 1947), *Afidentula manderstjernae* (Mulsant, 1853), and *Subcoccinella vigintiquatuorpunctata*.

ENT-4

NEW SPECIES AND A NEW RECORD OF GENUS *ELATHOUS* (ELATERIDAE: DENDROMETRINAE) FROM PAKISTAN

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A new click beetle ***Elathous sindhensis* sp.n**. reported from Sindh province of Pakistan. Photographs of adult as well as aedeagi, conflicting a comparison table, key to all Nearctic realm and Palearctic of *Elathous* species, distribution map of various districts of Sindh Pakistan.

ENT-5

ECONOMIC IMPACT OF *HIEROGLYPHUS* (ORTHOPTERA: ACRIDIDAE) IN AGRICULTURAL FIELDS OF SINDH, PAKISTAN

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The genus *Hieroglyphus* comprises a group of grasshoppers widely distributed across the Old World, including the Indian subcontinent. This study focuses on the infestation and incidence of *Hieroglyphus* species based on recent collections from various fields and grasslands in Sindh. Conducted between May 2022 and October 2023, the study involved the collection of 1,530 specimens. The highest infestation rate was recorded for *H. oryzivorus*, accounting for 53%, followed by *H. banian* at 25%. *H. nigrorepletus* contributed 15% of the infestation, while H. perpolita was reported as the least economically significant species. *H. concolor* accounted for 5% of the infestation, with an additional 2% attributed to newly collected specimens yet to be identified. The infestation rate was highest from July to October. The damage caused by *H. oryzivorus* and *H. banian* was most significant in paddy crops, followed by wheat and vegetables. *H. nigrorepletus* was identified as a serious pest of vegetables and jowar. The high concentration of nymphs of *H. oryzivorus* and H. banian during the growing season underscores the economic significance of this genus and presents a significant threat to the agricultural sector and economic development of the province. Furthermore, in the context of ongoing climate change, these infestations raise serious concerns regarding food security.

ENT-6

EFFECT OF DIFFERENT DIETS ON LIFE CYCLE OF *CHRYSOPERLA CARNEA* (STEPHENS) (NEUROPTERA: CHRYSOPIDAE)

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The green lacewing, *Chrysoperla carnea*, is a valuable biological control agent used in integrated pest management (IPM) programs due to its predatory nature. The effectiveness of *C. carnea* as a natural pest controller is influenced by various factors, including the diet provided during its larval stage. This study aims to assess the impact of three different larval diets on the life cycle of *C. carnea*: 1) *Sitotroga cerealella*, 2) *Corcyra cephalonica*, and 3) a mixed diet consisting of both *S. cerealella* and *C. cephalonica*. Larvae survival, pupation, and adult emergence rates were monitored across 21 days for each diet. Results indicated that the survival rates of larvae were the highest when fed with *S. cerealella* and *C. cephalonica* in a mixed diet, followed by *S. cerealella* alone and *C. cephalonica* alone, with the lowest survival rates observed for the latter. Furthermore, the time to pupation and adult emergence differed significantly across the diets, with mixed diet larvae showing better development than those fed on a single prey species. These findings suggest that diet composition plays a critical role in the development and efficacy of *C. carnea* as a biological control agent. The results provide insights into optimizing rearing conditions for mass production of *C. carnea* for pest management applications.

ENT-7

A COMPREHENSIVE STUDY ON THE IDENTIFICATION AND SURVEILLANCE OF MALARIA VECTORS FOR ENHANCED CONTROL IN DISTRICT MATIARI, SINDH

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Malaria is a live threatening disease which is transmitted to humans through the bites of infected female Anopheles mosquitos particularly *Anopheles stephensi* and *Anopheles culicifacies*, which are known vectors of malaria in the region. There are four species of the Protozoan genus Plasmodium that infect humans namely *Plasmodium falciparum*, *Plasmodium vivax*, *Plasmodium malariae*, *Plasmodium ovale*. In 2019, there were 229 million cases of malaria worldwide, with 558,000 deaths. 74% (416,000) of these deaths occurred in children under the age of five. This equates to nearly 750 children under the age of five per day. According to WHO report on malaria in 2023 more than 65% of Pakistan's population resides in malaria-endemic regions. It is reported that 500.000 malaria infections and 50,000 malaria deaths occur each year in Pakistan. Malaria remains a significant public health challenge in Pakistan, particularly in regions like Matiari District, Sindh, where environmental and socio-economic factors exacerbate the disease's transmission. This research aims to identify malaria vectors and establish an

entomological surveillance system to inform targeted control strategies. The present study aims to find out the prevalence of malaria fever in district Matiari and also the effect of infection on blood cells in general. In this regards a total of 3077 malarial patients who had malarial symptoms. Medical reports (RTDs, PCR and Microscopy) were collected from Civil Hospital Matiari and Taluka Hospital Hala. Out of 3077 malarial patients 3020 (98.3) had *Plasmodium vivax*, 57(1.7) had *Plasmodium falciparum*. No case of *P. malariae* and *P. ovale* detected. With regard to the age the highest positive cases 51.5 % were found in the age group 3-16 years and the least positive cases 37.4% were found in the age group of 51-80 years.

ENT-8

STUDIES ON OEDIPODINAE (ORTHOPTERA) FROM SUKKUR AND ITS ADJOINING AREAS

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The subfamily *Oedipodinae*, part of the *Orthoptera* order, plays a crucial role in the ecosystems of Sukkur and its surrounding regions. This study focuses on the biodiversity of Oedipodinae and the impact of climate change on their populations. Climate change, marked by rising temperatures and shifting precipitation patterns, significantly affects the habitat and distribution of these grasshoppers. Our research involved comprehensive field surveys and data collection on species diversity, population density, and habitat conditions. The results reveal a notable shift in species composition and a decline in population sizes, which correspond to changes in temperature and humidity. Species that thrive in cooler, moister environments are becoming less common, while those more resilient to heat and drought are increasing in number. Furthermore, habitat fragmentation and loss, driven by human activities, exacerbate these climate-induced changes. The findings highlight the urgent need for conservation strategies to counter the negative effects of climate change on Oedipodinae biodiversity. Protecting and restoring habitats, along with monitoring climate trends, are vital steps in maintaining ecological balance in the region. This study underscores the intricate relationship between climate change and insect biodiversity, offering an essential reference for further ecological and conservation research. During the study, a total of 321 specimens were collected and identified within the family *Acrididae* and the subfamily *Oedipodinae*. These included three genera: *Sphingonotus* Fieber, 1852; *Trilophidia* Stål, 1873; and *Acrotylus* Fieber, 1873, as well as four species: *Sphingonotus (Sphingonotus) rubescens rubescens* (Walker, 1870), *Sphingonotus (Sphingonotus) savignyi* Saussure, 1884, *Trilophidia annulata* (Thunberg, 1815), and *Acrotylus humbertianus* Saussure, 1884. The highest population was recorded for *Sphingonotus (Sphingonotus) rubescens rubescens* (Walker, 1870), while the lowest was found for *Acrotylus humbertianus* Saussure, 1884. Morphological descriptions of these species, along with photographs, are provided.

ENT-9

STUDIES ON TAXONOMIC STATUS OF VESPIDAE (HYMENOPTERA) FROM DISTRICT SHIKARPUR SINDH PAKISTAN

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The family Vespidae comprises wasps. There are over 5,500 species of Vespidae in 250 genera and six subfamilies in the order Hymenoptera, which has a worldwide distribution. In addition to Vespinae, Polistinae, Euparagiinae, Eumeninae, Masarinae, and Stenogastrinae, there are several other groups. The larvae of Vespidae (wasps) prey on caterpillars and other insects, making them an effective biological control agent in terrestrial ecosystems. These wasps are also important pollinators for a wide variety of fruits and vegetable plants. The majority of their habitats are in forests, fields of vegetables, and fruit orchards. It is well known that wasps play a vital part in ecosystems around the world, and some species are used as pesticides for cultivated plants as well as for the beekeeping sector. The study was conducted on the different fauna of wasp family of district Shikarpur Sindh, Pakistan. The specimens were captured from four talukas of district Shikarpur. About 236 specimens were collected and identified. Total eight species were identified viz: *Vespa orientalis, Polistes indicus, Polistes wattii, Polistes olivaceous, Polistes flavus, Polistes associus, Delta dimidiatipenne, Delta pyriforme.* Of which 04 species *Polistes flavus, Polistes associus, Delta dimidiatipenne, Delta pyriforme* are recorded for the first time from Sindh Pakistan. While other species are redescribed from study area. The maximum population of *Polistes flavus* with 28.3% followed by *Polistes wattii* with 25.8% and *Polistes indicus* with 18.2%. While minimum population of *Delta pyriforme* with 1.2% followed by *Polistes associus* with 1.6% and *Delta dimidiatipenne* with 2.1%. Besides this, morphological characters along with digital images are given. Definitely this study will form a base line for future researchers.

ENT-10

POST-COPULATORY MATING RITUALS IN ACRIDIDAE (ORTHOPTERA): INSIGHTS INTO SEXUAL SELECTION

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In Acrididae, post-copulatory mating rituals exhibit complex behaviors that influence reproductive success. This study investigates the significance of these rituals in sexual selection, focusing on mate guarding, sperm competition, and female choice. Observations reveal varied post-copulatory behaviors among Acrididae species, including prolonged copulation, mate guarding, and vibratory signals. Males respond by mounting at 90° and 180° with end-to-end contact of genitalia. Among the species studied, *Hieroglyphus oryzivorus* exhibits the longest mating duration (80.35 ± 31.51 hours), while *Oxyna bidenta* has the shortest (70.22 ± 6.42 minutes). These rituals enhance male reproductive success by securing paternity, deterring rival males, and signaling

genetic quality. Female Acrididae exhibit cryptic choice, influencing mate selection through subtle behavioral cues and producing sounds every 2–3 seconds. Our findings highlight the critical role of post-copulatory mating rituals in shaping reproductive strategies and sexual selection in Acrididae.

ENT-11

MORPHOLOGICAL AND MORPHOMETRIC VARIATIONS IN ACRIDIDAE (ACRIDOIDEA: ORTHOPTERA) ACROSS DIFFERENT REGIONS OF SINDH

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Sindh is one of the most fertile and productive agricultural regions of Pakistan. The province is located in the southeastern part of the country, bordering India to the east. Sindh has a subtropical climate, characterized by warm summers and moderate winters. The province's economy heavily depends on agriculture, producing essential crops such as wheat, cotton, sugarcane, rice, maize, and various vegetables and fruits. The order Orthoptera includes the family Acrididae, commonly known as true grasshoppers. They are characterized by an elongated body shape, medium to large size, a cone-shaped head, relatively short antennae, and typically short wings. Their hind legs are powerful, with enlarged femurs adapted for jumping. Recent studies have focused on their evolutionary biology, particularly the significance of morphological traits such as body size, coloration, and femur structure in their reproduction and survival. This study extensively examines the morphology and morphometry of the Acrididae family. A detailed field study was conducted across Sindh province of Pakistan during 2023–2024 to investigate morphological variations and evolutionary relationships. Several field surveys were carried out in diverse habitats throughout the region. A total of 273 specimens were collected and classified into eight major subfamilies, representing 17 species. Among these, the subfamily Oedipodinae was the most abundant, with four species, followed by Oxyinae (three species), Acridinae (three species), Eyprepocnemidinae (two species), Cyrtacanthacridinae (two species), Tropidopolinae (one species), Catantopinae (one species), and Hemiacridinae (one species). By identifying numerous key species and providing comprehensive morphological descriptions, this study contributes significantly to clarifying the taxonomy of Acrididae in Sindh.

ENT-12

DIVERSITY AND MORPHOLOGICAL VARIATION IN VARIOUS SPECIES OF OXYA SERVILLE, 1831 (ACRIDIDAE: ORTHOPTERA) FROM SINDH

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Species of the genus Oxya (small grasshoppers) are phytophagous in nature and cause significant damage to various valuable and economically important crops at all developmental stages. To determine the taxonomic and morphological status of the genus *Oxya*, a study was conducted across various

cultivated and uncultivated areas of Sindh. During the study, taxonomy, morphometric analysis, habitat diversity, and global distribution were examined. A total of 465 specimens were collected from different regions of Sindh and were identified as belonging to four species of the genus *Oxya*: *Oxya hyla* (Serville, 1831), *Oxya velox* (Fabricius, 1787), *Oxya fuscovittata* (Marschall, 1836), and *Oxya nitidula* (Walker, 1870). In Pakistan, particularly in Sindh, species of the genus *Oxya* are well known as serious pests of rice (Oryza sativa), sugarcane (*Saccharum officinarum*), wheat (*Triticum aestivum*), and maize (*Zea mays*). They are also considered minor pests of millets (*Setaria italica*) and various fodder crops. While the genus *Oxya* comprises multiple species worldwide, only four species were recorded in Sindh during this study.

ENT-13

MORPHOLOGICAL CHARACTERIZATION OF PYRGOMORPHINAE (CAELIFERA: PYRGOMORPHIDAE) FROM HYDERABAD, SINDH

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A transient field survey was conducted by the authors in 2024 in Hyderabad, Sindh. A total of 241 specimens were collected from the study region. Among these, four species belonging to three genera—*Chrotogonus, Poekilocerus*, and *Pyrgomorpha* under the subfamily Pyrgomorphinae were identified. The recorded species included Chrotogonus (Chrotogonus) trachypterus (Blanchard, 1836), *Chrotogonus (Chrotogonus) trachypterus trachypterus* (Blanchard, 1836), *Poekilocerus pictus* (Fabricius, 1775), and *Pyrgomorpha (Pyrgomorpha) bispinosa* (Walker, 1870).

ENT-14

LIFE HISTORY OF *ACHETA DOMESTICUS* (GRYLLIDAE: ORTHOPTERA) IN LOWER SINDH, PAKISTAN

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Acheta domesticus, the common house cricket, is cosmopolitan in distribution. A sample of 100 crickets was used to measure the average duration of each stage (egg, nymph, and adult). Female crickets laid an average of 2,195 (±225) eggs in their lifetimes, although variations in food availability and temperature conditions caused differences. During the reproductive phase, spanning 3 weeks (±3 days), an egg-laying rate of 125 (±15) eggs per day was recorded for females. Under controlled conditions at 25°C, the egg stage lasted an average of 13 days (±2 days). The cricket nymphs took 56 days (±5 days) to develop, undergoing 8 molts before reaching adulthood. On average, the adult stage lasted 53 days (±7 days), but generally ranged from 45 to 60 days, depending largely on temperature and humidity.

ENT-15

DIVERSITY AND ACOUSTIC BEHAVIOR OF CRICKETS (GRYLLIDAE) IN PAKISTAN

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The Gryllidae family is found in diverse environments across Pakistan, including swamps, trees, shrubs, grasses, and herbs. Crickets, belonging to this family, comprise approximately 2,400 species of leaping insects (Orthoptera) found worldwide, including in Pakistan, and are distinguished by the melodic chirping produced by males. Their length ranges from 3 to 49 mm, and they produce sounds by moving a scraper on one forewing along a row of 49 to 251 teeth on the opposite forewing. In Pakistan, their population peaks in April, May, and June, and their sex is determined by the bases of their wings, with males having stronger, shorter wings equipped with a file. Gryllidae are herbivores, omnivores, and scavengers, and their chirp frequency varies from 1,500 cycles per second in larger species to 10,000 cycles per second in smaller ones, depending on the number of teeth striking per second. The three main cricket songs include the calling song that attracts females, the courtship (or mating) song that encourages copulation, and the fighting chirp that deters other males. Both sexes have highly sensitive hearing organs on their forelegs, and the chirping rate is directly correlated with temperature, increasing as the temperature rises. Some species studied in Pakistan include *Acheta domesticus* (Linnaeus, 1758), *Gryllus (Gryllus) bimaculatus* (De Geer, 1773), *Gryllodes sigillatus* (Walker, 1869), and *Callogryllus ovilongus* Saeed & Yousuf, 2000**.**

ENT-16

EVALUATING THE POLLINATION EFFECTIVENESS OF SINGLE AND MULTIPLE VISITS OF HONEY BEES AND SOLITARY BEES IN SUNFLOWER SEED PRODUCTION

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Sunflower (Helianthus annuus L.) is an important oil seed crop, with a huge acreage of cultivated hybrids in Pakistan. Sunflower crop depends on insect pollination for seed setting, as it attracts diverse pollinator fauna, mainly due to pollen and nectar availability. To evaluate the role of native and social bees in sunflower seed production, a study was conducted in the agricultural landscape of Multan, Pakistan. The abundance and diversity of pollinators were assessed. Effectiveness was further tested in terms of foraging behavior, including visitation rate, stay time, and seed set efficacy for single and multiple visits (5, 10, 15). Additionally, various reproductive success parameters, namely flower head diameter, flower head weight, seed weight/flower head, and number of seed/flower head, were recorded. The relative abundance of honey bees was higher (77%) in both years, followed by solitary bees (17%), while syrphid flies were the least abundant (6%) on sunflower. Among honey bees, Apis mellifera and A. dorsata were the most abundant in both years, followed by the solitary bee Xylocopa sp. Furthermore, in single and

multiple seed set efficacy (5 and 10 visits), the solitary bee Xylocopa sp. produced the maximum seeds, followed by A. mellifera. A focused conservation strategy of solitary and managed bees in sunflower growing areas could lead to higher seed production.

ENT-17

OBSERVATIONS ON THE DEVELOPMENTAL STAGES AND ADAPTIVE STRATEGIES OF SCHIZODACTYLUS (SCHIZODACTYLIDAE: ENSIFERA)

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The insects of the genus *Schizodactylus*, belonging to the sub-order ensifera , comprise seven species globally, three of which—*Schizodactylus monstrosus*, *S. minor, and S. sindhensis*—are found in Pakistan. These large insects exhibit cannibalistic tendencies. A study conducted near the riverbanks of Khairpur Bridge in Larkana investigated the morphology and burrow excavation behavior across the nine nymphal stages of these species. The research examined their digging mechanisms, modifications in hind limbs, wing adaptations, feeding behavior, and the impact of climate change on their habitats. Previous studies have described their diet as primarily carnivorous and cannibalistic. However, this study observed that they can also exhibit herbivorous behavior, particularly when their habitats are damaged by flooding, causing them to relocate to nearby agricultural fields. The size of their burrows was found to increase proportionally with their body size, and they were also observed to create new burrows rather than reuse old ones. Once they leave a burrow, they do not return to it. These insects typically remain in enclosed burrows and demonstrate significant behavioral and ecological adaptations to environmental changes.

ENT-18

DIVERSITY OF ACRIDOMORPHA IN DIFFERENT VEGETATION OF THE MEHRANO FOREST FROM KHAIRPUR MIRS SINDH

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Mehrano Forest, located in the Khairpur District of Sindh, Pakistan, comprises agricultural land, forest, and a hunting area. It is home to diverse flora and fauna, including approximately 4,000 big game animals, notably the blackbuck. Sharing a boundary with the Nara Desert, the forest harbors a rich insect fauna, particularly Orthoptera, which remained unexplored until now. To document this biodiversity, a systematic survey was conducted through fortnightly sampling. A total of 618 specimens were collected, classified into two superfamilies—Acridoidea and Pyrgomorphoidea—belonging to two families: Acrididae and Pyrgomorphidae. Seventeen species were identified, including Acrididae: *Acrida exaltata*,

Truxalis eximia eximia, *T. fitzgeraldi*, *Duroniella laticornis*, *Acorypha glucopsis*, *Heteracris notabilis*, *Oxya hyla hyla*, *O. fuscovittata*, *O. velox*, *Anacridium aegyptium*, *H. littoralis*, *Aiolopus thalassinus*, and *A. thalassinus tumulus*; Pyrgomorphidae: *Chrotogonus trachypterus trachypterus*, *Pyrgomorpha bispinosa bispinosa*, *P. bispinosa deserti*, and *Poekilocerus pictus*. Most specimens were collected from rice, cotton, maize, and surrounding vegetation. The highest percentage of Acrididae was recorded for *Truxalis eximia eximia* (13%), followed by *Acrida exaltata* and *Truxalis fitzgeraldi* (11%), while the lowest was *Aiolopus thalassinus tumulus* (4%). In Pyrgomorphidae, *Poekilocerus pictus* had the highest percentage (39%), followed by *Chrotogonus trachypterus trachypterus* (31%), with *Pyrgomorpha bispinosa deserti* being the lowest (11%). Data analysis indicated that Pyrgomorphidae had the highest overall representation. The impact of human activities on Acridomorpha populations was also noted. Shannon diversity index (H) for Acridoidea was highest in rice at 2.36 (Trip 1), followed by 2.3 (Trip 3) and lowest at 2.09 (Trip 2). For Pyrgomorphidae, the highest value was in Trip 3 (1.24), followed by Trip 2 (1.17) and lowest in Trip 1 (1.04).

ENT-19

INFLUENCE OF DIET ON THE DEVELOPMENT OF *PHANEROPTERA ROSEATA* (PHANEROPTERINAE: TETTIGONIIDAE: ENSIFERA) UNDER LABORATORY CONDITIONS

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The Phaneropterinae, the most diverse phytophagous subfamily of Ensifera, comprises the largest winged katydids, commonly referred to as bush katydids or shrub crickets. They are also known as leaf crickets. These insects are considered hazardous due to their delicate yet potentially harmful wings. This research investigates the influence of various host plants on katydids, focusing on feeding habits, nutritional factors, chemical defenses, life cycle dynamics, and interactions with symbiotic microbes. The choice of host plant significantly impacts the life cycle and behavior of *Phaneroptera roseata*, particularly its developmental phases. A total of 149 specimens of Phaneropterinae were collected from different regions of District Jamshoro and tested on various diets, including *Cynodon dactylon* (Bermuda grass), *Helianthus annuus* (Sunflower), *Oryza sativa* (Rice), *Panicum turgidum* (Desert grass), *Medicago sativa* (Alfalfa), *Sorghum vulgare* (Jowar), and *Poa tenella* (Grass). The shortest lifespan was observed on *C. dactylon*, with an average duration of 3.16 days in the second instar, whereas the longest lifespan was recorded on *Poa tenella*, averaging 8.46 days in the fourth instar. The lifespan of *P. roseata* tended to increase with the quality of the host plant, with the longest durations observed on more nutritious plants such as Medicago sativa and *Poa tenella*. These plants proved to be the most suitable diets, as other food sources were either rejected or consumed in minimal quantities. This study provides insights into the host plant preferences of *P. roseata* and contributes to the understanding of pest management strategies, including the potential role of crop rotation in controlling katydid populations.

ENT-20

AN ASSESSMENT OF PALEARCTIC ACRIDIDAE (ORTHOPTERA) IN THE ARID LANDSCAPES OF BALOCHISTAN

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During the survey of the Palearctic fauna of Acrididae (2024-2025) in various representative localities of Balochistan Division, 163 species were collected, and 20 species were sorted out. The reported species are: *Acrotylus humbertianus* (1.9%), *Oxya hyla* (10.0%), *Acrida exaltata* (8.0%), *Aiolopus thalassinus thalassinus* (17.9%), *Heteracris illustris* (0.25%), *Locusta migratoria* (4.4%), *Oedaleus senegalensis* (3.15%), *Oedaleus abruptus* (0.23%), *Ochnlidia gracilis gracilis* (2.8%), *Schistocerca gregaria* (1.8%), *Scintharista notabilis* (17.2%), *Diabolocatantops innotabilis* (3.12%), *Sphingonotus rubescens rubescens* (7.31%), *Sphingonotus balteatus himalayanus* (2.16%), *Sphingonotus savignyi* (7.8%), *Acrotylus insubricus* (Scopoli) (4.2%), *Heteracris littoralis* (0.25%), *Truxiluxs fitzgeraladi* (4.0%), *Mesopsis laticornis* (15.5%), and *Truxalis eximia eximia* (3.0%). The species distribution showed that the subfamily Oedipodinae was the most common group at collection points in both plains and hilly areas. Additionally, host plants, seasonal distribution, taxonomic keys, body measurements, color polymorphism, seasonal occurrence, body size, morphological variations, genital studies, zoogeographical distribution, and pest status of the species were documented. The natural habitats and species richness were also analyzed to assess the diversity of these species. This study provides valuable information for extension services and other pest agencies.

ENT-21

TAXONOMY AND DISTRIBUTION OF GROUND BEETLES (COLEOPTERA) FROM DISTRICT SUKKUR, SINDH

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Ground beetle is the member of family Carabidae, often recognize by big prognathous mandibles, sturdily margined pronotum and antennae elongated thread like. Genitalia have been used to identify different species for more than hundred years, and the technique is constantly become upgrade. Main biogeographical regions of the world dwelled by more than 25000 species and very rich family Coleoptera order. Even though ground beetles are quite consistent morphologically but have little difference in basic body structure. Previous studies tried to relate the morphological characters with locality but some of the adaptations were found such as cave inhabitant, fosorial and arborial. The majorities of variation are related with habitats. Ground beetles are one of the taxonomically varied beetle families, have worldwide distribution and usually employed to show the qualitative status of the environment. Many species of ground beetle are key stone species of ecosystem and thus are frequently studied. The samples were captured from various localities of district Sukkur. The collection of species was done with the help of

aerial nets. The material used in this research were about 160 specimens which were collected during the March 2023 - December-2024. Collected material was brought in to the laboratory and killed by means of potassium cyanide in standard entomological killing bottles. The specimens were not left too long (½ hour) in cyanide because the color changed particularly that of green specimens. Five species were observed new in sindh, *Carabus cashmirensis, Chlaenius quadricolar, Chlaenius laticollis, Chlaenius hamifer and Pheropsophus andrewesi*, Species *Pheropsophus andrewesi* even new throughout Pakistan. Population of these species *Chlaenius quadricolar* and *Chlaenius laticollis* is more common while *Carabus cashmirensis* and *Pheropsophus andrewesi* was rare in number. Taluka Salehapat and Rohri were observed rich while New Sukkur contain less members.

ENT-22

ASSESSING THE IMPACT OF CLIMATE CHANGE ON THE POPULATION DYNAMICS OF *OEDIPODINAE* SPECIES IN JAMSHORO

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The subfamily Oedipodinae, belongs to the Orthoptera order, plays a significant role in the ecosystems of Jamshoro and its surrounding regions. This study examines the biodiversity of Oedipodinae and the effects of climate change on their populations. Climate change, characterized by rising temperatures and altered precipitation patterns, profoundly impacts the habitat and distribution of these grasshoppers. Our research involved extensive field surveys and data collection on species diversity, population density, and habitat conditions. Results indicate a noticeable shift in species composition and a decline in population sizes, correlating with changes in temperature and humidity levels. Some species adapted to cooler, moister environments are becoming less prevalent, while others more tolerant to heat and aridity are proliferating. Additionally, habitat fragmentation and loss due to human activities exacerbate these climate-induced changes. The findings underscore the urgency for conservation strategies to mitigate the adverse effects of climate change on Oedipodinae biodiversity. Protecting and restoring habitats, along with monitoring climate trends, are essential measures to preserve the ecological balance in the region. This study highlights the intricate link between climate change and insect biodiversity, serving as a crucial reference for further ecological and conservation research. During present study total 521 specimens were collect and identified into single Family Acrididae and subfamily oedipodinae 3 genera *Sphingonotus* Fieber, 1852, *Trilophidia* Stål, 1873, *Acrotylus Fieber*, 1873 and 4 species viz. *Sphingonotus (Sphingonotus) rubescens rubescens* (Walker, 1870), *Sphingonotus (Sphingonotus) savignyi* Saussure, 1884. *Trilophidia annulata* (Thunberg, 1815), *Acrotylus humbertianus* Saussure, 1884, respectively. The highest population was observed for *Acrotylus humbertianus* Saussure, 1884, while the lowest population was observed *Trilophidia anulata* (Thunberg, 1815). Morphological description of these species are provided with photograph's.

ENT-23

REPRODUCTIVE BEHAVIOR *TRIGONOCORPHA UNICOLOR* (TETTIGONIIDAE: ENSIFERA) OF SINDH

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Sindh, an agriculturally rich region, hosts a diverse and remarkable insect fauna. While various insect species have been extensively studied, little attention has been given to the Ensifera (long-horned grasshoppers) in this region. The subfamily Phaneropterinae, commonly known as leaf crickets, leaf katydids, or true bush crickets, are predominantly phytophagous. This study investigates the reproductive behavior of the tettigoniid species *Trigonocorpha unicolor*, focusing on its mating and ovipositional behaviors through controlled cage studies. Sexual dimorphism is evident in this species, with males being smaller than females. Upon reaching sexual maturity, males produce a species-specific, mild calling sound to attract receptive females. If a female responds, female engages in antennal contact with the male, initiating courtship and mating. The findings contribute to the understanding of the reproductive strategies of *T. unicolor*, highlighting its unique mating and oviposition behaviors within the ecological context of Sindh.

ENT-24

ECOLOGICAL IMPORTANCE OF FIREFLY

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Fireflies, belonging to the Lampyridae family, are bioluminescent insects with around 2,000 species worldwide. Their ability to emit light is due to the enzyme luciferase, which plays a vital role in bioluminescence. One of the most critical ecological roles of fireflies is their function as bioindicators. Since they are highly sensitive to environmental changes, their presence or absence reflects the health of an ecosystem. A decline in firefly populations often signals habitat destruction, pollution, or climate change effects. Fireflies also contribute to pest control. Their larvae are predatory and feed on soft-bodied invertebrates such as snails, slugs, and worms. This natural predation helps maintain the balance of soil and plant health, reducing the need for chemical pesticides. Bioluminescence is a unique character of some unique organisms, including fireflies. There are around 2000 species of fireflies worldwide which are belong to the lampyridae family. Luciferase is a protein that is involved in the process of light emission. Firefly larvae exhibit predatory behaviour by eating soft-bodied species such as earthworms and wood lice, which is advantageous from an ecological standpoint. However, firefly populations are declining due to habitat destruction, light pollution, and pesticide use. Conservation efforts, such as protecting wetlands and reducing artificial lighting, are necessary to ensure the survival of these important insects. Fireflies play an important role in ecosystems as pollinators and predators. Their presence indicates a healthy environment, and they contribute to eco-tourism. In conclusion, fireflies are more than just beautiful

creatures; they are vital for maintaining ecological balance. Their protection is essential for preserving biodiversity and environmental health.

ENT-25

EXAMINING THE BEHAVIORAL RESPONSES OF *ACHETA DOMESTICUS* UNDER LABORATORY CONDITIONS

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Acheta domesticus, commonly known as the house cricket, is a pale yellowish-brown insect with dark transverse bands across its head. This species is commercially reared for fishing bait and is increasingly recognized for its potential as a high-protein food source. House crickets are gonochoric insects, engaging in copulation and internal fertilization. They belong to the order Orthoptera, specifically the subfamily Gryllinae, which includes house and field crickets. *Acheta domesticus* is a model organism for rearing, which I used in my research to gain a deeper understanding of their behavior in both wild and controlled conditions. I aimed to investigate the variability in behavior depending on factors such as temperature, humidity, population density, light, space, and food type and availability, and how these factors influence the growth of nymphs and adults. The study analyzes how light impacts the behavioral activity of *Acheta domesticus* under laboratory conditions. Various charts and graphs illustrate the data recorded during my observations. The findings also underscore the aggression and mating behavior of *Acheta domesticus* under controlled conditions. Furthermore, the results indicate that behavior may vary depending on resource availability in both captive and wild environments. House crickets, such as *Acheta domesticus,* are commonly studied due to their abundance and ease of maintenance in laboratory settings. Additionally, *Acheta domesticus* (Linnaeus, 1758) is considered a significant urban pest that impacts public health and sanitation. This study, conducted from January to June 2024, investigates the behavioral patterns of *Acheta domesticus* under laboratory conditions in Pakistan. A total of 168 specimens were collected from various areas of District Hyderabad, including houses, grasslands, fields, areas near garbage, and stored food. House crickets, along with other edible insects, present opportunities for sustainable food production and income generation. This research represents the first effort to document the behavior of *Acheta domesticus* in laboratory conditions in Hyderabad, providing foundational knowledge for future studies and applications in urban pest management and edible insect farming.

ENT-26

STUDY ON THE ADAPTIVE COLORPOLYMORPHISM OFGENUS ACRIDA (ACRIDINAE: ACRIDIDAE) WITHIN A SPATIALLY HETEROGENOUS ENVIRONMENT.

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The Sindh province of Pakistan is located in southeastern region of Pakistan. Sindh is well-developed in agriculture and natural resources. The family of locusta Genus Acrida is found in Sindh and known for

damaging agriculture crops, vegetables, fruits and economic disruption on the other hand locusts are a good source of protein, energy, fatty acids, and minerals. they appear in two forms or phases, gregarious and solitary, (Uvarov, 1966, Uvarov, 1977, Pener, 1991;) locusts have different colors which has been associated with the need for crypsis and camouflage. They are eaten in many African, Middle Eastern, and Asian countries. They are most destructive migratory pest worldwide found in 120 countries causes 2.5 Billion annual damage. Various districts of sindh were surveyed and it was observed that crops such as cotton, rice, wheat, maize, grain, tomato were mostly cultivated and destroyed by swarm of locusts in some season. These surveys of Genus Acrida, Acrididae were conducted from July to September 2024 in Sindh. During survey that was carried out from June to September 2024 from agricultural field. In this study we have collected the specimens of acrididae and further more sorted out into three species that including *Locusta migratoria manilensis*, Meyen, 1835, *Patanga succincta* Johannson, 1763, *Schistocerca gregaria* Stal, 1873. It was observed that most dominant species of the family acrididae is *Locusta migratoria manilensis*, having bluish color polymorphism Where as other species were find as greenish, with black spots or yellow spots. As being adult, they turned into dark brown color. This analysis of color polymorphism of Genus Acrida is under process more parameters of pattern sampling will take for research and this study provides valuable information These findings deserve additional study, particularly concerning the roles of heterogeneous visual environments for color polymorphism Finally, comparative studies and more comprehensive approaches are required to elucidate when color polymorphism evolves, persists, or leads to speciation. Whereas *Schistocerca gregaria*, has grey color pattern this insect considered most dangerous locust due to ability of swarms. Pest status of each species was documented. Additionally, the study of the color morphism of the various species is under process.

ENT-27

BIOGEOGRAPHY AND DIVERSIFICATION OF ORTHOPTERA IN THE NARA DESERT, SINDH

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During the present study we collected 3,749 specimens from different localities of the Nara Desert, Sindh, between 2021 and 2023, which were sorted into three families, 18 genera, and 21 species. The identified species include *Acrida exaltata*, *Acrotylus humbertianus*, *Chrotogonus (Chrotogonus) trachypterus*, *Pyrgomorpha (Pyrgomorpha) bispinosa deserti*, *Atractomorpha acutipennis blanchardi*, *Trilophidia annulata*, *Heteracris littoralis*, *Chorthippus angulatus*, *Acrotylus longipes*, *Truxalis fitzgeraldi*, *Oxya hyla*, *Gonista rotundata*, *Poekilocerus pictus*, *Callogryllus ovilongus*, *Gryllodes supplicans*, *Gryllodes sigillatus*, *Gryllus (Gryllus) campestris*, *Gryllus (Gryllus) bimaculatus*, *Gryllus septentrionalis*, *Callogryllus saeedi*, *Acheta domesticus*, and *Teleogryllus occipitalis*. Among these species, *Acheta domesticus* had the highest number of specimens, followed by *Gryllodes sigillatus*, while *Teleogryllus occipitalis* had the lowest number recorded. Other species exhibited significant population variability, often becoming locally dominant and even serving as temporary keystone species, while entire Orthopteran communities play essential roles in ecosystem functioning over extended periods. The results reveal that agricultural land has the potential to support insect diversity and act as an effective refuge for some species from rocky areas. Given the ecological significance of these habitats, the study recommends

prioritizing their conservation to promote Orthopteran biodiversity and maintain ecological balance in the region.

ENT-28

LABORATORY REARING AND LIFE CYCLE ANALYSIS OF EARWIGS (DERMAPTERA)

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Earwigs (Order: Dermaptera) are free-living, flat, elongated insects characterized by a pair of forceps-like cerci at the end of their abdomen. They are often difficult to observe due to their nocturnal and secretive nature, preferring to hide in small cavities. Although taxonomic observations have been reported from different regions, there is no authentic information on the laboratory rearing and life history of earwigs. Therefore, the present study was designed to rear these insects under controlled conditions to study life history parameters, including fecundity, fertility, total number of eggs per female, hatching duration, number of instars, molting intervals, survivorship, adult lifespan, generations per year, and the environmental factors (temperature, humidity, and photoperiod) influencing development. This study will contribute to understanding their general biology and serve as a basis for improving pest management techniques in the future.

ENT-29

SYSTEMATIC STUDY AND HABITAT ANALYSIS OF MOLE CRICKETS (ENSIFERA: GRYLLOTALPIDAE) IN SINDH

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The present comparative study, conducted in 2024, aimed to determine the habitat and systematic position of mole crickets from various districts of Sindh. These insects are primarily found in grass and moist soil, often near water bodies. All species of the family Gryllotalpidae spend their lives in underground tunnels, which they excavate using their highly specialized, shovel-like front legs. They have a prognathous, somewhat elongated head, an extended pronotum, and short, slightly thickened antennae, all adapted for their subterranean lifestyle. Mole crickets typically emerge only during courtship, although their calls occur underground. Several species are serious crop pests, as they not only feed on plant roots but also damage entire root systems through their tunneling activities. Mole crickets form a small monophyletic group within the Gryllidea clade, consisting of over 100 species across seven genera worldwide. During field visits, 129 specimens were collected from various districts of Sindh, including Mirpur Khas, Khairpur Mir's, Ghotki, Tandojam, Matiari, Kotri, and Jamshoro. Due to dense foliage, the highest number of specimens was

collected from Tandojam, Mirpur Khas, and Matiari, while Jamshoro had the lowest count due to its lack of greenery. The collected species included *Gryllotalpa orientalis* Burmeister, 1838, *Gryllotalpa Africana* Palisot de Beauvois, 1805, and *Gryllotalpa Krimbasi* Baccetti, 1992. A more detailed survey is underway.

ENT-30

Exploring the Taxonomy of Cicadellidae (Hemiptera: Insecta) in Thar, Sindh

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Tharparkar forms a natural border between India and Pakistan, with approximately 85% of the Thar Desert located in India. In Pakistan, Tharparkar is a major part of this desert region in Sindh. The district is bordered by Mirpurkhas and Umerkot to the north, India (Barmer and Jaisalmer) to the east, Badin to the west, and the Rann of Kutch to the south. Among the various pest species in Tharparkar, leafhoppers (family *Cicadellidae*) are significant agricultural pests. They damage crops through direct feeding (sap-sucking) and by transmitting viral and bacterial plant pathogens. Leafhoppers are wedge-shaped insects, ranging from 1/8 to 1/2 inch in length, and can be green, grey, brown, or a mix of colors and patterns. *Cicadellidae* is one of the ten largest insect families, with some species known as sharpshooters. During present research, conducted across different seasons, we visited several localities in Tharparkar, including Umerkot, Diplo, Kantio, Chachro, Mithi, and Islamkot. We collected leafhoppers in varying ratios, with the highest numbers recorded during summer. This is because pests begin to multiply in spring as plants revive. When temperatures are sufficiently high, nymphs hatch within 10–12 days, feeding on tender plant parts and growing rapidly. However, due to their small size and delicate bodies, they are easily washed away by even light rainfall, leading to a population decline during the rainy season. While adult leafhoppers can overwinter and survive until the next growing season, their numbers decrease by the end of winter due to reduced breeding. We observed that leafhoppers were most abundant on *Atriplex* plants, where they suck sap from the small leaves and tender parts, causing the plants to dry up and hindering growth. However, after the rainy season, the plants recover, and leafhopper populations return in greater numbers. During the present study, we collected leafhoppers from the subfamilies *Deltocephalinae*, *Megophthalminae*, and *Cicadellinae*, identifying their tribes and genera. A total of 19 species were reported. Identifications were carried out using pertinent literature and specimen examinations from collections.

ENT-31

LABORATORY STUDIES ON THE GIANT ASIAN MANTIS, *HIERODULA TRANSCAUCASICA* (BRUNNER DE WATTENWYL, 1878) (MANTODEA: MANTIDAE)

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Praying mantids are a group of charismatic predatory insects that primarily feed on other insects and arthropods. They are diurnal and predominantly inhabit tropical and subtropical regions, with only a few

species found in colder zones. As efficient fly-catching predators, mantids capture both small and relatively large prey. Certain biological aspects of the Giant Asian Mantis, Hierodula transcaucasica (Brunner de Wattenwyl, 1878), were studied in the laboratory. Mantids were kept in communal cages, with adult females separated from adult males after the final molt to prevent cannibalism. The cages were furnished with branches and twigs and illuminated from above by two fluorescent lights. Communal living was facilitated by providing an abundance of live flies (Musca domestica), introduced into the cages once or twice daily. To meet their additional water requirements, a small wet sponge was placed inside the container three times per week. Results indicated that the generation period lasted 119 days for both females and males at a daily mean temperature of 25.9°C with a relative humidity of 45.0%. Molting occurred frequently, at intervals of 6 to 14 days. To rear different stages of H. transcaucasica under laboratory conditions and conduct further biological studies, transparent plastic jars measuring 19 cm in length and 9 cm in diameter were used. Oothecae laid in the laboratory were measured using calipers, with an average length of 18.31 mm. The number of newly hatched nymphs per egg case was recorded, averaging 187 nymphs, which were then transferred to separate rearing jars. Nymphs were fed daily with a mixture of various collected insects, including aphids, flies, crickets, and moths. Biological data of different developmental stages were observed and recorded. Newly hatched nymphs of H. transcaucasica were closely monitored, with molting events, the duration of immature and adult stages, oviposition (pre-oviposition and post-oviposition) periods, and overall generation periods documented under laboratory conditions.

ENT-32

DISTRIBUTION AND DIVERSITY OF SPATHOSTERNINAE SPECIES (ACRIDIDAE: ORTHOPTERA) IN SINDH, PAKISTAN

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Sindh is one of the four provinces of Pakistan, ranking third in terms of area and second in population. The insect order Orthoptera plays a significant role in natural ecosystems, with grasshoppers from the family Acrididae being among the most well-known and ecologically important members. While these insects contribute to the environment, certain species can also cause considerable damage to agricultural crops, including rice and wheat. True grasshoppers, commonly known as short-horned grasshoppers, belong to the family Acrididae. Orthoptera is one of the most diverse insect orders, comprising approximately 22,500 species worldwide. A survey conducted across various talukas of Sindh revealed that key crops such as tomatoes, wheat, rice, barley, sugarcane, and cotton are predominantly cultivated in the region. These surveys were carried out from March to July 2024. During the 2024 survey of Acrididae, Spathosterninae was identified as one of the smallest subfamilies, consisting of 12 valid species, classified within a single tribe and three genera. In Pakistan, two species of *Spathosternum*, including *S. venulosum*, have been recorded. These species are widely distributed and typically inhabit grassy areas, particularly around seasonal and permanent marshes, riverine swamplands, and drawdown zones. Several species within the genus exhibit polymorphism, including Hieroglyphus daganensis, which shares a preference for similar marshy habitats. In Pakistan, two important species of Spathosterninae have been identified, yet detailed knowledge about their biology and ecology remains limited. The present study

highlights the need for further surveys in Sindh to improve the understanding of Spathosterninae species, their distribution, and their ecological impact.

ENT-33

DNA BARCODE ANALYSIS UNVEILS TETRIGIDAE (ORTHOPTERA: CAELIFERA) POLYMORPHISM IN SINDH

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Tetrigidae species are primarily ground-dwelling and are often found on leaves, in wet areas, or near water bodies such as rivers, streams, and stagnant water. Dietary variations among orthopteran species, including Tetrigidae, are influenced by the structure and development of their body parts. These groundhoppers exemplify diversification, with various species displaying inconsistencies in color patterns. Such variations serve as camouflage, enabling species to blend into their natural environments, including leaves, grass, sand, and stones. Molecular characterization was conducted for 26 species, with 11 successfully barcoded. DNA barcoding, using mitochondrial COI gene sequences, was employed to investigate polymorphism within Tetrigidae. The analysis revealed significant genetic variation within Tetrigidae species, indicating high intraspecific polymorphism. Polymorphic sites in the COI gene correlated with morphological variations, such as differences in wing shape, color, and body size. Genetic polymorphism was also associated with geographic distribution, as different populations exhibited distinct genetic signatures. DNA barcoding helped clarify species boundaries within Tetrigidae, identifying cryptic species and highlighting the need for taxonomic revisions. Polymorphism and camouflage behavior were confirmed in species such as *Coptotettix longtanensis*, as demonstrated through DNA barcoding. These findings underscore the effectiveness of DNA barcoding in detecting polymorphism within Tetrigidae, providing valuable insights into their evolutionary history, genetic diversity, and species relationships.

ENT-34

ADAPTIVE STRATEGIES, UNIQUE MORPHOLOGICAL AND BEHAVIORAL TRAITS OF TETTIGONIOIDAE AMONG ORTHOPTERANS

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The presence of Indus River shows the abundance of the Tettigoniodae species especially at the night time. The Tettigonioidae species are mostly phytophagous in nature but a few of them are carnivorous and have predatory nature. Tettigonioidae species are major pests of most of the crops that have more effect on the economy of the country. Tettigoniidae species feed on tender wigs of the plants hence, it causes considerable

damage to the wheat, rice, sugarcane, fruit orchards, herb, shrubs, grasses, berries and trees. We collected various species from different aerated fields of Sindh from 2023-2024. One of the amazing things, we have found in Tettigoniidae species is that these species mimic themselves from predators and adopt the surrounding environment. Tettigoniidae species feed on leaves of host plants and therefore adopt leaf like appearance of that plant. Although, by adopting this attribute they protect themselves from capturing or from enemies.

ENT-35

SEASONAL DYNAMICS OF RHIPICEPHALUS TICKS (ACARI: IXODIDAE) ON RUMINANTS IN LARKANA DIVISION, SINDH, PAKISTAN

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Ruminants are proved supreme and feasible in agriculture sector and help in food supply to humans. They are an important source of many products such as milk, meat and manure. Some ruminants are draught animals and they pull the load as a vehicle. Among regular dietary supplements animal protein is an important source of food. Ticks belong to phylum Arthropoda and are associated with mites (due to their appearance). Universally dispersed ticks (Acari:Ixodidae) have blood of birds, and mammals as their primary food and reptiles and amphibians as secondary source. Additionally, they have direct adverse impact on the health of their hosts and are vectors of many diseases of animals and humans in northern hemisphere. In present study seasonal dynamics and infestation of ticks focusing on genus Rhipicephalus was observed in Larkana, division, Sindh, Pakistan. Randomly selected farms of Larkana division were visited fortnightly and 1500 cattle, 3000 camel and 1875 sheep came under observation. Specimens recovered from the host animals were temporarily preserved in glycerin and were identified under dissecting microscopes using standard keys. The species recovered from present research were *Rhipicephaus appendiculatus* and *Rhipicephaus microplus* and their intensity was noted 0.81 in cattle, 1.07 in camel and 0.43 in sheep, 1.11 in cattle, 1.18 in camel and 0.69 in sheep respectively. Female ticks were more abundant than male ticks. The prevalence in cattle was 41.86%, camel 17.1% and sheep 51.73%. This study concludes ruminants of Larkana division are at highest risk of infestation.

ENT-36

TAXONOMY AND MORPHOLOGICAL SIGNIFICANCE OF *MENACANTHUS PALLIDULUS* (NEUMANN, 1912) (PSOCODEA: AMBLYCERA: MENOPONIDAE) FROM HYDERABAD, SINDH, PAKISTAN

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The chewing lice (Psocodea: Amblycera: Menoponidae) are biting insects with strong mandibles. They cause parasitism which is always harmful to the host. The chewing louse (Psocodea: Insecta)

Menacanthus pallidulus (Neumann, 1912) is usually smaller in size than other species of chewing lice of fowls. It is yellowish soft bodied parasitic insect. It was attached on silky and soft feathers of the hosts. It was fast moving and causing irritation, provocation and frustration in hosts. The type host of *Menacanthus pallidulus* (Neumann, 1912) was *Gallus gallus domesticus* (Linnaeus, 1758) domestic fowl. The study was carried out during the year of January 2021 to December 2022. A total of 154 specimens were collected from 12 localities of Hyderabad, Sindh, Pakistan. It was reported from *Pavo cristatus* Linnaeus, 1758, Common pea fowl, *Gallus gallus domesticus* (Linnaeus, 1758), domestic fowl and *Meleagris gallopavo* Linnaeus, 1758 Turkey fowl as new hosts and new locality record. from the study area. The chewing louse belongs to the family Phasianidae. The species was described Morpho-taxonomically with special reference to its chaetotaxy and genitalia of both male and female sexes. The purpose of the present study is to compile the checklist of galliform chewing lice fauna and identify maximum number of species from Hyderabad, Sindh, region Pakistan.

ENT-37

FIELD ASSESSMENT OF NYMPHAL DENSITY IN THE GENUS *GRYLLUS* (GRYLLINAE: GRYLLIDAE)

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This study investigates the nymphal density of the genus *Gryllus* (subfamily Gryllinae, family Gryllidae) in the Hyderabad Division of Sindh. Conducted between May and September 2024, the research covered several areas, including Tando Jam, Tando Hyder, Tando Allahyar, Rasheedabad, and Hyderabad City. A total of 247 specimens from three species (*Gryllus bimaculatus*, *Gryllus campestris*, and *Gryllus septentrionalis*) were collected and analyzed to explore their developmental stages, population dynamics, and environmental adaptations.Abiotic factors such as temperature, relative humidity, and plant cover significantly influenced nymphal density, with peak densities observed in May and June. Extreme conditions, such as drought and high humidity, reduced nymphal populations, while favorable conditions (approximately 32°C temperature and moderate humidity) provided optimal microhabitats. The study also found that both photoperiod and population density affected nymphal development. Longer daylight hours accelerated developmental rates, while higher population densities intensified competition. Species-specific differences in life history traits were observed. *Gryllus campestris* exhibited greater robustness and longer development time, suggesting a more conservative life history strategy. In contrast, *Gryllus bimaculatus* showed higher density and faster development, indicating a rapid growth strategy. *Gryllus septentrionalis*, however, had the shortest lifespan and lowest survival rates, with high mortality in later instars, likely due to genetic or physiological limitations.

ENT-38

FAUNISTIC STUDY OF FAMILY FORMICIDAE (HYMENOPTERA) FROM DISTRICT HARIPUR, KHYBER PAKHTUNKHWA, PAKISTAN

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A faunistic study was conducted to explore family Formicidae in district Haripur, Pakistan. The Ants were collected with the help of aspirators, hand-net as well as by hand picking directly, while pitfall traps are used indirectly. The collected specimens were identified using recent literature available on antweb.com. The result revealed a total 27 species of five subfamilies i.e, Formicinae, Myrmicinae, Ponerinae, Dolichoderinae and Pseudomyrmicinae. The Subfamily Myrmicinae was the most speciose with 13 species under 8 genera viz, *Messor instabilis, Pheidole indica, P. roberti, Monomorium lusai, M. sagei, M, indicum, Cardiocondyla mauritanica, Meranoplus bicolor, Crematogaster rothneyi, C.himalyana, C. biroi, Solenopsis geminate, Aphenogaster beesoni*. The Subfamily Formicinae was reported with 10 species under 4 genera viz, *Camponotus compressus, C. Socrates, C. mitis, C.confucii, C. variegatus, C. consobrinus, C. sylvaticus, Polyrachis hodgsoni, Paratrechina longicornis, Lepisiota pusaensis.* The Subfamily Ponerinae was described with two species under two genera viz, *Odontoponera denticulata, Anochetus cryptus*. The Subfamily Dolichoderinae and Pseudomyrmicinae were recorded with one species each viz, *Tapinoma melanocephalum* and *Tetraponera periyarensis*. Following species were recorded as New Country Records; *Anochetus cryptus, Camponotus mitis, C. consobrinus, Lepisiota pusaensis* and *Tetraponera periyarensis*. Spatial distribution of each species along with diagnostic characters and detailed description of each species is provided.

ENT-39

STUDY ON MORPHOLOGICAL DIFFERENCES IN EARWIGS (DERMAPTERA: ORTHOPTERA) OF BAHAWALPUR

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Earwigs (*Dermaptera*), particularly those from the Anisolabididae family, exhibit significant morphological variation, yet their taxonomy remains understudied. This study investigates the morphological differences in earwig populations of Bahawalpur using both morphological and genetic analyses. Morphological evaluations identified seven distinct morphospecies within the genera *Anisolabis* and *Gonolabis*, confirmed through genetic barcode data. However, molecular phylogenies did not support the monophyly of these taxa. Spatial and temporal variations in earwig morphology were examined, revealing that male cerci size varied regionally and across years, with southern populations exhibiting larger body sizes and a higher proportion of males with extended cerci. Comparative analysis also demonstrated significant size differences between mainland and island populations. Furthermore,

reproductive strategies in earwigs were analyzed through ultrastructural studies of lateral oviducts in oviparous, ovoviviparous, and viviparous species. The findings suggest that viviparous species exhibit specialized adaptations for embryonic development, highlighting the diversity in reproductive mechanisms within *Dermaptera*.

ENT-40

COMPARATIVE ANALYSIS OF SELECTED CAELIFERAN GRASSHOPPERS IN THE CHOLISTAN DESERT: OCCURRENCE AND DISTRIBUTION PATTERNS

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The Cholistan Desert, a significant extension of the Great Indian Desert, is situated in the southern Punjab province of Pakistan. Known locally as Rohi, it spans latitudes 27º42´ to 29º45´ North and longitudes 69º52´ to 75º24´ East, covering approximately 2.6 million hectares. Its length is about 480 km, with a width ranging from 32 to 192 km. The desert's unique ecological characteristics provide a vital habitat for diverse flora and fauna, including members of the order Orthoptera. This order comprises two suborders: Caelifera (short-horned grasshoppers and locusts) and Ensifera (crickets, katydids, and weta). Grasshoppers, belonging to Caelifera, are among the most diverse insect groups, making them ideal biological indicators due to their significant body size, ease of capture, and ecological dominance. Caelifera includes approximately 2,400 genera and nearly 11,000 known species globally. The suborder is named for the shape of its ovipositor, short and up curved like an engraving tool, derived from the Latin word “Caelum,” meaning engraving tool. This study aims to conduct a comparative analysis of selective Caelifera species in the Cholistan Desert, focusing on their occurrence across distinct habitats and seasons. Specimens will be collected from three primary habitat types of dune habitats, saline flats, and vegetative patches using methods such as handpicking, beating vegetation, insect sweeping, night trapping, and aerial netting. Seasonal sampling will be carried out in summer and winter to assess temporal variations in species diversity and abundance. Collected specimens will be preserved in entomological killing bottles, prepared following standard protocols, and identified under a stereoscopic dissecting microscope using taxonomic keys and available literature. Despite their ecological significance in food webs and economic impact as pests, the diversity of Orthoptera, including Caelifera, remains understudied in the Cholistan Desert. This study seeks to bridge this knowledge gap, providing insights into species distribution and the influence of habitat-specific environmental factors.

ENT-41

DISTRIBUTION OF FAMILY TENEBRIONIDAE (COLEOPTERA) FROM CHOLISTAN DESERT

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Cholistan Desert, in southern Punjab, Pakistan, covers over 26,000 square kilometers, featuring sand dunes and extreme temperatures. Home to diverse flora and fauna, including nomadic tribes like the Cholistanis, it's both a challenging environment and a rich region, drawing interest from researchers and adventurers. The study's objective was to thoroughly survey Tenebrionidae beetles, categorize them into distinct taxa, pinpoint their prevalence areas, and create identification keys while documenting their ecological characteristics. The study was conducted in the Bahawalpur District's surrounding areas of the Cholistan Desert to study the tenebrionid specimens. Sampling sites were selected based on their geographical coordinates. Data collection involved weekly sampling using handpicking, net sweeping, and pitfall traps. Insect preservation, image analysis, and identification followed, with statistical analysis conducted using Past 4.03 for biodiversity indices and GraphPad Prism 5.0 for graphical representation. A total of 234 darkling beetles were collected which belonged to 4 species. *Blaps gigas* (Linnaeus, 1767) emerged as the dominant species, consistently observed throughout the year with its population peaking during the second trip, comprising 76 samples (21 males, 55 females). *Trachyderma hispidia* (Forskal, 1775) exhibited consistent numbers across all trips, reaching its highest count during the initial expedition, totaling 60 samples (19 males, 41 females). *Eusattus muricatus* LeConte, 1851 and *Pimelia bipunctata* Fabricius, 1781 showcased population fluctuations, with apexes noted during the second journey, amassing 54 (16 males, 38 females) and 44 samples (14 males, 30 females), respectively. The sex ratio across all species leaned towards females, with 70 males and 164 females among the 234 total samples. Spatially, species abundance varied across desert, agricultural, and surface communities, with *Blaps gigas* and *Trachyderma hispidia* predominantly found in desert regions, while *Eusattus muricatus* and *Pimelia bipunctata* exhibited a more dispersed distribution.

ENT-42

A COMPARATIVE ANALYSIS OF HEMIACRIDINAE (ORTHOPTERA) IN SINDH AND KHYBER PAKHTUNKHWA

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A comparative analysis of *Hieroglyphus* species from Khyber Pakhtunkhwa (KPK) and Sindh provinces of Pakistan was conducted to explore the diversity, distribution, and ecological adaptations of

grasshoppers within these regions. The study identifies and compares the morphological features, behavioral patterns, and ecological preferences of various *Hieroglyphus* species found in KPK and Sindh. Detailed field surveys, specimen collection, and laboratory examinations revealed distinct species variations influenced by the contrasting environmental conditions of the two regions. The results indicated significant differences in size, coloration, and reproductive strategies, which were found to be adaptations to the different climatic and vegetation types of KPK and Sindh. Moreover, the distribution patterns of *Hieroglyphus* species are closely linked to the availability of specific grasses and the arid landscapes characteristic of each province. This comparative analysis highlights the ecological roles of *Hieroglyphus* in both regions and provides insights into the evolutionary processes shaping their adaptations to diverse environments. The findings contribute to a better understanding of grasshopper biodiversity and the potential impacts of climate change on species distribution and ecological balance in Pakistan.

ENT-43

STUDY OF CRYPTIC SPECIES OF GRYLLIDAE (ORDER: ORTHOPTERA) FROM BAHAWALPUR

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This study investigates the cryptic species within the Gryllidae family (crickets) of the order Orthoptera from the Bahawalpur region in Pakistan. The aim was to identify hidden genetic diversity within morphologically similar cricket populations, which may represent distinct cryptic species. Samples were collected from diverse habitats across Bahawalpur, including agricultural fields, grasslands, and semi-arid environments. Our results revealed multiple genetically distinct lineages that were morphologically indistinguishable, confirming the presence of cryptic species within the Gryllidae family in the region. Phylogenetic analyses indicated significant genetic divergence between these lineages, suggesting that geographical isolation and ecological factors play a role in their speciation. This cryptic diversity is likely overlooked in traditional morphological studies, emphasizing the need for molecular techniques in accurate species identification. The study also explored the ecological roles of these cryptic species, noting their presence in a variety of habitats and their contributions to local ecosystems, including soil aeration and decomposition. Despite their ecological significance, some of these populations face potential threats from habitat degradation and climate change, which may affect their distribution and survival. This research enhances the understanding of Gryllidae biodiversity in Bahawalpur and highlights the importance of incorporating molecular tools into taxonomic studies to reveal hidden species diversity.

ENT-44

OBSERVATIONS ON SEASONALITY AND WING DIMORPHISM IN MOLE CRICKET GRYLLOTALPA (ORTHOPTERA: GRYLLOTALPIDAE)

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The oriental mole cricket *Gryllotalpa orientalis* exhibits variation in wing dimorphism. In an Okinawa population, no short-winged individuals were observed, and wing dimorphism has not been detected. Flight behavior of *G. orientalis* was observed from April to October in Okinawa. In contrast, a Hyogo population exhibited seasonal wing dimorphism and long-winged individuals appear from June to September. The flight period of the long-winged morph coincided with this period. Short-winged individuals appeared from September to the following June and they never fly. Both populations showed univoltine life cycles. Considering the possible flight period, wing pattern and life cycle of mole crickets in these two areas, it is presumed that flightlessness is expected to arise when adults cannot experience suitable temperatures for flight activity.

ENT-45

OBSERVATIONS ON MORPHOLOGICAL CHARACTERISTICS IN GRYLLOTALPA (ORTHOPTERA: GRYLLOTALPIDAE) FROM CHOLISTAN DESERT

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In order to comprehend the structural adaptations of *Gryllotalpa* species to arid conditions, the study will examine their exterior morphology in the Cholistan Desert in Pakistan. To find important distinguishing features, a variety of morphological parameters will be examined in the gathered specimens, including body size, coloration, wing structure, antennal segmentation. The adaptations of these mole crickets to burrowing, especially their sturdy forelegs with powerful digging spines that allow them to travel through compacted and sandy soil, will be given special attention. Furthermore, the research will emphasize differences in wing morphology and body pigmentation that could be impacted by environmental factors. To help with species identification, variations in pronotal form, antennal length, and overall body proportions will also be examined. The results provide important information about the ecological roles and survival tactics of *Gryllotalpa* species in desert environments, and they also make a substantial contribution to the taxonomic classification of these species in the area. The diversity of mole crickets and their morphological evolution in response to harsh climate conditions will be better understood thanks to this research, which will lay the groundwork for future investigations into their distribution, behavior, and ecological interactions in desert ecosystems.

ENT-46

SYSTEMATIC STUDY ON FIELD CRICKETS (ORTHOPTERA: GRYLLIDAE) OF THE CHOLISTAN DESERT

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The systematic study aims to document the diversity and ecological roles of field crickets (Orthoptera: Gryllidae) within the Cholistan Desert. The Cholistan Desert, part of the larger Thar Desert ecosystem, represents one of the harshest environments on Earth characterized by extreme aridity, high temperatures, and limited vegetation. Despite these challenges, the desert hosts a range of life forms, including field crickets, which play a critical role in the desert ecosystem. This study will investigate species diversity, distribution patterns, and ecological roles of field crickets across different microhabitats of the Cholistan Desert, such as sand dunes, scrublands, and oases. Sampling techniques will include pitfall traps, sweep nets, and acoustic monitoring, which will be used to capture and identify cricket species**.** Morphological identification will be employed to confirm species identity. Data will be analyzed using diversity indices, species richness estimation, and multivariate statistical techniques. The outcomes of this study are expected to fill critical gaps in our understanding of cricket diversity in arid environments, provide insights into their ecological roles within the desert ecosystem, and contribute to broader entomological and conservation efforts.

ENT-47

DNA BARCODING REVOLUTIONIZES CONOCEPHALINAE GRASSHOPPER IDENTIFICATION IN BAHAWALPUR, PAKISTAN

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Accurate identification of insect species is crucial for biodiversity conservation, ecological research, and pest management. Conocephalinae, a subfamily of katydids within Ensifera, exhibit significant diversity, but their classification remains challenging due to morphological similarities. This study focuses on the grasshopper species of Bahawalpur Division, Pakistan, employing an integrative approach that combines DNA barcoding for precise identification. Mitochondrial COI gene sequencing was utilized to generate DNA barcodes, enabling the differentiation of closely related species. The application of molecular techniques significantly improved species resolution, allowing for rapid and accurate identification with higher reliability than traditional morphological methods. Our findings highlight the effectiveness of DNA barcoding in resolving taxonomic ambiguities, identifying cryptic species, and supporting biodiversity assessments. This approach offers a powerful tool for entomological studies, particularly in underexplored regions like Bahawalpur, and holds promise for real-time monitoring and

environmental DNA (eDNA) applications. This research underscores the transformative role of DNA barcoding in modern insect taxonomy and conservation, paving the way for broader applications in ecological monitoring and species.

ENT-48

ECOLOGICAL STATUS OF THREE IRRIGATED CANALS OF PANJNAD HEADWORKS PUNJAB PAKISTAN USING AQUATIC ENTOMOFAUNA AS A BIOINDICATORS

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Aquatic entomofauna, being highly sensitive to surface water pollution, will be utilized as bioindicators to assess water quality. This study aims to evaluate the composition, distribution, and diversity of aquatic entomofauna in the Panjnad Headworks, located in southern Punjab, Pakistan. The research will examine the influence of various physicochemical parameters, including pH, temperature, total dissolved solids (TDS), biological oxygen demand (BOD), turbidity, phosphate, and nitrate content, across three irrigated canals of the Panjnad Headworks, with comparisons drawn against WHO standards. Entomofauna will be collected using D-frame nets, preserved in 70% ethanol, and identified using a dissecting microscope. Data analysis, including ANOVA, will be conducted to compare different sampling sites. Biological metrics such as taxa richness, Shannon diversity index, Margalef's index, evenness, and dominance will be calculated using PAST 4.0 data analysis software. The findings of this study are expected to provide valuable insights into the overall health of the aquatic system, contributing to the development of effective conservation strategies.

ENT-49

A SYSTEMATIC STUDY ON MOLE CRICKETS (GRYLLOTALPIDAE: ENSIFERA) FROM CHOLISTAN DESERT

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The Cholistan Desert, located in southern Punjab, Pakistan, is characterized by its arid climate, vast sand dunes and sparse vegetation, covering approximately 26,300 square kilometers and supporting a unique ecosystem. This study was aimed at presenting a systematic study on mole crickets (Gryllotalpidae: Ensifera) from the Cholistan Desert, focusing on the species *Scapteriscus acletus* and *Scapteriscus vicinus*. Mole crickets, which belong to the family Gryllotalpidae in the order Orthoptera, are insects that live in

the soil. Mole crickets have a stout body, long antennae and powerful front legs for digging. They are nocturnal. They are adapted to living underground and are considered fossorial insects. Extensive field surveys were conducted across seven localities: Basti Yar Muhammad, 18 BC, Nouabaad, Pakka Bara, Marri Sheikh Shajrah, 12 BC and Jageer Bhatti Dari, from April 2023 to March 2024. A total of 910 mole cricket specimens were collected, with 395 males and 515 females. *Scapteriscus acletus* accounted for 397 specimens, while *Scapteriscus vicinus* was more prevalent with 513 specimens. The highest number of specimens (202) was recorded in Basti Yar Muhammad and the least in 18 BC (77). Seasonal variations indicated the highest collection during April-June 2023. This study enhances the understanding of mole cricket distribution and population dynamics in the Cholistan Desert, providing a basis for further ecological and behavioral research on these insects.

ENT-50

SEASONAL VARIATION IN ORTHOPTERAN DIVERSITY: A CASE STUDY IN RAINY SEASON IN CHOLISTAN DESERT

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The order orthoptera includes grasshoppers, locusts and crickets, which are incredibly diverse in terms of species, but not all of them are considered pests. While some Orthoptera species can indeed become agricultural pests not all of them exhibit this behavior. The diversity within Orthoptera includes many harmless species that play vital roles in ecosystems such as pollinators, decomposers, and prey for other animals. However, certain grasshopper and locust species when their populations explode can pose significant threats to crops (locusts' outbreak in 2019-2020), as they consume large quantities of vegetation. Therefore, it's essential to differentiate between the various Orthoptera species and manage them appropriately to strike a balance between preserving biodiversity and mitigating potential agricultural pest problems. This study investigated the seasonal variation in orthopteran diversity in the Cholistan region specifically in rainy season (mostly the hatching period of orthoptera). Field surveys were conducted at multiple sites across the region of Cholistan desert which lies in the southern Punjab province between latitudes 27°42' and 29° 45' north and longitudes 69° 52' and 75° 24' east. To collect the orthopteran specimens through standardized trapping and sampling methods. These specimens were identifying up to the species level, and their abundance and distribution patterns were recorded. This research provides valuable insights into how the environment responds to seasonal changes, shedding light on the resilience of arid ecosystems to short-term fluctuations in moisture levels. During the purposed study, Geographic Information System (GIS) software was utilized to gather geographic information about species, facilitating spatial mapping. Simpson's index was served as a pivotal tool for quantifying species diversity. Additionally, morphological analysis has been done through digital imaging software and direct comparison via key and existing literature.

ENT-51

LIFE HISTORY STATICS OF *POKILOCERUS PICTUS* (ORTHOPTERA: PYGOMORPHIDAE) IN CHOLISTAN DESERT

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In this study, we aimed to investigate the life history characteristics of Poekilocerus pictus in the Cholistan Desert, focusing on three key objectives: determining developmental stages and their durations, exploring reproductive behavior, breeding patterns, assessing survival rates and mortality factors. In the first objective, we have quantified the duration of each developmental stage to understand how much time the entire life cycle takes. Additionally, in-depth analysis of reproductive behavior, including copulation and oviposition behavior of *Poekilocerus pictus*, provided critical information about the species' reproductive strategy that's most appropriate time for control measures. This study also has documented intricate courtship rituals and mating behaviors, revealing the species' reliance on monsoon rains as a trigger for breeding. Furthermore, survival rates and mortality factors affecting Poekilocerus pictus populations will be rigorously assessed through long-term field studies. These insights contribute to our understanding of how this species has evolved to maximize its reproductive success in a desert ecosystem characterized by extreme environmental fluctuations. In terms of statistical analysis, the One-way ANOVA have performed to assess the statistically significant differences in the means of the duration of developmental stages across the different stages of insect. As insects play significant roles in agriculture, both as pests and beneficial organisms. Understanding the developmental stages of insect pests is essential for effective pest management strategies. By targeting vulnerable stages in an insect's life cycle, scientists and farmers can develop more precise and environmentally friendly pest control methods.

ENT-52

STUDY ON THE LIFE CYCLE OF THE AKK GRASSHOPPER *POIKILOCERUS PICTUS* (ORTHOPTERA: PYRGMORPHIDAE) FROM CHOLISTAN DESERT

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Poikilocerus pictus, the Akk grasshopper, is an important species in Pakistan's harsh cholistan desert. An investigation will be carried out to learn more about its life cycle, developmental phases, dietary habits, reproductive behavior, and ecological importance in arid environments. *Poikilocerus pictus* travels through five instar phases, each of which varies according to the environment, according to the research. When plant abundance increases during the monsoon months, the species' reproductive activity peaks. With a

penchant for particular plant types, its main food sources are desert grasses, shrubs, and forbs. *Poikilocerus pictus's* influence on vegetation dynamics will be emphasized in the study, particularly in light of desertification and shifting land use. Understanding grasshopper behavior, population dynamics, and potential as either beneficial or pest species is aided by the findings. Under laboratory settings, the pathogenic potential of two native entomofungal strains of *beauveria bassiana* and *Metarhizium anisopliae* will be examined in relation to the Aak grasshopper, *Poekilocerus pictus*, fabricus, (Orthoptera: Acrididea). Some observations on the examination of egg pods, their morphological characteristics, and hatching were made during the current study. *Poekilocerus pictus* egg pods were seen to be delicate, lengthy, and significantly twisted and curled close to the base surface; the eggs within the pod will also be observed to be organized erratically and to overlap with one another.

ENT-53

TAXONOMIC AND ECOLOGICAL STUDIES OF POLLINATORS IN DISTRICT GHOTKI SINDH PAKISTAN

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Pollinators are closely related to human welfare through sustainable use of food, the conservation of balanced ecosystem, crop production, and propagation of wild plants. Generally, pollinators are insects, such as bees, butterflies, moths, wasps, flies and beetles. Apart from this, species of bird and bat also provide pollination service to plants. Many insect groups, providing pollination services to agricultural and wild plant, are mostly associated with the orders Hymenoptera, Coleoptera, Diptera, Lepidoptera, Odonata, Hemiptera, Thysanoptera and Neuroptera. During the present study 02 talukas of district Ghotki were surveyed: Taluka Ghotki and Taluka Mirpur Mathelo to collect the pollinators from different fields. About 265 specimens were collected and taken to Advanced Entomology Laboratory Department of Zoology and identified into 03 orders viz: Hymenoptera, Diptera and Odonata, 04 families : Apidae, Vespidae, Syrphidae and Plotystictidae and 07 species i-e: *Apis florea, Delta pyriforme, Eupeodes luniger, Eristalinus sepulchrali, Eupeodes sp., Protosticta hearseyi*, and *Syritta* sp. The visitation rate of *Apis florea* (4.4 ± 3.13) and *Eristalinus sepulchrali* (3.8 ± 2.99) was relatively higher on the different crops than other species. Besides this, morphological characteristics of species and digital images are given.

ENT-54

UNDERSTANDING GRYLLIDAE SPECIES THROUGH MORPHOLOGICAL AND BIOACOUSTIC PERSPECTIVES

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Crickets are members of the order Orthoptera and family Gryllidae. Over 900 different species of crickets can be found in the world, with the house cricket *Acheta domesticus* being the most prevalent.

Since crickets are nocturnal insects, the night is when they are most active. As omnivores, crickets eat a wide range of things such as plants, insects and even other crickets. In crickets male produce the song by using their wings and the song used for territorial defense and attracting females. The song is produced in short period, each of which lasts for one to two seconds and is repeated every two to five seconds. The song can change in reaction to social interactions and is affected by environmental elements like light, humidity and temperature. A total of 1145 specimens were captured from four different areas i.e: Warehouses, Gardens, Kitchens and Fields and identified into four species viz: *Acheta domesticus*, *Gryllodes sigillatus*, *Gryllodes supplicans* and *Gryllus bimaculatus*. All these species were develop and validate on the basis of their sound production. Their songs are described in terms of their structure, frequency, and amplitude. *Acheta domesticus* songs consist of "kre" sounds repeated at 1-3/s, with 2-4 syllables per echeme, and a frequency range of 4700-4800 Hz. *Gryllodes sigillatus* male calls have echemes with four syllables, increasing in amplitude and duration, with a dominant frequency of 7.3 kHz and a harmonic series. *Gryllodes supplicans* calls have echemes with a short trill, around 110 syllables per echeme, increasing in amplitude, with a dominant frequency of 9.8 kHz and a harmonic series. *Gryllus bimaculatus* calls have echemes with four to five syllables, a fundamental frequency of 4.5 kHz, and a second peak of 13.1 kHz, with more widely spaced echemes and less consistent down times. Each species has a unique song pattern, with differences in syllable number, frequency, and amplitude, which are likely used for mate attraction and territorial defence. Without a doubt, scientists will use this discovery as a model for future research.

ENT-55

BEES (HYMENOPTERA) OF LARKANA DISTRICT, SINDH, PAKISTAN: TAXONOMY, DISTRIBUTION, AND ECOLOGICAL ROLES

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The order Hymenoptera includes sawflies, wasps, bees, and ants. The Hymenoptera order has about 150,000 extant species described and approximately 2,000 extinct ones as well. Numerous species are parasitic in nature. Usually, females have a unique ovipositor that they use to deliver their eggs into hosts or other inaccessible areas. There are two groups of hymenoptera: the Apocrita, that have a slender waist, and the Symphyta, which have no waist. An extensive field surveys were carried out to collect bees' fauna from different ecological zones of district Larkana during the February 2024 – July 2024. Total of 252 specimens were captured and identified into single family Apidae 02 genera i-e: *Amegilla* Friese, 1897 , *Xylocopa*,Latreille, 1802 and 03 species viz: *Amegilla niveocincta* (Smith, 1854), *Xylocopa aestuans* (Linnaeus, 1758) and *Xylocopa fenestrata* (Fabricius, 1798) respectively. The highest population was observed for *Xylocopa fenestrata* (Fabricius, 1798) while lowest population was observed *Amegilla niveocincta* (Smith, 1854). Morphological descriptions of these species are provided with photographs.

ENT-56

EXPLORING THE TAXONOMY AND GEOGRAPHIC DISTRIBUTION OF COCCINELLIDAE (COLEOPTERA) IN JAMSHORO, SINDH, PAKISTAN

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Coccinellidae are commonly known as common ladybug beetles. The family Coccinellidae is recognized with their unique attractive appearance and convex body shape worldwide about 5,200 described. Coccinellidae is a well-known abundant and diversified coleopterans family with about.6000 described species of Beetle's worldwide. It is sub-families are Coccinellinae, Chilocorine, Coccidulinae, Ortalinae, and Epilachninae. which are distributed worldwide and are predacious in nature except Epilachninae which is phytophagous. Lady bird beetles are mostly considered beneficial because of their predatory activity and help in regulating pest population of soft bodies insects like aphids, jassids etc. Field surveys were carried out to collect Coccinellidae beetles from district Jamshoro. A total of 156 specimens were collected during February 2024- July 2024. The specimens were identified into family Coccinellidae with single genus *Coccinella* and two species: *Coccinella septempunctata* and *Coccinella undecimpunctata*. The highest population of *Coccinella septempunctata* was obsereved with 71.15% and lowest population was observed for *Coccinella undecimpunctata* with 28.84%. Besides this morphological description and digital images for species are provided.

ENT-57

BIOLOGICAL ASPECTS OF *LABIDURA RIPARIA* (DERMAPTERA) UNDER CONTROLLED LABORATORY CONDITIONS

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The Earwig belongs to order Dermaptera has great economic importance. It is essential to currently identify them so that diagnosis of economic issue can be properly made. The earwigs have been recorded as the pest of irish sweet potaoes in storage and damaging the roots of the plants and inside the fruits and vegitables like apricot, peaches apple, tomatoes and onions. Omnivores have significant implications for the role of European earwig as a biological control agent and pest. Relatively specialized natural enemies might starve or emigrate when abundance of their prey is low, whereas the omnivorous European earwig can survive on alternative foods. Combining earwigs with relatively specialized natural enemies such as coccinellids or parasitoids may strengthen biological control across the season, as earwigs can suppress low-density pest populations during periods when these other natural enemies are not present Humidity and rainfall enhance the population dynamics of earwigs during the months of the July to September. Yet, no proper work has been done through at Sindh therefore present attempt was made. During the present study 1228 specimen was collected from various localities Badin, Tando Bago, Golarchi, Matli, Tando

Ghulam Ali, Kario Ghanwar, Rajo Khanani**.** As a results of present investigation the material was collected and identified in the life cycle of *Labidurai riperia.* Earwig eggs are found inside underground nests during winter and spring. Eggs are small (1 cm), yellowish white, and usually occur in masses of 30–60 per nest. The female lays 50 to 80 eggs in cluster. The first instar develop into second instar in 7-10 days, the second instar develop into third instar 12-15 days, third instar develop into fourth instar in 15-20 days while fourth instar develop into fifth instar in 20-30.

ENT-58

BIODIVERSITY PATTERNS OF ACRIDIDAE GRASSHOPPERS IN THE HYDERABAD REGION OF SINDH, PAKISTAN

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The harmful effects that grasshoppers have on a wide variety of green vegetation give them a major economic significance. Grasshoppers are found in a wide range of ecological systems and have a vast distribution. Throughout the course of this inquiry, a comprehensive survey was carried out in order to determine the extent to which grasshoppers belonging to the family Acrididae are prevalent in Hyderabad and the locations that are next to it. According to the findings, there are 32 different species of grasshoppers, which are classified into 11 different genera and five different sub-families. These sub-families are as follows: Oedipodinae, Acridinae, Hemiacridinae, Gomphocerinae, and Truxalinae. The research highlighted the fact that the Acridinae subfamily is the most prevalent, followed by the Oedipodinae and Gomphocerinae subfamilies. On the other hand, the Truxalinae and Hemiacridinae subfamilies were found to be the least prevalent in the areas that were investigated in Hyderabad and its neighbouring areas. In addition, the material that was obtained from a variety of habitats and sites was subjected to a comprehensive analysis. The material's scientific significance for future references is increased as a result of the acquisition of Acridid fauna from a variety of habitats and host plants. The development of comprehensive identifying keys included the incorporation of easily discernible physical characteristics as well as detailed depictions of anatomical aspects that are concealed. In order to provide a more comprehensive knowledge, these keys cover the many subfamilies, genera, and species that belong to the Acrididae family. Additionally, distribution maps are included.

ENT-59

DIVERSITY OF EARWIGS (DERMAPTERA) FROM SINDH PAKISTAN

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The earwigs are belong to order Dermaptera. Earwigs are of considerable economic importance due to their impact on various crops and stored product. They act as severe pest in agricultural lands, forests, grasslands and stored grains. An identification of earwig species is crucial for effective diagnosis and

management of economic issues caused by these pests. The research collected a total of 7,169 earwig specimens from different localities in Sindh, including Hyderabad, Jamshoro, Matiari, Shaheed Benazirabad, Khairpur Mirs, Dadu, Mirpurkhas, Nausharo Feroze, Sanghar, Tharparkar, and Larkana. Through comprehensive investigations conducted between 2019 and 2021, a total of 21 species were identified, with 20 species recorded for the first time and one species being completely new to science. These species belong to five families: Labiduridae (7 species), Anisolabidae (5 species), Spongiphoridae (5 species), Pygidicranidae (2 species), and Forficulidae (2 species). The identified species were *Nala lividipes* (Dufour, 1820) 7.79%, *Nala Basilis* (Benkoi, 1970) 7%, *Pseudoisolabis Burri* (Borelli, 1909) 6.02%, *Forcipula quadrispinosa* (Dohrn, 1863) 6.30%, *Allostethus indicum* (Bur Meister, 1838) 5.77%, *Labidura riparia* (Pallas, 1773) 7.01%, *Forcipula Akbari* (Wagan & Baloch, 2012) 0.37%, *Titanolab is Colossea* (Dohrn, 1864) 8.53%, *Euborella annulipes* (Lucas, 1847) 7.72%, *Euborella femoralis* (Dohrn, 1863) 8.21%, *Gonalabis electa* (Burr, 1910) 2.69%, *Anisolabis martima* (Bonelli, 1832) 5.42%, *Vostox brunneipennis* (Serville, 1838) 1.98%, *Spirolabis pilicornis* (Motschulsky, 1863) 2.66%, *Chaetospania javana* (Borelli, 1926) 1.70%, *Marva Sindhesis* n. sp. 5.03%, *Marva Arachidis* (Yersin, 1839) 5.03, *Echinosoma roseiventre* (Surivastav, 1988) 4. 10%, *Pyragrospsis buscki* (Caudell, 1907) 1.38%, *Forficula Lucasi* (Dohrn 1865) 5.20%, *Anechura Fedtschenkoi* (Borelli, 1909) 4.89%. The economic impact of earwigs is significant, with recorded instances of damage to Irish sweet potatoes during storage, as well as the roots, fruits, and vegetables such as apricots, peaches, apples, tomatoes, and onions. The population dynamics of earwigs are influenced by abiotic factors such as humidity and rainfall, particularly during the months of July to September. Temperature ranges from a minimum of 35°C to a maximum of 45°C annually. The study confirms the occurrence and expanded distribution of previously recorded species, highlighting the need for further research and management strategies specific to the Sindh region. Descriptive maps and species descriptions are provided to aid in accurate identification. It is worth noting that despite casual references, no comprehensive research has been conducted on earwigs in Sindh until this present study. Understanding the taxonomy and distribution of earwigs in Sindh is vital for implementing effective pest management practices, protecting crops, and minimizing economic losses. The findings of this study contribute to the knowledge of earwig diversity in the region and serve as a foundation for future research and conservation efforts.

ENT-60

THE HIDDEN DIVERSITY OF TETTIGONIOIDEA (ENSIFERA: ORTHOPTERA) IN PAKISTAN'S FAUNA

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Pakistan is a diverse region having different ecological zones that provide the ideal breeding places for the growth of variety of insect's population including grasshoppers. Tettigonioidea are phytophagous in nature having great economic important. These are pest of agricultural crops, fruits, orchards, grapevine, berry and many of them injurious to shrubs, grasses, forest and trees. During the present study an extensive surveys were carried out during the year 2013-2024 from different provinces of Pakistan. As a result of this survey, fairly large No. of samples were captured by tradition insect net and some by large forceps and field sites included: agriculture land, forests, orchards, grapevine & berry gardens, hilly, semi desert and desert areas, trees, shrubs, herbs and grasses. The collected material was sorted out into

Trigonocorypha unicolor, Stål, 1873, *T. angustata*, Uvarov, 1922, *Trigonocorypha nr angustata* Uvarov, 1922, *Phaneroptera spinosa*, Bei-Bienko, 1965, *P. roseata*, Walker, 1869, *P.gracilis* Bei-Bienko,1954, *Ducetia japonica*, Thunberg, 1815 of Sub-family Phaneropterinae, *Calopterusa balucha* (Uvarov, 1932), *Glyphonotus sinensis* Uvarov, 1939, *Eupholidoptera karatolosi* Mofidi & Quicke 2007 of Sub-family Tettigoniinae, *Euconocephalus incertus*, Walker 1869, *E. pallidus*, Redtenbacher, 1891, *E. mucro* de Haan, 1842 Sub-family Conocephalinae, *Hexacentrus unicolor* Serville, 1831, *H. pusillus* Redtenbacher, 1891 belong to sub-family Hexacentrinae and *Mecopda platyphoea* Walker, 1870, *Afromecopoda monroviana* (Karsch, 1886) of sub-family Mecopodinae, *Decticus verrucivorous* (Linnaeus, 1758), *D.albifrons* (Fabricius, 1775) of sub-family Decticinae were recorded. Beside this, the distribution of all previously recorded species has been greatly extended to the new localities. The identification keys for various species have also been constructed along with brief description and list of host plants was also presented. Current study supplied imperative basis and data for integrated Pest Management (IPM) of Tettigonioidea biodiversity in Pakistan.

ENT-61

INVESTIGATION THE BIODIVERSITY AND DISTRIBUTION OF GENUS *MELOLONTHA* FROM SINDH, PAKISTAN

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More than 30,000 different species of beetles from all over the world are included in the current definition of the family Scarabaeidae. These beetles are frequently referred to as scarabs or scarab beetles. Within the past several years, there has been a significant amount of change in the way that people think about how to classify this family. There is a significant amount of scarabaeid beetles that are a nuisance of both cultivated and natural vegetation. The fauna of beetles in Sindh Province was surveyed and gathered from a wider range of habitats than was previously known. A total of fifty specimens were gathered and categorised into the genus *Melolontha* Fabricius, 1775, which belongs to the subfamily Melolonthinae. Two of the species that were obtained were *Melolontha indica* Hope, 1831 and *Melolontha furcicauda* Ancey, 1881. In addition, the existence of *Melolontha furcicauda* in Sindh Province of Pakistan has been documented for the very first time, and a new regional record for *M. indica* in Pakistan has been established. In addition, digital photographs and a description of the range of the species are provided for the very first time. It is hoped that future research that is interested in this demographic will be able to benefit from the well-established foundation that the current study has supplied.

ENT-62

A COMPREHENSIVE FAUNISTIC SURVEY OF ACRIDIDAE (ORTHOPTERA) IN SINDH, PAKISTAN

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The family Acrididae is one of the largest families in the Orthoptera, and the subfamily Acridinae, which includes grasshoppers, is commonly referred to as the silent slant-faced grasshoppers. The species is similar to members of the subfamily Gomphocerinae, with whom they share a slanted face. They are also similar in appearance between the two groups. Despite the fact that they are silent, Acridinae are distinct from Gomphocerinae in that they do not have stridulatory pegs on their hind legs. This is because the common name suggests that they are silent. For the purpose of collecting specimens belonging to the family Acrididae, the field investigations were carried out between the months of March 2022 and March 2024. Approximately three thousand specimens were gathered and classified into six different taxa. i-e: *Acrida, Duroniella* , *Gelastorhinus* , *Gonista* , *Phlaeoba* , *Truxalis* and 09 species i-e: *Acrida exaltata* (Walker,1859),*Duroniella laticornis* (Krauss,1909), *Duroniella laeviceps* Uvarov,1938, *Gelastorhinus semipictus* (Walker,1870), *Gonista rotundata* Uvarov, 1933, *Phlaeoba tenebrosa* (Walker,1871), *Phlaeoba panteli* Bolívar, 1902, *Truxalis eximia eximia* Eichwald, 1830, and *Truxalis fitzgeraldi* Dirsh, 1950. Additionally, for the first time, morphological differences, geographic information system maps, and a list of host plants are presented for the species that were investigated. Without a doubt, the current investigation will be of great assistance to the coming generations of scientists who will be working with the Acrididae fauna of this region.

ENT-63

SYSTEMATIC STUDY OF WEEVILS (CURCULIONIDAE) FROM DIFFERENT ECOLOGICAL ZONES OF DISTRICT KHAIRPUR, SINDH PAKISTAN

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A large number of insects belong to the order Coleoptera, which includes beetles as one of its members. Those that belong to the family Curculionidae are known as weevils. Among the most frequent types of pests, weevils are known to feed on vegetation that is otherwise in good health. Scale insects and red palm weevils have been the most common pests of date palms in the Khairpur district since 1980. Scale insects are the most common problem. The industry of date palms in Khairpur is extremely important to the economy of the city. In addition, weevils are a frequent pest that can be found in grain storage facilities. These organisms offer a risk to grains that have been stored, such as corn, wheat, and

rice. There are still a big number of beetle species that have not been found. For the purpose of utilizing management measures to put a stop to the proliferation of these pests, it is required to use molecular differentiation and morphological identification of these pests. Weevil fauna of the Khairpur area of Sindh, Pakistan, will be identified and evaluated as part of this study. Additionally, the morphological and molecular differences between different species of weevils will be investigated. These are the two primary objectives of this research. The research was carried out at the Entomology Laboratory, which is part of the Department of Zoology at Shah Abdul Latif University (SALU), which is located in Khairpur. Ten hundred eighteen specimens belonging to the family Curculionidae were gathered by researchers from a variety of locations around the Khairpur area over the year of 2019–2022. For the purpose of determining the identities of the samples, physical and genetic characteristics were characterised. *Rhynchophorus ferrugineus, Sitophilus oryzae Sitophilus zeamais Sitophilus granarius Tanymacus khaipuresnsis* sp.nov *Pachyrhinus lethierryi Sphenophorus parvulus Phylobius pomaceus* and *Phylobius ferrugineus* were also among the species identified. Three of these species are new to science: *Pachyrhinus lethierryi Sphenophorus parvulus* and *Phylobius pomaceus*. *Tanymacus khaipuresnsis* sp. nov is the name of the species that is being submitted to the scientific community as a new species. Moreover, molecular data not only substantiates the existence of species variation but also suggests the existence of other species.

ENT-64

DIVERSITY AND DISTRIBUTION OF GRASSHOPPERS (ACRIDIDAE:ORTHOPTERA) FROM SUFI ANWER SHAH SAFARI PARKI GHOTKI SINDH PAKISTAN

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Family Acrididae consists of 28 subfamilies with 1,412 genera and 6,832 recognized species out of which 2,481 have been reported from Asia and 169 species and subspecies from Pakistan. Locusts, or grasshoppers, are the most well-known members of the Acrididae family. They are recognized by the short and thick antennae, and the tympana of the first abdominal segment are located on its side. They are considered to be major plant pests because of the considerable damage they cause to agricultural crops, forests, vegetables, orchards and wide variety of fruits. The Acrididae grasshoppers were collected from different sites of Sufi Anwer Shah Safari Park Ghotki Sindh Pakistan. An extensive field surveys were carried out in eight sites of Sufi Anwer Shah Safari Park Ghotki Sindh Pakistan to collect specimens of family Acrididae. A total of 1263 specimens were collected from January 2024 to December 2024. The specimens were sorted out into single family Acrididae with 08 subfamilies: Acridinae, Cyrtacanthacridinae, Eyprepocnemidinae, Hemiacridinae, Oxyinae, Oedipodinae, Calliptaminae and Catantopinae falling into 18 genera: *Acrida, Truxalis, Phlaeoba, Duroniella, Anacridium, Cyrtacanthacris, Patanga , Eyprepocnemis, Heteracris, Ochrilidia, Spathosternum, Hieroglyphus, Oxya, Trilophidia, Acrotylus, Acorypha, Calliptamus , Diabolocatantop* and 25 species i-e: *Acrida exaltata, Acrida gigantea, Truxalis eximia eximia,Truxalis fitzgeraldi, Phlaeoba tenebrosa, Phlaeoba infumata, Duroniella laticornis, Anacridium aegyptium, Cyrtacanthacris tatarica tatarica, Patanga japonica, Eyprepocnemis alacris alacris, Heteracris littoralis, Heteracris adspersa, Ochrilidia geniculata, Ochrilidia gracilis gracilis, Spathosternum prasiniferum prasiniferum, Hieroglyphus nigrorepletus, Oxya hyla hyla, Trilophidia annulata, Acrotylus humbertianus, Acrotylus longipes longipes , Acorypha glaucopsis, Calliptamus barbarous barbarous, Calliptamus italicus*, and *Diabolocatantops innotabilis* respectively. The highest population was observed for *Acrida exaltata* with 9.34% followed by

Trilophidia annulata with 7.02% and *Phlaeoba tenebrosa* with 6.57% while lowest population was observed for *Eyprepocnemis alacris alacris* with 1.66% followed by *Ochrilidia geniculata* with 2.13% and *Patanga japonica* with 2.13% respectively. Beside this, morphological descriptions, digital images along with distributional data is provided for the first time from this region.

ENT-65

ASSESSING THE CONSEQUENCES OF CLIMATE CHANGE ON THE BIODIVERSITY OF GROUND BEETLES (CARABIDAE) IN SINDH, PAKISTAN

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Carbides found in warm-temperate and tropical climates, particularly along hilly forest borders they are widespread insects found across the planet, excluding Antarctica; they dwell in a variety of environments ranging from shrubs to tropics and deserts. Carbides are widely distributed throughout the world and play a crucial role in the health of ecosystems. But climate change is a major threat to global biodiversity. From the tropics to the poles, all ecosystems seem to be affected. Carbides population appears to be declining globally by about 1% each year, according to a comprehensive meta-analysis published in 2020. Research on the distribution and selection of carbide beetles in various environments has proved that species may vary from place to place because of environmental and climatic change. The survey of the ecological diversity of Carbide beetles in Sindh plains were undertaken from January 2024 to December 2024. The study was carried out at twelve sampling sites, with the help of both light trap and pitfall trap regions. During study period 3970 carbide specimens belonging to 9 genera were collected. Among them 250 individuals were captured at Khairpur, 205 individuals from Sukkur, 235 from Ghotki, 210 from Shikarpur, 220 from Tando Allayar,170 from Hyderabad, 190 from Matiari, 200 from Jamshoro, 235 from Badin, 215 from Thatta, 175 from Nawabshah, 255 from Sanghar. The highest population was recorded in summer season followed by spring, whereas least abundance was observed in winter. Monthly population dynamics showed that Carbide beetles were highest in number in the months of June, July followed by August and September while least population was recorded in February followed by January and December. *Carabus lineatus* lateralis 1802, *Carabus caschmirensis* Redtenbacher, 1844, *Pheropsophus andrewesi* Jedlicka, 1964, *Pheropsophus africanus* Dejean 1825, *Chlaenius laticollis* Say, 1823, *Chlaenius quadricolar* Oliver, 1790, *Chlaenius hamifer* Chaudoir, 1856, *Harpalus suensoni* Degeer 1774, *Harpalus erythropus*, Dejaen 1829, *Calosoma sycophanta* Linnaeus, 1758, *Calosoma auropunctatum* Linnaeus, 1758, *Anthia sexuamatta* Fabricius, 1775, *Nesamblyops oreobius* Broun, 1893, *Dioryche subrecta* Macleay 1825. The present study showed notable abundance of genus *Carabus* and *Chalenius* due to presence of agricultural crops and vegetation at study sites. Secondly, they were abundant from the months of June to September as there is breeding season of carbides in spring and in June and July, they turned into adults so found abundantly. The investigations showed that *Chlaenius laticollis,* and *Carabus cashmirensis* were more abundant in studied localities they have adapted a broad range of Eco climatic conditions, so these species are stable species in an ecosystem. And it shows that highly bio diverse and stable environment will have a high D value. This also indicates that the particular environment has “good biological health”.

ENT-66

AN ANNOTATED CHECKLIST OF SPECIES OF THE GENUS *MELANOTUS* ESCHSCHOLTZ, 1829 (COLEOPTERA: ELATERIDAE: MELANOTINAE) FROM PAKISTAN WITH NEW RECORDS

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We prepared a checklist of species of the genus *Melanotus* Eschscholtz, 1829 from Pakistan. We carried out survey of members of Melanotinae with range of habitats of the country. Twenty-three species previously recorded with some of them reported with new locality. Three species first time recorded from Pakistan viz., *Melanotus auriculus* Platia & Schimmel, 2001; *M. schawalleri* Platia & Schimmel, 2001 and *M. seriatus* Platia & Schimmel, 2001. We provide a checklist of all known species, document their distribution.

ENT-67

DISTRIBUTIONAL NOTES ON SOME SPECIES OF BEETLES (INSECTA: COLEOPTERA) FROM PAKISTAN

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The study offers a wide range of beetles with different families in respect of new records and little known species from Pakistan in 2024. Eight families encompass sixteen species and six subspecies. Ten species and four subspecies first time reported from Pakistan. The families and species as new records are as; Bothrideridae (*Dastracus* cf *turcicus* Dajoz, 1973b); Buprestidae (*Lampetis (Spinthoptera*) cf *affinis* E.Saunders, 1866); Chrysomelidae (*Sphenoraria nigripennis*); Curculionidae (*Pycnodactylopsis fumosa* Fåhraeus, 1842); Histeridae (*Saprinus coerulescence coerulescence* Hoffmann, 1803); Scarabaeidae (*Phyllognathus dionysius* Fabricius, 1792); *Adoretus ladakanus nuristanicus* Balthasar, 1936; *Protaetia afghan* Petrovitz, 1955 and Tebnebrionidae (*Blaps inflexa* Zubkov, 1883; *B. felix* Waterhouse, 1889; *B. parvicollis parvicollis* Zubkov, 1829; *Cyphogenia aurita aurita* Pallas, 1781). The distribution of each species also presented.

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RESISTANCE IN RED FLOUR BEETLE AGAINST BOTANICAL PESTICIDES UNDER LABORATORY CONDITION

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The Red Flour Beetle (*Tribolium castaneum* H.) is a cosmopolitan pest of the stored grains and cereals. This pest develops rapidly under favorable conditions in storage facilities such as warehouses, mills, and flour depots, affecting the quality of flour, causing significant economic loss, and threatening food security. The purpose of this study is to assess the resistance and efficacy of the red flour beetle. The present study will play a very crucial role in the principle of integrated pest management (IPM), which enhances food security. Botanical pesticides Neem Tree (*Azadirachta indica*), AK or Milkweed (Calotropis gigantean) powder, Lemon Tree (*Citrus limetta*), and Babur/Kikar (*Acacia nilotica*) were evaluated. Neem recorded the highest mortality rate (20%), followed by (12%), lemon (11%), and the lowest Babur (9). The differences between the group means are statistically significant. P-value (0.00177) showed a low p-value (<0.05). A higher F-value suggests greater disparity between group means. F-value. Since 9.421769 > 3.490295, the differences between the groups are significant. The mortality rate is directly proportional to the increased dose. The neem appears to be the most effective, with the highest mortality rate of 20% at 20 g. Babur, on the other hand, has the lowest mortality rate, starting at just 2% at 5 g.

ENT-69

BIODIVERSITY OF SHORT HORNED GRASSHOPPERS (ACRIDIDAE: ORTHOPTERA) FROM DISTRICT SHAHEED BENAZIRABAD, SINDH PAKISTAN

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District Shaheed Benazirabad is agriculture field, richly supplied with very valuable crops of Pakistan like Wheat, Cotton, Sugar cane, Jowar, Millet, Maize, Mango Farms, Fruit Farms and Various Grasses. This District is included in the Middle Sindh. This district of Middle zone of Sindh is very important with their temperature is suitable for rapid multiplication of insects short horned grasshoppers family Acrididae and long horned grasshoppers family Tettigonidae have economic importance to consider pest of different crops in District Shaheed Benazirabad so that proper diagnosis can be made, because locust is notorious member of the above said family is a major pest of the various cash crops. During present study in year 2021- 22 we have collected 820 specimens have different species from different localities of District Shaheed Benazirabad namely village Walidad Zardari, Village Bux Ali Dahri, Village Bandhi, Village Bahaaro Khan Mari and Village Sardar Khan Rind. We have collected the following 17 species namely

Oxya hyla hyla, Serville 1831, 5.71% *Oxya fuscovittata*, Marshal 1836 6.83%, *Hieroglyphus perpolita*, Uvarov 1832 5,71%, *Aiolopus thalassinus thalassinus* Fabricius 1781 8.22%, *Aiolopus thalassinus tamulus*, Fabricius 1798 9.06%, *Acrotylus insubricus*, Scopoli 1786 7.67%, *Acrotylus fischeri*, Azam 1901 8.64%, *Locusta migratoria*, Linnaeus 1758 6.55%, *Sphingnostus savingnyi*, Saussure 1884 5.02% , *Trilophidia anulata*, Thunberg 1815 3.06%, *Ttuxalis eximia eximia* Eichwald 1830,2.78% *Acrida exaltata*, Walker 1859 6.27%, *Hilethera aeolopoides* Uvarov 1922 4.88%, *Gonista rotundata* Uvarov 1933 5.85%, *Anacridium rubrispinum* Bie Benkio 1948 4.04%,*Oxya velox*, Fabricius 1787 8.08%,*Oxya japonica*, Thunberg 1815 1.53%.

ENT-70

GRASSHOPPER DIVERSITY IN SINDH, PAKISTAN: A SURVEY OF TRIBES AND SPECIES

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Sindh, Pakistan, offers an optimal environment for diverse grasshopper populations. A comprehensive 2023 survey identified 948 specimens, including 692 instars and 256 adults, distributed across three tribes Acrotilini, Epacromini, and Locustini. *Acrotylus humbertianus* emerged as the dominant species (26.16%), followed by *Helithera aelopoidea* (21.75%) and *Aiolopus thalassinus thalassinus* (17.75%), while others, such as *A. longipes subfasciatus* and *Locusta migratoria*, showed lower prevalence. Taxonomic keys were developed to facilitate accurate classification, and biodiversity indices, including the Simpson Index, underscored species richness and ecological balance. These findings provide valuable insights into the role of grasshoppers within Sindh's agro-ecosystems and offer a foundation for further biodiversity research and conservation efforts.

ENT-71

A NEW SPECIES OF *HALIPEGUS* LOOSS, 1899 (TREMATODA: DEROGENIDAE) FROM THE INTESTINE OF DICROGLOSSID FROG IN HYDERABAD, SINDH PROVINCE, PAKISTAN

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Halipegus species are digenetic parasitic trematodes commonly found under the tongue, buccal cavity, esophagus, eustachian tubes and intestine of different species of frogs. The specimens of genus *Halipegus* Looss, 1899 were documented from the intestine of dicroglossid frog, *Euphlyctis (=Rana) cyanophlyctis* in Hyderabad, Sindh province of Pakistan. The detailed microscopic examination revealed that the present specimens of *Halipegus* differ markedly from the closely related species of this genus in body size, elongated body with neck like anterior end, acetabulum more than twice as large as oral sucker and identical number of lobes in each of the two groups of vitellaria. On the basis of the above

differentiating features, the specimens under study were found to be new to science and are described as *Halipegus alyi* n.sp.

ENT-72

TWO NEW ENTRIES OF (COLEOPTERA) FROM DISTRICT TANDO MUHAMMAD KHAN SINDH, PAKISTAN

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Current study was conducted new recorded species were reported from different localities of district Tando Muhammad khan. The collected material was sorted out into 2 species followed by *Julodis euphartica (*Laporta & Gory 1835) belonging to the family Bupersidae and *Megacephala euphratica* (Chaudoris, 1865) belonging to the family Carabidae. During the Monthly visit and collected specimens. Which constructs the new records from Sindh Province. It is a good addition to the existence of species from Sindh. Besides this, important host plants which were effective by these species were enlisted.

ENT-73

NEW REPORT OF THE FEATHER MITES (ACARI: ACARIFORMES) FROM BLACK-WING STILT *HIMANTOPUS HIMANTOPUS* (CHARADRIFORMES: RECURVIROSTRIDAE SINDH, PAKISTAN

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In Sindh, Pakistan, 50 Black-wing Stilts (Himantopus himantopus) were checked for feather mites. Three new records for Pakistan were among the seven species of feather mites (Acari: Acariformes) that were obtained and identified. Proctophylloides spp. were the most numerous feather mite species, making up 57.1% of the entire mite population. The work emphasizes the need for more research on the ecology and systematics of these mites and offers fresh insights into the diversity and distribution of feather mites on Pakistan's Black-wing stilt.

ENT-74

DIVERSITY AND EVOLUTIONARY LINKAGES OF ACRIDIDAE (CAELIFERA: ORTHOPTERA) IN UPPER SINDH

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Pakistan's agricultural sector contributes approximately 24% to the country's GDP. The majority of the population, particularly in rural areas, relies heavily on agriculture, with around 70% of villagers depending on agricultural crops. Cash crops such as sugarcane, rice, wheat, maize, and cotton are highly vulnerable to various pests, including species from the Caelifera family. To address this issue, field surveys were conducted in Sindh. A total of 1,023 specimens were collected and classified into 26 species belonging to the Acrididae family, which includes eight subfamilies: Acridinae (Macleay, 1819), Oxyinae (Brunner von Wattenwyl, 1893), Spathosterinae (Rehn, 1957), Gomphocerinae (Fieber, 1853), Eyprepocnemidinae (Brunner von Wattenwyl, 1893), Cyrtacanthacridinae (Kirby, 1902), Oedipodinae (Walker, 1871), and Hemiacridinae (Dirsh, 1956). Among these, Oedipodinae was the most dominant subfamily, with 385 specimens (37.63%), followed by Acridinae with 269 specimens (26.29%). The least common subfamily observed was Hemiacridinae, with only 23 specimens (2.24%). Notably, *Truxalis eximia* had the highest number of specimens, with 81 (7.91%), followed by Oxya hyla hyla with 76 (7.42%), whereas Heteracris adspersa was the least common species, with only one specimen (0.09%). Specimens were collected from ten different districts of Upper Sindh across various host plants. To assess species diversity, Simpson's Index of Biodiversity, species richness, and the biodiversity index were calculated. The highest diversity was recorded in grassy vegetation. Molecular analysis was also conducted on the 26 species by submitting samples to the International Barcode of Life (iBOL) at the University of Guelph, Canada. Successful DNA barcoding was achieved for only five species. The results of this study suggest a close evolutionary linkage between the subfamilies Spathosterinae and Hemiacridinae. DNA barcoding plays a crucial role in taxonomy and provides valuable insights for timely pest control measures. The findings of this study have significant implications for agricultural agencies and pest management strategies. By determining the pest status of different species, the study aids in the development of appropriate and targeted control measures to mitigate damage to major cash crops such as sugarcane, rice, wheat, maize, and cotton.

ENT-75

BIODIVERSITY OF EPHYDRIDAE (DIPTERA) IN PAKISTAN: CURRENT KNOWLEDGE AND RESEARCH GAPS

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The family Ephydridae (shore flies) comprises a diverse group of flies with ecological and economic significance, often inhabiting aquatic or semi-aquatic environments. Despite their global diversity, the knowledge of Ephydridae in Pakistan remains limited, with only 21 species documented from 9 genera. This

restricted dataset underscores the need for comprehensive studies to understand the group's biodiversity and ecological roles in the region. In this study, we review the current state of knowledge on Ephydridae in Pakistan, identifying key taxa and their known distributions. Existing records suggest that the species are adapted to a range of habitats, including saline and brackish water ecosystems, which are prominent in the country's diverse ecological zones. However, there is a substantial knowledge gap regarding their life histories, ecological interactions, and potential applications in environmental monitoring. Our analysis highlights areas with insufficient sampling and underrepresented genera, emphasizing the need for targeted field surveys and integrative taxonomic approaches combining morphological and molecular techniques. These efforts are crucial to uncovering hidden diversity and to developing a clearer understanding of the biogeographical patterns and evolutionary relationships of Ephydridae in Pakistan. This research aims to serve as a foundation for future investigations into the biodiversity and conservation of Ephydridae in the region. Bridging these gaps in knowledge is not only critical for ecological studies but also for leveraging the potential of Ephydridae in applied sciences, such as bioindicators for water quality assessment.

SECTION – I V

P A R A S I T O L O G Y

PAR-1

DIVERSITY AND CONTROL OF PLANT PARASITIC NEMATODES OF APRICOT IN DISTRICT HUNZA

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Plant parasitic nematodes that parasitize plants are common and can affect not only commercial fruits but also a variety of other crops. The purpose of the study was to determine the percentage of plant parasitic nematodes (PPN) connected to apricot trees in different areas of the Hunza district. To evaluate and determine the percentage of PPN, samples were collected from Nasir Abad, Aliabad, Karim Abad, Atta Abad, and Sost. These were then analyzed using the Baermann funnel technique. The results showed that Karim Abad had the most PPN recorded (52%) of any locality, while Sost had the lowest PPN. Recorded (24%) of all the areas. The following species, which belong to various genera, were identified in a variety of apricot orc hards: Tylenchorhynchus annulatus, Helicotylenchus psuedorabustus, Longidorus larvae, Aphele nchus avenae, and Merilinius larvae. Three organic manures were used for PPN management: pigeon manure (8 kg), chicken manure (6 kg), and cow dung (4 kg). The most commonly used organic manure among these amendments was cow dung, which demonstrated the greatest PPN population decline. In addition, pigeon manure was less common than cow and chicken manure. It was concluded that the presence of PPN in apricot trees in Hunza district causing damage to apricot trees and reduced the yield and its growth. For their management, three types of organic manure were used, but the study revealed that cow manure is the best nematicides it should be used. And it is recommended that a program be started that raises the use of organic amendments and its benifits for those farmers who unaware are and lack knowledge about nematode damage.

PAR-2

SOIL TRANSMITTED HELMINTH (STH) INFECTIONS IN DIFFERENT OCCUPATIONAL GROUPS OF DISTRICT SWAT, PAKISTAN

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We investigated the prevalence of geohelminth parasites in Farmers, education concerned and shepherd of Swat, Khyber Pakhtunkhwa, Pakistan. A total of 1041 stool samples were examined from d

January 2006 to December 2008 using direct smear (normal saline and Lugol,s iodine solution) the concentration methods and procedures. Seven hundred and sixty three (73.2%) individuals were found infected with one or more than one geohelminth parasites. Four hundred and eighteen (54.7%) were infected with single parasite and three hundred forty-five (45.3%) with multiple infections. *Ascaris lumbricoides* 460 (53.0%), *Trichuris trichura* 228 (26.2%), and hookworms 56 (6.45%) were detected. The adults were found more parasitized than children and males were more infected than females. Shepherds were found more infected than farmers and education concerned. Although Swat is an area with poor hygiene located in temperate zone near the border of Afghanistan and China. The prevalence of reported geohelminth parasites here compared with the same studies is unexpectedly high. These types of studies should continue time to time to know the hazardous of such parasitic infections for the betterment of the human population in the area.

PAR-3

EFFICACY OF ANTHELMINTIC PLANT EXTRACTS AGAINST *ASCARIDIA GALLI* IN FREE-RANGE POULTRY

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Free-range poultry production systems provide a sustainable source of high-quality protein through eggs and meat, contributing to sustainable poultry production and provide organic poultry products. In many developing countries, free-range poultry farming is a primary source of income for small-scale farmers. One of the biggest enemies in this profitable industry is the intestinal parasites and among these *Ascardia galli* is very important. The *A. galli* infection obstructs and damages the intestinal tract of chicken resulting in reduced egg production and body weight. Anthelmintic drugs are widely used to treat this infection. However, due to the development of resistance, it is necessary to develop plant-based alternative to cope with this global problem. The objective was to evaluate the anthelmintic efficacy of citrus fruits, turmeric and garlic against *A. galli*. The plants (peels of citrus fruits (lemon, musumbi, and orange), rhizomes of turmeric, cloves of garlic and their mixture) were dried, grounded into powder and was extracted using hot maceration. In vitro anthelmintic efficacy of aqueous extract was evaluated against *A. galli*. Infected intestines from poultry farms were collected for the isolation of *A. galli* worms and eggs. For Egg Development Inhibition (EDI) Test, 10% and 20% concentration of each plant extract was prepared and mixed with Phosphate Buffer Saline (PBS) in test tubes with *A. galli* eggs. In the Adult Mortality Test (AMT), 10% and 20% concentrations were used against adult *A. galli* worms and incubated for 24 hours. The results revealed that all plants showed anthelmintic activity against *A. galli*. The mixture's extract (94%) was highly effective on eggs development compared with other extracts (<90%). Similarly, mixture's extract also showed 100% adult mortality after 15 hours compared with other extracts with mortality reaching after 20 hours. This shows that plant mixture's extract was highly effective compared with other plant extracts. These plants could be used as feed additives to reduce the *A. galli* infection in poultry.

PAR-4

NEW RECORD OF *APATEMON GRACILIS* RUDOLPHI, 1819 (TREMATODA: STRIGEIDAE) IN *MICROCARBO NIGER* AND *PHALACORCORAX CARBO* OF HAMAL LAKE SINDH, PAKISTAN

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Helminthological studies on the Cormorants of freshwater habitats of the Sindh province was conducted. During the examination of gut contents and visceral organs of Microcarbo niger and *Phalacorcorax carbo*, a total of 421 specimens belonging to genus *Apatemon* Szidat, 1928 were collected and processed according the standard helminthological methods. These specimens were identified as *Apatemon gracilis* Rudolphi, 1819 on the basis of morphological features. It is first time recorded of *Apatemon gracilis* Rudolphi, 1819 from *Microcarob niger* and *Phalacrocorax carbo* of Sindh.

PAR-5

CENTRORHYNCHUS SALUNI N.SP. (ACANTHOCEPHALA: CENTRORHYNCHIDAE) FROM THE GREATER COUCAL *CENTROPUSSINENSIS* (CUCULIFORMES: CUCULIDAE) IN SALEH PAT, SUKKUR, SINDH.

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During current studies on the helminth parasites of Greater Coucal *Centropussinensis*, a total of 03 hosts were collected from Saleh Pat, Sukkur, Sindh, Pakistan. During examination of gut contents and visceral organs, a total of seven Acanthocephala belonging to genus *Centrorhynchus*Lühe, 1911 were collected from intestine of single host. These specimens were processed through standardized methods given by Garcia and Ash (1979) and Schmidt (1988). Present species differs from its congeners in having fusiform and aspinose body, number of longitudinal rows of hooks (30-34), number of hooks in each row (12-13), size of hooks, claviform proboscis receptacle inserted inside proboscis upto middle of it, short neck, cylindrical lemnisci which is longer than proboscis receptacle, slightly oblique and tandem testes which are situated in anterior half of body and six cement glands. On the basis of these differentiating diagnostic characteristics between present species and its close allies, a new species *saluni* is proposed. The name of new species refers to the Shah Abdul Latif University Khairpur.

PAR-6

DESCRIPTION OF A NEW SPECIES OF *SERRASENTIS* (ACANTHOCEPHALA: RHADINORHYNCHIDAE) FROM A MARINE FISH *CORYPHAENA HIPPURUS* IN GWADAR COAST, BALOCHISTAN, PAKISTAN

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The helminthological studies on the dolphinfish *Coryphaena hippurus* (Linnaeus, 1758) (Perciformes: Coryphaenidae) revealed a new species of the acanthocephalan belonging to the genus *Serrasentis* VanCleave, 1923. Only single male specimen was recovered from the liver of the host fish. The present specimen differs from its congeners on the basis of body size and shape, body armed with 17 lateral transverse cuticular combs; number of longitudinal rows of hooks (25) with 13 hooks in each row; position of testes and other characteristics. On the basis of these differentiating characteristics, a new species *Serrasentis batheli* n.sp. is proposed. The name of new species refers to the name of famous hill-top "Bathel" in Gwadar, Balochistan, Pakistan.

PAR-7

PREVALENCE OF LEISHMANIASIS IN DISTRICT DADU, SINDH, PAKISTAN

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Present study was conducted to report the prevalence of Leishmaniasis in district Dadu, Sindh, Pakistan. During present study, the Leishmaniasis cases were collected from different collection centers of the district Dadu, including Civil Hospital Dadu, Taluka Hospital Johi, Taluka Hospital K.N. Shah and Taluka Hospital Mehar. A total of (2,118) cases of Leishmaniasis were recorded. Out of these 1,148 cases of Leishmaniasis were recorded for females thus making maximum prevalence of 54.20%, whereas, 970 cases of Leishmaniasis were recorded for males making the prevalence of 45.80%. In females, maximum cases were recorded in the age-group 0-9 years in which 430 cases were reported, thus making maximum prevalence of 37.45%, whereas, in males, maximum cases were recorded in age-group 0-9 years in which 416 cases were reported, thus making maximum prevalence of 42.88%.

PAR-8

FIRST RECORD OF *SYNHIMANTUS (DISPHARYNX) NASUTA* (NEMATODA: ACUARIOIDEA: ACUARIIDAE) IN PAKISTAN WITH NEW AVIAN HOST OF FAMILY RALLIDAE

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Only a small percentage of migrating birds have been shown to be infected with helminth parasites from Pakistan. In accordance with that, the current study aims to provide information on helminth parasites from the under lining of the gizzard of Eurasian coot *Fulica atra* in Pakistan. A total two nematodes (one ♂ & one ♀) were collected from the single host (*Fulica atra*). Present specimens are recognized as *Synhimantus (Dispharynx) nasuta* (Rudolphi, 1819) Chabaud, 1975 based on diagnostic traits such as body form, pharynx length, shape and length of spicules, and numbers of papillae. This is first record of *S. (D.) nasuta* from the avian host of family Rallidae, thus making it new host record from the Eurasian coot *Fulica atra* in Pakistan.

PAR-9

RAW VEGETABLES CONTAMINATED BY PARASITES IN DIFFERENT TOWNS OF KARACHI

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This study investigates the parasitic contamination of vegetables commonly consumed in Karachi. Vegetables, essential for human nutrition, can also pose health risks as they may harbor parasites that cause infections. Samples of thirteen vegetables were collected from local vendors across six towns in Karachi: Jamshed Town, Korangi Town, Liaquatabad Town, North Nazimabad Town, Orangi Town, and Saddar Town. The vegetables sampled included Tomato (*Solanum lycopersicum*), Lettuce (*Lactuca sativa*), Carrot (*Daucus carota*), Spinach (*Spinacia oleracea*), Radish (*Raphanus sativus*), Cucumber (*Cucumis sativus*), Potatoes (*Solanum tuberosum*), Coriander (*Coriandrum sativum*), Mint (*Mentha*), Green Onion (*Allium fistulosum*), Green Chillies (*Capsicum frutescens*), Bell Pepper (*Capsicum annuum*), and Beet Root (*Beta vulgaris*). A total of 400 samples were examined in the lab of Jinnah University for Women, with findings revealing that nearly all the vegetables were contaminated, resulting in an overall prevalence rate of 98%. Mint was found to be the most contaminated, while Beet Root had the least contamination. The most common parasites detected were *Hymenolepis nana* and *Ascaris lumbricoides*. These results highlight the role of contaminated vegetables as vectors for parasitic infections, emphasizing the need for improved food safety measures.

PAR-10

PREVALENCE OF HELMINTH PARASITIES OF DOMESTIC PIGEONS *COLUMBA LIVIA DOMESTICA* (COLUMBIFORMES: COLUMBIDAE) FROM KASHMORE SINDH, PAKISTAN

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Domestic pigeons *Columba livia domestica* are kept by humans all around the globe which are not only reared as pets but also used for food and ornamental purposes. Pigeons cohabit with many avian and animal species and humans**.** They can be infected with various pathogens and act as a reservoir for many parasitic infections. Their droppings pollute the surrounding environment, enhancing the danger of parasitic infestation spread between different animal and avian species. The research work was carried out during September 2023 to August 2024. Four localities of Kashmore, Sindh, Pakistan were selected for the collection of the helminth parasites. Every month pigeons were captured from natural environment and dissected in advanced parasitological laboratory of department of Zoology, University of Sindh, Jamshoro. Intestine was opened and kept in saline water. Population density of cestode and nematode parasites were collected. Parasites were fixed in 70% ethanol. Infected parts of the intestines were preserved in 10% Formalin. Total 16 pigeons were dissected and 12 intestines were found infected with parasites. Currently 53 helminth parasites were collected which are sorted into one genus and one species of cestode and nematode parasite *Raillietina tetragona* and *Ascaridia columbae*. 45 cetodes and 08 nematodes were collected during research study. The prevalence of helminth parasited was found 75%. The species presently were reported as new host and new locality record from the study area. Gross pathology of intestine was also observed as smelling watery intestinal content, granuloma formation or tubercles, inflammation, Pale sunken mucous membrane, dilation of mucosal wall with small holes. The present study was designated for identification of incidence and morphology of economically important helminth parasites *Raillietina tetragona* and *Ascaridia columbae*. from domesticated pigeons *Columba livia domestica*.

PAR-11

OCCURRENCE OF *PARAMPHISTOMUM CERVI* IN RUMINANT (COW AND BAFFALO) FROM HYDERABAD, SINDH, PAKISTAN

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Amphistomes are Platyhelminth (flatworm) parasites (Platyhelminthes: Trematoda: Digenea) responsible for Paramphistomosis in domesticated animals, which causes heavy economic losses to the livestock industry annually. Distribution of amphistomosis is worldwide, but the highest prevalence has been accounted in tropical and subtropical regions, particularly in Africa, Asia, Australia, and Eastern Europe. Presently two ruminent animals (Cow and Baffalo) were selected for the collection of Amphistomes. The research work was carried out during September 2023 to August 2024. Four localities

of Hyderabad, Sindh, Pakistan were selected for the collection of the amphistome parasites. Infected Intestine of ruminants was collected from slaughter houses and flukes were randomly picked and were washed in tap water. After washing flukes were flattened between two glass slides for 48hours and fixed 70% ethanol. Infected parts of the intestines of ruminats were preserved in 10% Farmalin. Presently out of 10 intestines of ruminant mammals (Cow and Baffalo) four intestines found infected with amphistome parasites. Collected specimens of Amphistomes were preserved in 70% ethanol. Currently 1949 amphistome parasites were collected which are sorted into one species of trematode parasite *Paramphistomum cervi*. The prevalence of amphistome parasites was 40%. The species presently was reported as new host and new locality record from the study area. Gross pathology of intestine was also observed as smelling watery intestinal content, granuloma formation, inflammation, Pale sunken mucous membrane, dilation of mucosal wall with small holes and congestion hemorrhage. The present study was designnated for identification of incidence and morphology of economically important helminth parasite *Paramphistomum cervi* from domesticated ruminant animals (Cow and Baffalo).

PAR-12

INCIDENCE OF AMPHISTOME PARASITES IN THE INTESTINE OF RUMINANT (COW AND BAFFALO) FROM HYDERABAD, SINDH, PAKISTAN

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Amphistomes are Platyhelminth (flatworm) parasites (Platyhelminthes: Trematoda: Digenea) responsible for Paramphistomosis in domesticated animals, which causes heavy economic losses to the livestock industry annually. Distribution of amphistomosis is worldwide, but the highest prevalence has been accounted in tropical and subtropical regions, particularly in Africa, Asia, Australia, and Eastern Europe. Presently two ruminent animals (Cow and Baffalo) were selected for the collection of Amphistomes. The research work was carried out during September 2023 to August 2024. Four localities of Hyderabad, Sindh, Pakistan were selected for the collection of the amphistome parasites. Infected Intestine of ruminants was collected from slaughter houses and flukes were randomly picked and were washed in tap water. After washing flukes were flattened between two glass slides for 48hours and fixed 70% ethanol. Infected parts of the intestines of ruminats were preserved in 10% Farmalin. Presently out of 10 intestines of ruminant mammals (Cow and Baffalo) four intestines found infected with amphistome parasites. Collected specimens of Amphistomes were preserved in 70% ethanol. Currently 1949 amphistome parasites were collected which are sorted into one species of trematode parasite *Paramphistomum cervi*. The prevalence of amphistome parasites was 40%. The species presently was reported as new host and new locality record from the study area. Gross pathology of intestine was also observed as smelling watery intestinal content, granuloma formation, inflammation, Pale sunken mucous membrane, dilation of mucosal wall with small holes and congestion hemorrhage. The present study was designnated for identification of incidence and morphology of economically important helminth parasite *Paramphistomum cervi* from domesticated ruminant animals (Cow and Baffalo).

PAR-13

SEROPREVALENCE AND ASSOCIATED RISK FACTORS OF BRUCELLOSIS AMONG DOMESTIC RUMINANTS IN AZAD JAMMU AND KASHMIR

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Brucellosis is a common zoonotic illness resulting from various species of *Brucella*. It mainly affects cattle and wildlife, posing a major public health concern, especially in locations where sanitation, food safety, and veterinary care standards are poor. This investigation focuses on the seroprevalence of brucellosis conducted in two districts, Muzaffarabad and Poonch of Azad Jammu and Kashmir (AJK), with a total of 584 samples collected across various species, including cows, buffaloes, sheep, and goats. Data was collected through structured in-person interviews with livestock owners, and the serum samples from animals were tested using the Rose Bengal Plate Test (RBT). Significantly higher seroprevalence of brucellosis was observed in Muzaffarabad ($p<0.05$; 2.66%) compared to Poonch (0%), with urban areas (7.57%) exhibiting a higher prevalence than rural areas 1.73%; ($p=0.006$). Cows had the highest seroprevalence (7.75%; $p<0.001$), particularly females (8.21%), reflecting the reproductive nature of the disease, while no cases were detected in male cattle, buffaloes, sheep, or goats. Factors including age, body condition, mastitis, milk reduction, and herd size were identified as significant determinants of infection. Mature cows (>7 years; $p=0.0008$) had the highest seroprevalence, and cattle with a history of mastitis (28.57%; $p=0.002$) and milk reduction (28.57%; $p<0.0001$) showed significantly higher infection rates. Herd size was also a key factor, with larger herds exhibiting a higher prevalence ($p=0.016$). In contrast, no significant ($p>0.05$) associations were found with other factors, including abortion history, body condition, and reproductive health indicators. Additionally, brucellosis was most common in crossbred cattle, although breed differences were not statistically significant. Furthermore, the study found that knowledge and awareness of brucellosis among ruminant owners were alarmingly low, with only 9% of owners aware of the disease. The study highlights the importance of environmental, demographic, and management factors in brucellosis transmission and underscores the need for targeted control measures, particularly in urban and densely populated rural areas. Continued research is essential to expand our understanding of brucellosis in the region and its broader implications for public and animal health.

PAR-14

TRENDS OF ENDO-PARASITES IN DEER FAMILY IN ZOOLOGICAL GARDENS, PUNJAB, PAKISTAN

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Wild life is an important component of ecosystem as they add to the diversity. Deer are vital diversity unit which enhance aesthetics of environment and also have importance in biology as an important part of

ecosystem. Present study was designed to examined the prevalence and species of gastrointestinal parasites in three different species of deer, namely the Hog Deer (*Axis porcinus*), Fallow Deer (*Dama dama*), and Blackbuck (*Antilope cervicapra*) in the selected reserves in Punjab, Pakistan. Fecal samples were analyzed for potential parasitic infestation. Out of the three species, examination of the fecal samples for parasite eggs and cysts showed a high parasite load of several species of gastrointestinal parasites. The results indicated that levels of these parasites' loads were noted to be dependent on age, gender and the seasons. In this study, a total of 65.8% of the samples had parasite prevalence, according to microscopic analysis. The majority of deer were afflicted with either protozans or helminth parasites, or both. Parasitic infections prevalence in Hog Deer was highest (50%) followed by Fallow Deer (26.6%) and (23.3%) Blackbuck. Analyses were performed according to age and season which showed lower aged deer were most susceptible to infections. Seasonal effects showed increased parasite loads during certain time of the year because of environmental conditions favoring growth and multiplications of parasites. Age differences were also noted; the male deer were slightly found to be more infected than their female counterpart. Thus, this study highlighted the urgent necessity to develop specific approaches to control and prevent parasitic diseases in deer.

SECTION - V

FISHERIES, ECOLOGY, WILDLIFE, FRESHWATER BIOLOGY, MARINE BIOLOGY

1. FRESHWATER BIOLOGY AND FISHERIES

2. MARINE BIOLOGY

3. PALEONTOLOGY

4. WILDLIFE, DIVERSITY AND CONSERVATION

5. ECOLOGY

1. FRESHWATER BIOLOGY AND FISHERIES

FEWFM-1
Fisheries

ANALYSIS OF MICROBIAL QUALITY OF *HYPOPHTHALMICHTHYS MOLITRIX* FROM SOUTHERN PUNJAB, PAKISTAN

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The present study evaluates the microbial quality of *Hypophthalmichthys molitrix* (silver carp) from Southern Punjab, Pakistan, to assess its safety for human consumption and identify potential health risks. Fish samples were collected from aquaculture farms, local markets, and wild habitats in the region and analyzed for microbial contamination. Total viable counts (TVC) and the presence of pathogenic bacteria, including *Escherichia coli*, *Salmonella spp.*, and *Listeria monocytogenes*, were determined using standard microbiological techniques. Spoilage-associated microorganisms such as *Pseudomonas spp.* and hydrogen sulfide-producing bacteria were also identified to assess freshness and handling practices. Results revealed variable microbial loads, with samples (n = 100) exceeding acceptable limits established by international food safety standards, indicating poor hygiene during handling and storage. Fecal contamination was evident in several samples, highlighting water quality issues and inadequate post-harvest practices. Seasonal variations in microbial load were observed, with higher counts recorded during warmer months. Antibiotic resistance testing revealed significant resistance patterns in certain bacterial isolates, raising concerns about antibiotic misuse in aquaculture practices. This study underscores the need for improved aquaculture management, strict enforcement of hygiene standards, and consumer awareness to ensure the safety and quality of silver carp. The findings provide valuable insights for policymakers, stakeholders, and researchers aiming to enhance fish quality and mitigate public health risks in Pakistan.

FEWFM-2
Fisheries

A COMPARATIVE STUDY ON THE CHEMICAL AND PHYSICAL ATTRIBUTES OF GIFT TILAPIA IN AQUARIUM AND CAGE CULTURE

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The current study was design to investigate the impact of various environmental conditions on fish growth by analyzing water quality factors like pH, temperature, dissolved oxygen, and total dissolved

solids across a control group, two aquarium setups (A1 and A2), and a cage environment. Data were collected every four weeks. The findings indicate that water quality was significantly better in the control and aquarium groups than in the cage group. Growth measurements, including height and total weight, were taken at the start and end of the study, revealing that fish in the aquarium environment grew more effectively than those in cages. Statistical analysis revealed a notable average difference of 17 units between the control and cage groups, suggesting that controlled environments are more conducive to fish growth. The study underscores the importance of stable and optimal environmental conditions for enhancing fish health and growth, showing that improved water quality and environmental complexity lead to better developmental outcomes. Additionally, the study highlights that aquariums with carefully managed conditions foster greater growth compared to cages, which often present challenges like limited space and higher stress. These findings provide valuable insights for optimizing aquaculture practices to enhance fish production and welfare.

FEWFM-3
Fisheries

EFFECT OF PARTIALLY SUBSTITUTED SOYBEAN MEAL WITH SILKWORM PUPAE ON GROWTH PERFORMANCE AND PHYSIOLOGICAL RESPONSES OF *PANGASIUS PANGASIUS*

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The rising cost of fish and soybean meals for aquafeeds has encouraged researchers to look for alternative protein sources. To find an alternative this study was designed to replace soybean meal with silkworm pupae meal. A 75-day feeding trial was conducted on pangasius fingerlings to assess the effects of partially substituted soybean meal with silkworm pupae meal (SWPM) on growth performance, antioxidant activity, and digestive enzymes. Four isonitrogenous diets were made with 0% SWPM as control and 25%, 50%, and 75% SWPM as experimental diets. The fingerlings were given control and experimental diets at 3% of their body weight. The study found that the groups given SWPM at 25% and 50% concentration had the best growth performance, feed efficiency (up to 0.80 ± 0.00%), and feed conversion ratio (up to 1.24 ± 0.00%). Both groups showed increased highest final weight (up to 22.25 ± 0.76g), weight gain % (up to 95.03 ± 0.35), and improved survival growth rates (100%) as compared to control. Significant differences ($p \leq 0.05$) were observed between the control and treated groups (25% and 50%) in terms of antioxidant activity and digestive enzymes. The histomorphometry examination revealed no damage in hepatic tissues, intestinal villi, and podocytes as a result of the inclusion of SWPM. The data suggest that silkworm pupae meal may serve as an adequate replacement for soybean meal, up to 50%, without negatively impacting the growth performance, antioxidant, and digestive enzyme activities of Pangasius.

FEWFM-4
Fisheries

FISH CULTURE WITH AQUAPONICS SYSTEM FOR OPTIMUM GROWTH AND MAXIMUM SURVIVAL

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Aquaponics is a technique that involves the aquaculture (fish farming) and hydroponics (plant farming) at the same time. This technique is considered as the best technique for environment as it is related to water sustainability. The two types of farming work in such a way that a symbiotic association is developed in which the waste produced by fish is utilized by the plants by the converting the waste (ammonia) intro the nitrates that used by plants as a food. The water quality parameters are essential to monitor as they are directly related to the health and survival of fish. To monitor and control these parameters, sensors were developed and applied. The study was carried out at the Fisheries and Aquaculture lab at Jinnah University for Women in two treatments of Aquaponics (Smart Aquaponics system; installed with sensors and Control Aquaponics system; was being monitored by Water testing kits and meters) and 20 fingerlings of Nile tilapia, *Oreochromis niloticus* were placed in each treatment. 4 plastic glasses were placed in each aquarium having mint *(Mentha spicata)* that was grown over there. Water quality parameters and length-weight of fishes were monitored after the interval of 7 days. The growth of fish was observed very efficient. Mint was best grown in this system as it is crucial for the good water quality conditions. The survival rate in Smart Aquaponics system was 100% whereas in Control Aquaponics system the survival rate was 95%. Aquaponics is considered to be beneficial for socioeconomic purpose and is more water sustainable as compared to the traditional methods of farming. Organic food is produced with zero waste production. Smart Aquaponics system is proved to be an efficient and environment friendly system by high production and maximum survival.

FEWFM-5
Fisheries

STUDIES ON THE ANNUALLY TWICE INDUCED SPAWNING OF INDIAN MAJOR CARP (*Labeo rohita*) AND ITS BENEFITS

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The study was conducted at the Department of Fisheries and Aquaculture, UVAS Lahore, Ravi Campus, to evaluate the effects of biannual induced spawning on the reproductive performance of Labeo rohita. Two mature inbred couples were selected, with males weighing 4.4 ± 0.4 kg and females weighing 5.5 ± 0.7 kg. Spawning was induced twice, during June–July and August–September, using Ovaprim as a hormonal inducer (0.6 ml/kg for females and 0.3 ml/kg for males). Fertilized eggs were incubated at 28–

30°C, achieving hatching within 34–40 hours. Fry were transported in ventilated plastic bags, and survival rates, growth, and deformities were assessed. Water quality parameters were monitored daily, and fry were fed to satiation twice a day. Results showed significant improvements in reproductive performance during the August–September season, with a 91% hatching rate, 16% increase in offspring weight, and an average total length of 5.4 mm. Offspring survival and growth rates were positively correlated with male body weight and milt quality. Females from the second spawning season exhibited higher fertilization and fecundity rates. Statistical analysis confirmed significant differences between batches, with the second breeding season yielding superior results. These findings suggest that biannual spawning enhances reproductive output and offspring quality, with the latter season being optimal. This approach offers a promising strategy to improve aquaculture practices, ensuring food security and fostering economic development in aquaculture-dependent regions.

FEWFM-6
Fisheries

FORMULATION OF IMMERSION VACCINE FOR INDIAN MAJOR CARPS AGAINST *AEROMONAS VERONII*

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This research assesses the efficacy of an immersion vaccine against *Aeromonas veronii* bacteria in Indian major carps within the aquaculture context. During the three-month trial, pre-challenge, challenge, and post-challenge tests were administered to Indian major carps to evaluate their responses and adaptations under specific conditions. The results indicates that the control groups exhibited an average mortality rate of 80-90%, emphasizing the severity of the bacterial challenge. However, following the administration of the vaccine, a substantial reduction in mortality rates to 20-30% was observed. These results provide compelling evidence for the high effectiveness of the vaccine in mitigating the impact of *A. veronii* bacteria on fish health, highlighting its potential as a valuable tool in aquaculture disease management. This study centers on advancing fish health management within the aquaculture industry by developing an immersion vaccine specifically targeting *A. veronii* for three prominent species: *Labeo rohita*, *Cirrhinus mrigala*, and *Catla catla*. The formulation of this vaccine is expected to contribute significantly to disease prevention and overall health enhancement in these aquaculture species. Oil adjuvants, specifically evaluated for their efficacy in vaccine formulations, demonstrated superior benefits compared to other oils. These adjuvants proved to be cost-effective and efficient in the aquaculture vaccination sector. Furthermore, the study suggests that oil adjuvants have the potential to enhance vaccine performance by specifically targeting antigens, thereby significantly boosting fish immunity. This study explores the effectiveness of a bivalent inactivated vaccine against *A. veronii* infection in Indian major carps, comparing the administration methods of immersion and injection. The findings indicate that the vaccine administered via immersion exhibits greater suitability for the prevention of *A. veronii* infection compared to injection. These results provide valuable insights for optimizing vaccination strategies in aquaculture, enhancing the overall health and disease resistance of Indian major carps.

FEWFM-7
Fisheries

EVALUATING THE GROWTH PERFORMANCE OF INDIAN MAJOR CARPS USING ANIMAL GUT PROBIOTICS: CURRENT TRENDS AND FUTURE PROSPECTS

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The present study provides insight into an experiment carried out on Indian Major Carps (IMCs) with the replacement of fishmeal with different animal intestines as a source of protein and probiotics: Fish intestine (T1), Chicken intestine (T2), Beef intestine (T3), and control group with commercial fish feed. To calculate the growth rate and adjust the daily food throughout the experiment, the total weight and length of each fish were measured every 15 days. Survival rate, specific growth rate, feed conversion ratio (FCR), hematological, serum biochemical and immunological parameters were also measured to check the effect of different treatments. The experiment's findings revealed highly significant differences in fish growth between the treatment groups ($p<0.05$). T1 and T3 treatments significantly increased weight gain, and specific growth rate ($P < 0.05$). Similarly, the minimum value of FCR was obtained in T3 indicating its high efficiency, than the other test diets. The overall survival rate varied from 57-75% and the highest survival rate was observed in T2 (64%) and T3 (75%) treatment. These results also revealed that the level of blood Urea, Aspartate Aminotransferase, Cholesterol, Glucose, Hemoglobin, Triglycerides, and Lymphocytes was highest in T1 treatment ($p<0.05$), while Immunoglobulin G concentration was highest in T2. Similarly, highest concentration of Leukocytes and High-Density Lipoprotein was observed in T3 ($p<0.05$). The results of this study showed conclusively that T1 and T3 could be utilized as traditional sources of protein and energy in commercially prepared feed to improve the growth of IMCs fingerlings.

FEWFM-8
Fisheries

EFFECTS OF *HERMATIA ILLUCENSE* LARVAE MEAL ON GROWTH AND HEMATOLOGY OF *LABEO ROHITA*

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Fish is the best source of protein with low fat contents and fast digestibility. Due to its nutritional value, the consumption of fish is steadily on the rise with each passing day. The global demand for fish will reach 25 million tones to and approximately 180 million tones, by 2029. In aquaculture, fish meal (FM) is the chief component that enhances both the growth and the efficiency of feed utilization in fish. It contains up to 20 % to 30 % protein. But it costs too much, and it's difficult for fish farmers to provide quality meals. Insect meals (IM) are gaining attention these days. Out of IM, Black Soldier Fly larvae Meal (BSFLM) is a novel FM replacement. The current research focuses on substituting

FM with an alternative ingredient, *Hermatia illucens* (*HI*) larvae meal and its effect on *Labeo rohita's* growth and hematology. For this purpose, a 28-days feeding trial was conducted. Twenty-four *Labeo rohita* fingerlings up to 18.42 ± 0.5 g were used and divided into four glass tanks, by placing six fingerlings in each tank. A group was used as a control group while groups T1, T2, and T3 fed with 25%, 50%, and 75% BSFLM, respectively. While the control group has been given 100% FM. The findings show that there is a significant increase in growth observed in the T1 and T2 groups fed with the replacement of 25% and 50% BSFLM, respectively, when compared to the control group. The hematological analysis shows that there is no negative effect of blood counts hemoglobin (Hb), red blood cells (RBCs), white blood cells (WBCs), mean corpuscular volume, mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin, hematocrit, mean platelet volume, platelet distribution width, red blood cells distribution width, lymphocytes, granulocytes, monocytes, and platelets observed. The study shows that the addition level of BSFLM at a ratio of 50% is useful and increases the development and weight of *Labeo rohita*. This also can decrease the cost of feeding by up to 20% on commercial level.

FEWFM-9
Fisheries

DIVERSITY OF FRESHWATER MICRO-PLANKTON COMMUNITY IN DISTRICT HASILPUR AND PAKPATTAN, PAKISTAN.

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Micro planktons are mainly unicellular organisms; the zooplanktons are basically heterotrophs while phytoplankton are autotrophs. They help in indicating climate change and also the main component of maintaining the food chain. Changes in water temperature, light, chemical composition (pH, oxygen, salinity, and hazardous contaminants), the availability of food (bacteria and algae), and fish and invertebrate predation are only a few of the environmental elements that affect zooplankton. Pond water samples were collected in triplicate from three different transects of Hasilpur and Pakpattan districts in pre-monsoon, monsoon and post monsoon in 2024 and preserved in 4% formalin solution. From Hasilpur, a total of 14 phytoplankton species belong to the classes Chlorophyceae, Bacillariophyceae and Cladophoraceae were found from a thick algal layer on water surface in which *Rhizoclonium*, *Oscillitoria*, and *Spirogyra* was dominant. From Pakpattan, total 11 species of plankton were reported in which dominant phytoplankton species were *Pediastrum* sp. and *Eudorina elegans* while major zooplankton groups were identified from annelida, copepoda and and cypris larva. This study revealed the seasonal fluctuations of phytoplankton and zooplankton distribution in freshwater.

FEWFM-10
Fisheries

FOOD AND FEEDING BEHAVIOR OF CATFISH (WALLAGO ATTU) FROM INDUS RIVER NEAR JAMSHORO, SINDH, PAKISTAN

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The study of feeding habitat of *Wallago attu* performed to collect the data from Indus River adjacent to Jamshoro, Sindh, Pakistan. 110 fish have been retrieved of diverse sizes from November 2021 to May 2022. Size of experimental sample varied from 25.0 to 65.0cm in length while in weight from 254-980 g accordingly. The out- come of the investigation suggested that food habitat of *Wallago attu* noted as carnivores higher feeding preferences. The result of food feeding of *Wallago attu* was revealed that the fish likes smaller fishes (40%) as most preferred food following by insects (30%) worms was (10.%) as worms third choice in small and medium length groups, while large group showed second preference was worms (32%). The other food item like plant matter found (10%) and miscellaneous/ unidentified was found to (10.0%). Result of length weight aspect showed that the fish showing satisfactory growth (b=2.72) close to ideal. Value of conditions (Kn) values was noticed ranged between (1.01-1). Finally, it was concluded that *Wallago attu* in the present study showed better growth as showed formula be low. log w = -3.20 + 3.10 (male) log w = -3.26 + 3.21 (female) log w = -3.0 + 3.15 (both).

FEWFM-11
Fisheries

COMPARISON OF HEMATOLOGICAL INDICES, MEAT QUALITY TRAITS, AND PROXIMATE ANALYSIS OF BIOFLOC AND FARM-RAISED TILAPIA (*OREOCHROMIS NILOTICUS*)

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This study aimed to compare the hematological indices, meat quality traits, and proximate composition of Nile Tilapia (*Oreochromis niloticus*) raised in biofloc and conventional farming systems. A total of 24 Tilapia samples were collected from both systems, with 12 from biofloc tanks and 12 from traditional farm ponds. Hematological parameters, including red blood cell count (RBC), white blood cell count (WBC), hemoglobin (Hb), and platelet count (PLT), were analyzed using standard procedures. Proximate analysis was conducted to determine moisture, protein, fat, and ash content, while meat quality traits such as color (lightness, redness, and yellowness), water-holding capacity (WHC), pH, lipid oxidation, and drip loss were evaluated. The results revealed significant

differences ($p<0.0001$) in hematological indices between the two systems. Farmed Tilapia exhibited higher RBC counts (1.86a / 1.15b), hemoglobin levels (4.50a / 3.68b), and mean corpuscular volume (MCV) (125.60a / 115.67b), while biofloc Tilapia showed higher mean corpuscular hemoglobin (MCH) (28.64a / 27.25b) and WBC counts (42.70a / 41.13b). Proximate analysis indicated that biofloc Tilapia had higher ash (16.33a% / 15.03b%) and protein content (71.94a% / 71.06b%), whereas farmed Tilapia had higher moisture content (6.02a% / 5.87b%). Fat content did not differ significantly between the systems. In terms of meat quality, biofloc Tilapia exhibited higher lightness (47.87a / 44.24b), WHC (31.34a% / 25.34b %), and lower lipid oxidation (0.08b / 0.14a), while farmed Tilapia showed higher redness (6.77a / 5.30b). No significant differences were observed in yellowness or pH between the systems. The findings suggest that biofloc systems enhance certain meat quality traits, such as water-holding capacity and lipid stability, while traditional farming systems may favor specific hematological parameters. These results provide valuable insights for optimizing Tilapia aquaculture practices, emphasizing the potential benefits of biofloc technology in improving nutritional and meat quality attributes

FEWFM-12
Fisheries

EFFECT OF THREONINE ON THE GROWTH OF TILAPIA (*Oreochromis niloticus*)

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Sixty days study was conducted in glass aquaria to explore the effects of threonine on the growth performance of Tilapia. Tilapia is an omnivore freshwater fish species cultured in aquaculture systems. Proper nutrition plays a vital role in exploiting growth and overall performance. Threonine is an essential amino acid as well as third limiting amino acid in fish diet. It is important for protein synthesis and proper growth in fish. Fish fry of an average initial weight 0.41g were equally placed in four groups. 30%CP was maintained throughout the experimental trial other than supplementation. Controlled treatment T0 was without any supplementation and other experimental diets labeled as Treatment 1 having 25% CP with NRC recommended doses of threonine 1.5% supplementation, Treatment 2; threonine 2.0% supplementation, Treatment 3; threonine 2.5% supplementation were prepared. Fish were fed with @2% of their body weight twice a day at 9.00am and 16:00pm. Survival rate was hundred percent thorough out the trial. Significantly higher ($p < 0.05$) weight gain (1.23 ± 0.02), specific growth rate (14.61 ± 0.03) along with improved feed conversion ratio (1.31 ± 0.01) was observed in T4. Therefore, threonine can be used safely in Tilapia fry diet.

FEWFM-13
Fisheries

EFFECTS OF DIFFERENT TRADITIONAL AND COMMERCIAL AQUAFEED ON GROWTH PERFORMANCE, SURVIVAL AND PROXIMATE COMPOSITION OF *LABEO ROHITA* REARED IN THE SEMI-INTENSIVE COMPOSITE CULTURE SYSTEM

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This study was investigated to assess the effects of different traditional and commercial aqua feed on proximate composition, growth performance and survival rate of *Labeo rohita* reared in the composite semi-intensive culture system. The aqua feeds of various companies (AMG, Supreme, Aqua, Star Floating, Hi-Pro and Punjab feed) are used as commercial feed. Farm-made feeds were maize gluten and rice polish. For confidentiality, these feeds were randomly given code labels T1, T2, T3, T4, T5, T6, T7 and T8 which were only known to investigating staff. There were two replicates for each treatment. In this experiment, a higher growth rate was observed in T3 as compared to other treatments. Lesser weight gain was observed in the T1 (270.30 ± 0.5). The maximum body length (19.25 ± 2.19) was found in T3. Similarly, the minimum body length (5.97 ± 2.94) was seen in T2. FCR ratio (2.36 ± 0.01) was recorded in T3. Simultaneously, FCR (1.86 ± 0.002) was also recorded in T4 which is the perfect ratio for farmers. Higher SGR was noted in T3 (1.62 ± 0.05). Overall, T4 showed lesser SGR (1.05 ± 0.001). T4 showed the higher crude protein (28.66 ± 0.24%). In the body composition, higher fat content was recorded in T3 (5.46 ± 0.33%). These outcomes also proved that the rise in the dietary protein level and lipid content can improve the fish body crude fats and protein level. Thus, based on growth performance, survival and proximate composition. It is concluded that T3 and T4 may be recommended for commercial culture of *L. rohita*.

FEWFM-14
Fisheries

MORPHOMETRIC ANALYSIS OF FARM AND WILD CIRRHINUS MRIGALA IN SOUTHERN PUNJAB, PAKISTAN

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The morphometric features of *Cirrhinus mrigala* were studied from ten different sites including both natural water bodies and commercial farms from South Punjab, Pakistan. This study was aimed to determine the morphometric characteristics, weight-length relationship and condition factor. A total of 120

samples of fish (farm=60, wild=60) were collected from October 2022 to January 2023. The study was ethically approved from the Research Ethics Committee of The Women University Multan and it was ensured that no fish was harmed during sampling procedure. Morphometric measurements were taken with the measuring tool specially designed for the fish measurement and weight was taken with weighing scale. After, dissection internal organs were separated, and the weights of the liver, kidney, digestive system, gills, and heart were recorded. A significant negative allometric growth pattern was observed in length-weight relationship representing the decrease in weight as the fish get increase in length. In farmed fish, fish width, eye ball length, pectoral fin length, and pelvic fin length were significantly higher while digestive system weight and liver weight were significantly higher in river fish, other parameters fish weight, fish length, fork length, length from snout to operculum, caudal fin length, caudal fin weight, dorsal fin length, dorsal fin base weight, pectoral fin weight, pelvic fin weight, head length, kidney weight, gills weight and heart weight remained non-significant. In conclusion, this analysis provides valuable insights into the morphometric characteristics, weight-length relationships, and condition factor of *Cirrhinus mrigala* offering understanding of the species growth patterns and overall health.

FEWFM-15a
Fisheries

PREVALENCE OF MICROPLASTICS IN SURFACE WATER AND FISHES OF URBAN WATERWAYS IN SIALKOT

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Plastic's economic significance stems from low cost and durability, but microplastics pose severe environmental risks, affecting terrestrial and aquatic ecosystems. This study focused on assessing the presence and distribution of MPs in surface water, sediments, and fishes in urban streams: Nullah Aik and Nullah Palkhu, during the pre-monsoon and post-monsoon seasons. The microplastics (MPs) concentrations were notably higher in both tributaries during the post-monsoon season (Nullah Aik 1137.2 MPs/m^3, Nullah Palkhu 2132.8 MPs/m^3) in the surface water samples as compared to the pre-monsoon season (Nullah Aik 877.84 MPs/m^3 and Nullah Palkhu 1227 MPs/m^3). Similarly, a higher concentration of MPs was observed in the sediment samples of Nullah Aik (2030 MPs/kg) and Nullah Palkhu (2415 MPs/kg) in the post-monsoon season than in the pre-monsoon season of Nullah Aik (1470 MPs/kg) and Nullah Palkhu (1925 MPs/kg). Among fish species, the omnivorous Gara gotyla showed the highest MPs concentration at 29.33 MPs per fish, whereas, Colisa fasciata showed the lowest concentration at 5.67 MPs per fish. with demersal-dwelling fish generally having higher concentrations than carnivorous and herbivorous counterparts. The study revealed a consistent pattern of MPs types, with fibers, films/sheets, and fragments being the most prevalent, and the dominant polymer type identified as polyethylene terephthalate (PET). The contamination sources were attributed to municipal waste, plastic waste, open dumping of solid waste, and industrial effluents in the tributaries. This study highlights the importance of sustainable waste management practices and continuous monitoring to address this plastic pollution challenges.

FEWFM-15
Fisheries

STARVATION-INDUCED CHANGES IN IMMUNOLOGICAL AND HAEMATOLOGICAL INDICES OF *LABEO ROHITA* (ROHU)

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In aquaculture, fish food and fish health is much important. Improper management of aquaculture leads to disturbed fish health and fasting stress. Food shortage is experienced by all aquatic animals including fish and this food shortage completely changes the immune system of fish. The present research work was aimed to study the immunological parameters of rohu under fasting condition. Duration of experimental trial was 60 days. For this purpose, the fish were divided into two groups. The 1st group called a control group and was fed with diet twice a day. 2nd group called a starved group and in this group fish were kept in starved conditions for 10 days, 20 days and 30 days. The physico-chemical parameters such as water temperature, dissolved oxygen, pH, total hardness, electrical conductivity, calcium and magnesium were also determined during this experiment. After experimental trial the blood sample from the fish caudal vein was collected to examine hematological and immunological parameters such as hemoglobin, red blood cells, hematocrit, white blood cells, MCV, MCH, MCHC, monocytes, lymphocytes, eosinophils neutrophils and granulocytes. The data obtained from blood samples and physicochemical parameters were statistically analyzed by analysis of variance and correlation. The correlation analysis was executed to determine relationship between different physico-chemical parameters.

2. MARINE BIOLOGY

FEWFM-16
Marine Biology

STUDY OF FACTORS CAUSING CHANGE IN MANGROVES AND ITS IMPACT ON BIRDS DIVERSITY USING GEOSPATIAL TECHNIQUES AT MIANI HOR, LAGOON, RAMSAR SITE, BALOCHISTAN

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Miani Hor, a crucial coastal wetland alone in the Arabian Sea, is a Ramsar site. Three different kinds of mangroves only naturally grow in this part of Pakistan's coast. The present study observed 140 birds belong to 19 orders 49 family alone the coastline in their selected habitat. This research reported, Heuglin's gull (1729), Little Tern (606), Dalmatian Pelican (780), Great Cormorant (2021), Sooty gull (655), Caspian gull (573), Linder billed gull (1181), Caspian tern (980), great flamingo (288), the house sparrow (432), the laughing dove (456), and the Kentish plover (446) were most abdunt species in the study area. Out of which 181 seasonal birds were found 36 were resident, 42 were winter visitor, 3 species were passage migrant, 84 migratory, 8 summer visitor, 4 summer breeding visitor and 4 species were vagrant. Hunting and other anthropogenic activity, habitat deterioration, and habitat loss from land reclamation are the main challenges to coastal birds. In recent years, the following species have been declining from the coast: Calidris albus, Curlew, Oyster Catcher, Haemotopus ostralegus, sandpipers, Calidris testaceus, Calidris falcinellus, Great Knot, Calidris tenuirostris, Marbled Teal, Sanderling Marmaronetta angustirostris, Golden Plover, Pluvialis apricaria, Grey Plover, and Pluvialis squatarola. This study employs remote sensing techniques to investigate the factors driving the transition of mangrove cove vegetation from its peak to minimal cover. Utilizing satellite imagery and spatial analysis, we aim to identify and quantify key environmental variables contributing to these changes. The research further explores the consequential impacts on avian diversity, encompassing both migratory and resident bird species within the mangrove ecosystem. Through a multidisciplinary approach, integrating remote sensing technology with ecological assessments, this study seeks to provide a nuanced understanding of the intricate relationships between vegetation dynamics and bird populations in mangrove habitats. The findings hold significance for ecological conservation and management strategies, offering valuable insights into the interconnected ecological processes shaping these vital coastal ecosystems.

FEWFM-17
Marine Biology

BIOREMEDIATION OF PESTICIDES USING MARINE CYANOBACTERIA

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Cyanobacteria, commonly known as blue-green algae, represent a wide array of photosynthetic prokaryotes that perform oxygenic photosynthesis. These organisms are vital to numerous ecosystems, playing a significant role in the global cycles of carbon and nitrogen. This research aims to explore the capability of cyanobacteria to mitigate the effects of pesticides, focusing specifically on cyanobacterial consortia from Sandspit, Karachi. The study's primary objectives are to perform biochemical analyses, assess the impact of pesticides, and identify different strains of cyanobacteria. Techniques for mass culturing in the laboratory were implemented using ASN III media. Two distinct consortia were then subjected to various pesticides commonly used in agricultural, industrial, and household environments, with observations made on the growth rates of the cyanobacteria over time. Biochemical assays were conducted to measure the concentrations of carbohydrates, proteins, and lipids under both pesticide-exposed and non-exposed conditions. Additionally, the diversity of strains within the consortia was determined through microscopic examination. The results showed varied reactions to pesticide exposure among the consortia, indicating their potential utility in bioremediation efforts. Specifically, the consortia subjected to pesticides showed a reduction in proteins, lipids, and carbohydrates when compared to controls. This highlights the detrimental effects of pesticides on the biochemical composition of cyanobacteria. The study suggests that cyanobacteria may play a role in reducing pesticide toxicity, although further investigation is needed to fully understand the mechanisms at play.

FEWFM-18
Marine Biology

EXPLORING RED SEAWEEDS OF KARACHI COAST FOR ITS COSMECEUTICAL PROPERTIES

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The study explored the cosmeceutical potential of red seaweeds (*Rhodophyta*) found along the Karachi Coast (Northern Arabian Sea). These marine macroalgae are known for their bioactive compounds that exhibit antioxidant, antimicrobial, anti-inflammatory, and anti-aging properties. Sampling was

conducted at Buleji and Haji Ali Muhammad Goth. Four species, used in study, finalized after identification, were *Laurenciaobtusa*, *Solieriarobusta*, *Asparagopsistaxiformis*, and *Janiarubens*. Physiochemical analyses revealed variations in protein, carbohydrate, lipid, and mineral content. For cosmeceutical activity, extracts were obtained using the hot percolation method with ethanol-water solvents. Biological assays, including antioxidant assay, anti-aging assay, antimicrobial activity, dermal toxicity, and anti-inflammatory tests are in process of performance, which will be interpreted to demonstrate significant efficacy in reducing hyperpigmentation, maintaining skin elasticity, and combating pathogens. Cytotoxicity test was assessed using the Brine Shrimp Lethality Assay (BSLA), which revealed moderate activity, indicating the potential for further exploration in cosmeceutical applications. The findings have highlighted that red seaweeds are valuable resources for sustainable cosmeceutical products.

FEWFM-19
Marine Biology

THREATS OF GLOBAL CLIMATE CHANGES TO MANGROVES STANDS SCATTERED ALONG NORTHERN ARABIAN SEA COASTLINE

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The current study encompassed assessment of pollution in the seawater and adjoining sediments caused by ten heavy metal (aluminium, arsenic, cadmium, chromium, copper, iron, mercury, lead, selenium, and zinc) at three mangroves stands (Indus delta, Sandspit, and Miani Hor) located sequentially along the Northern Arabian Sea coastline at a difference of almost 300 km from one another, in three seasons i.e., monsoon (Jun to Sep 2017), post-monsoon (Oct to Nov 2017) and pre-monsoon (Mar to May 2018). Mangrove forests at Indus Delta are on the eastern coast of Sindh, Sandspit stands are located in Karachi at the mouth of Lyari River, while Miani Hor, a tidal creek system is situated in the south western cost of Baluchistan. These mangroves stands provide habitat for various species of waterfowl and migratory birds and are vital for maintaining marine and coastal biodiversity. It serves as a breeding ground for fish and shrimps and a nesting site for sea turtles, critical for ecological balance. Thus seasonal and regional variations on contamination of these metals were evaluated and their interactions with seawater and sediments were established, using the two-way ANOVA and PCA. The marine ecosystem of mangrove stands at Sandspit was heavily polluted due to influx of industrial and domestic effluents from the megacity. The pollution index was highest (HPI 138,738) during monsoon, exhibiting following order of metals in water Hg> Cr> Al> Pb> As> Cd> Fe> Cu> Zn> Se and sediments Hg> Cd> As> Se> Cr> Pb> Zn> Fe> Cu> Al. The Indus Delta mangrove stand receives contamination from undesirable agricultural run-off through the Indus River and its tributaries. The Miani Hor mangrove stand faces lesser pollution. The contamination levels in water compared to sediments during monsoon season was possibly due to strong

tides and wave actions, excessive agricultural and industrial discharge, and monsoon rain run-off containing alluvial heavy metals. In contrast, sediments exhibited higher contamination levels during pre-monsoon season due to low tides, weak currents, and lesser run-off.

FEWFM-20
Marine Biology

ANTIMICROBIAL ACTIVITY OF FAMILY PORTUNIDAE (*PORTUNUS PELAGICUS* AND *PORTUNUS SANGUINOLENTUS*) WITH RESPECT TO COUGH

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Crabs are invertebrates which belong to phylum arthropods and sub phylum crustacean. Their meat is consumed worldwide as delicacy; therefore, the study of crabs related to their antimicrobial potential is essential for discovery of new pharmaceutical. Object of this study was to evaluate the body composition and biological activities of aqueous extracts of family *Portunidae*. The body of crab comprised of three parts meat, shell and residue. Shell accounts most of percentage, the highest percentage was observed in *P. sanguinolentus* 46.48 ± 0.27. Meat yield from both species was similar. The meat was subjected to aqueous extraction and aqueous extract and residual meat were also analysed for toxicity and microbiological activity. Brine shrimp lethality assay showed**:** Effect of crab extracts and residue on mortality (Mean ± SE) *Artemia salina* after 24 h of incubation, at various concentration µg/10mL 25, 50, 75, 100, 500 and 1000. *A. salina* mortality was directly proportional to the concentration, as the highest mortality was seen in the highest concentration. PS extract showed least mortality among all samples. Antimicrobial activity was performed by disc placed method, captivating amikacin and vancomycin in two different species of *Staphylococcus* and *Pseudomonas*. By comparing both PS2 extracts show adequate zone of inhibition against *staphylococcus* 17.1 mm and 15 mm in *pseudomonas*.

FEWFM-21
Marine Biology

THE STUDY OF BACILLARIOPHYTA FAMILIES DIVERSITY IN THE COASTAL WATERS OF LASBELA, BALOCHISTAN

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Various phytoplankton species belonging to different families were investigated in the coastal waters of Lasbela, Baluchistan. During the months of September 2019 through August 2020, seasonal sampling

was done from the adjacent open sea and the inshore Miani Hor Lagoon. A total of 119 species from two groups of phytoplankton were identified during the post-monsoon, pre-monsoon, and monsoon seasons. During the seasonal study Bacillariophyta and Dinophyta are the two groups of phytoplankton that were observed. A total of 64 Bacillariophyta species have been identified throughout the year. Within the Bacillariophyta group, there are and 19 families 31 genera of phytoplankton were recognized. Within the Post-monsoon Season, 12 families of Bacillariophyta were found in both offshore and inshore waters. During the post-monsoon season, the Rhizosoleniaceae family dominated inshore waters, while the Coscinodiscaceae family dominated offshore waters. In both inshore and offshore waters, 17 families of Bacillariophyta were found during the pre-monsoon season. During the monsoon season, 15 groups of Bacillariophyta were found in both inshore and offshore waters.

FEWFM-22
Marine Biology

PREVALENCE OF MICROPLASTIC IN ASIAN GREEN MUSCLE (*PERNA VIRIDIS*) AND ITS HABITAT COLLECTED FROM ROCKY SHORE OF KARACHI COAST

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Microplastics (MPs) are one of the major pollutants in many habitats. Owing to increasing threats of MPs in marine ecosystem the present study was design to investigate the presence of MPs in visceral mass of Asian green muscles (*Perna viridis*), and its habitat. The animals (*Perna viridis*) of various sized, sediment and water samples were collected from intertidal region (rocky ledge of Manora along Karachi coast, bought to the laboratory and were preserved for further analysis. Animals were sorted and categorized in to three size classes (3-5 cm, 6-8cm and 9-12 cm) length, weight and weight of visral mass were noted. *Perna viridis* showing a clear increase in the length and weight of shells, as well as the weight of soft tissue with size. The length of shell varies and showing average values of 3.2 ±0.2, 6.30±0.2 and 8.7±0.5, respectively. ANOVA values indicated that shell length increases with the increase of shell size significantly ($P<0.05$). A significant positive linear regression ($R^2 = 0.9845$) was observed between length and weight of shell, weight of visceral mass also showed strong correlation ($R^2 = 0.9247$) with length of shell. Whole visral mass, sediment (100gm) and water (1liter) were digested separately for the examination of various types and texture of MPs. Weight of visceral mass and total count of MPs was relatively positive relationship ($R^2 = 0.8968$) of *Perna viridis* with respect to their sizes. In case of percent composition of various types of MPs, film constitutes highest in small and medium size of animal while in large size of *Perna viridis* fiber was abundant. Highest pollution of microplastic was observed in sediment as compare to water and animal. A total of 386 microplastics (MPs) particles were isolated from visceral mass, out of which 176 were found to be fibers followed by 175 (films) and 35 (fragments), respectively. From sediment total 9601/kg of microplastic particles was observed which consist of fiber (6364), 2068 (fragments) and 1169 (film), respectively. However, in the water sample total 1222/l microplastics were recorded. Findings of the present study will provide in depth knowledge on occurrence of MPs in commercially important green mussels and their habitat. Further studies are required to explore the source of these MPs to conserve the environment.

FEWFM-23
Marine Biology

PRELIMINARY ASSESSMENT OF MARINE LITTER AND MICROPLASTICS IN THE EXPORT QUALITY SEAFOOD FROM PAKISTAN (ARABIAN SEA)

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The study to monitor marine litter and microplastics is designed to address the UNO Sustainable Developmental Goals (SDGs) i.e., Life below water (SDG 14) and Zero Hunger (SDG 2). Karachi is a metropolitan city with global ranking in Population, imposing the pollution related issues. The study has been conducted on three beaches along the Karachi Coast namely Sunehri, Buleji, and Sandspit Beach. The preliminary results showed Sandspit as highly polluted site with 319 litter items/km transect, Buleji 207/km transect, and Sonehri 149 items/km transect. The plastic litter was found maximum at Buleji composing 91% w/w of total litter while Sandspit and Sonehri had ~87% plastic. These results are average from initial three visits, the collection and observation will continue periodically. Microplastics are emerging major threat for the oceans and marine life. It also has long-term implications on the seafoods and human health. The assessment of microplastics contamination in the export quality sea foods was performed in invertebrates from Karachi Coast (Arabian Sea). The samples of *Babylonia spirata* (Mollusc, sea snail), *Portunus pelagicus* (Crustaceans, crab), *Portunus sanguinolentus* (Crustaceans, crab), and *Penaeus spp.* (Crustaceans, prawn) were purchased from a local sea food Export Company. The preliminary results revealed abundance of microplastics in specimens as mentioned in parentheses as follows: *Portunis plagicus* (41 items in 4 individuals), *Portunis Sanguinolentus* (33 items in 4 individuals), *Penaeus spp.* (26 items in 30 individuals) and *Babylonia spirata* (10 items in 30 individuals). The preliminary data shows that Crustaceans had more abundance of microplastics in their body parts as compared to Mollusc species.

FEWFM-24
Marine Biology

COMPARATIVE ANALYSIS OF ZOOPLANKTON POPULATION DYNAMICS IN POLLUTED AND NON-POLLUTED COASTAL ZONES OF THE NORTHERN ARABIAN SEA

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Zooplankton are minute aquatic animals with limited swimming capabilities drift within the water columns of ocean, seas or freshwater bodies to move great distance. Their remarkable tolerance to environmental stress designates them as an indicator species for assessing physical, chemical and

biological processes in marine environments. In this study, monthly changes in zooplankton population were compared between two distinct sites: Gadani ship breaking yard on the Balochistan coast (a polluted site) and the Sandspit on the Sind coast (a non-polluted site) within the Northern Arabian Sea, Pakistan over a one-year period. Standard methods to record the abundance and diversity of zooplankton were employed revealing their variations across seasons and between sampling stations. In Gadani, Copepods dominated the zooplankton community, representing 41.6% compared to 19.8% in Sandspit. Notably, Sandspit exhibited the highest abundance of Bristle worm compared to Foraminifera, with Calanoid Copepod ranking third. However, Gadani displayed the highest percentage of Calanoid Copepod followed by Cyclopoid and Herpecticoid. In Sandspit diversity and abundance of zooplankton was greater as compare to Gadani Ship breaking area. This variation may be due to pollution that reduces species diversity and promote population of tolerant species. Furthermore, the study identified the influence of four seasons on the physiological and chemical parameters of marine waters that shaped species composition and distribution of zooplankton.

FEWFM-25
Marine Biology

DNA BARCODING OF HERMIT CRAB SPECIES *(DECAPODA; ANOMURA)* FOUND ALONG THE COAST OF PAKISTAN

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Hermit crabs are common marine creatures that are members of the infraorder "Anomura" and the class Malacostraca order Decapoda. Phylogenetic analyses of 12 species of hermit crab belongs to four genera (*Calcinus, Clibanarius, Pagurus* and *Diogenes*) have been carried out using sequences from a single molecular locus (cytochrome oxidase c subunit 1 (COX)) The gene for cytochrome c oxidase subunit I (cox1) is essential for DNA barcoding and phylogenetic analysis. Because of its species-specific variety, it has emerged as a crucial tool for population genetics, phylogeography, speciation, and systematics. The cox1 gene in metazoan invertebrates is amplified using "Folmer primers," for barcode and phylogenetic analysis. Using the DNeasy Blood and Tissue Kit (Qiagen), genomic DNA was isolated from each crab's muscle tissue (chela and pereiopods) in accordance with the manufacturer's instructions. Polymerase Chain Reaction (PCR) was used to amplify the extracted DNA samples according to particular genetic markers.. Using the 2% and 1% agarose gel method, all PCR results were first examined visually. The NCBI online site (www.ncbi.nlm.nih.gov) BLAST (Basic Local Alignment Search Tool), which is based on BLASTn, was used to search and compare DNA sequences for sequence similarity. The NCBI nucleotide-sequence databases now contain the updated COI gene nucleotide sequences as submitted after confirmation. In this study, the barcoding of 12 species of Hermit crabs were done by utilizing DNA barcoding to resolve taxonomic problems brought on by phenotypic variations in order to identify hermit crab species along Pakistan's coast. This study also revealed that the folmer primer partial sequence of the mitochondrial cytochrome c oxidase subunit I (COI) gene is a useful genetic tool for barcoding and species identification of hermit crabs.

FEWFM-26
Marine Biology

UNRAVELING GENETIC DIVERSITY: A PRELIMINARY ANALYSIS OF *Charybdis feriata* IN THE INDO-PACIFIC REGION FOR COASTAL CONSERVATION

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Swimming crabs are the representative group members of the family Portunidae, are resident crustaceans that are commonly found in estuaries, intertidal and subtidal environments, and pelagic environments. They are often distributed throughout the Indo-West Pacific region. *Charybdis feriata* is one of the most species in the genus *Charybdis* of the subfamily Thalamitinae. *C. feriata* can be easily identified by its cross-shaped patches and orange-brown bands on the carapace's stomach region, as well as its gray-brown back pattern. The 16S rRNA gene from mitochondrial DNA was used in the current investigation to evaluate the genetic diversity of *C. feriata*. Specimens of *C. feriata* purchased from the Karachi fish Harbor Pakistan and stored at-20°C for the molecular analyses. Chela muscles used for the extraction of the genomic DNA; the process done by the blood and tissue kit Qiagen's DNeasy catalogue No. 69504. A 523-base pair (bp) of the target DNA segments amplified by the PCR (Polymerase chain reaction), by using universal primers of the 16S rRNA gene in the mtDNA genome. The gene sequences from Taiwan, China, Vietnam, and India that were acquired from Genbank were examined with the sequences procured from Pakistan. This initial investigation provides useful information for the appropriate conservation and management of this highly commercial species in Pakistan's coastal waters, as well as an unpretentious contribution to our understanding of the genetic variety of *C. feriata* within the Indo-Pacific area.

FEWFM-27
Marine Biology

GENETIC VARIATIONS IN COMMERCIALLY IMPORTANT PENAEID (Decapoda: PENAEOIDEA: PENAEDIE) SHRIMP BY USING SOLUBLE PROTEIN PAGE AS BIOMARKER TOOL

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Throughout the world, penaeid shrimps are found in tropical and subtropical waters, where they represent a valuable resource in estuaries and coastal habitats. It is consumed worldwide and has major financial and commercial significance on a global scale. Due of the high demand from exporters, the exporting companies' packaging specifications include peeling, deheading, or deveining them. Because of this particular packaging approach, it is challenging for the customer to identify the muscles of the

requisite species. They also mislabeled species that are morphologically comparable or in the juvenile phases. SDS PAGE (Soluble protein) and Native PAGE can be used as a biochemical marker method for commercially significant shrimps for their confirmation of correct species samples so that they can be readily recognized. Fourteen species were evaluated electrophoretically in this class Penaeidae research. Typically, soluble protein (SDS), native amylase, and native Commasie brilliant blue stain are used for Penaeid species. In comparison to *Penaeus* > *Metapenaeus* > *Metapenaeopsis* > *Parapenaeus* > *Marsupenaeus* > *Parapeneopsis* > *Solenocera*, the genus *Fenneropenaeus* displayed the most genetic diversity. When shrimp species lack distinct morphological characteristics, such as carapace and body color after peeling, biochemical marker recognition can be used to identify them commercially, choose the appropriate species for breeding in aquaculture operations, and protect the species in the wild.

FEWFM-28
Marine Biology

COMPARATIVE EVALUATION OF FISHERY WASTE THROUGH BIOCHEMICAL CHARACTERIZATION AND THE PRESERVATIVE POTENTIAL

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Growing interest in sustainable practices and the utilization of waste materials has spurred research on the biochemical properties of marine by-products, particularly fish scales and crab and shrimp shells. Research on the biochemical characteristics of marine by-products, especially fish scales and crab and shrimp shells, has increased due to growing interest in sustainable practices and the use of waste materials. Rich in minerals, proteins, and chitin, these materials which are usually discarded in the seafood industry support their structural integrity and may have a variety of industrial and environmental applications. This study focuses on the possible uses and advantages that this waste can offer while determining the comparative biochemical composition, protein concentration, and extraction techniques for the bio waste of crab and shrimp species. Fish scale and crustacean waste samples were randomly selected from the Karachi Fish Harbor in Karachi, Sindh, Pakistan, and used for their biochemical analysis as well as the extraction of chitin and chitosan. There were significant differences in the biochemical components (protein, carbohydrates, lipids, and moisture contents) across the three categories of biowaste (shrimp shells, crab shells, and fish scales). Significant differences were observed in the scale and shell samples' total chitin concentrations (DF=4; F-Value=9.76; P-Value=0.002). These materials, which are frequently thrown away in the seafood business, are abundant in minerals, proteins, and chitin, which support their structural integrity and may have a number of industrial and environmental uses. A biopolymer called chitosan, which is produced from chitin, which is contained in fish scales and crab exoskeletons, offers a sustainable substitute with a wide range of possible uses.

FEWFM-29
Marine Biology

BIOCHEMICAL VARIATIONS IN COMMERCIALLY IMPORTANT MANTIS SHRIMP (CRUSTACEA: STOMATOPODA) SPECIES FOUND IN COASTAL WATERS OF PAKISTAN

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Throughout the world, an important part of the seafood industry is shellfish including Stomatopod shrimps (Order Stomatopoda Latreille, 1817), are found in tropical and subtropical waters and represent a valuable resource. Mantis shrimps, also known as other predatory marine Crustacea, are members of the Order Stomatopoda. Both their financial value and the amount of high-quality proteins they provide for human consumption are substantial. Mantis shrimp, also known as stomatopods 486 species are found worldwide. The study took place between October 2021 and September 2024. Individuals were gathered from Fish Harbors, and the available identifying keys were used to identify them. In the collection, seven species of the genera *Oratosquillina interrupta, Erugosquilla (E. hesperia* and *E. woodmasoni), Miyakea nepa, Harpiosquilla (H. annandalei* and *H. raphidea),* and *Cloridopsis scorpio* were found. In order to ascertain the relative biochemical contents; protein, carbohydrate and lipid concentration were examined for the selected mantis, this study focuses on the potential nutritional benefits that these species may provide. The biochemical components (protein, carbohydrates, lipids, and moisture contents) varied significantly among the species. In addition, SDS PAGE (Soluble protein) used as a biochemical marker for these shrimps for their confirmation of correct species samples so that they can be readily recognized.

FEWFM-30
Marine Biology

COMPARATIVE MORPHOLOGY AND MORPHOMETRIC RELATIONSHIP AMONG THREE SPECIES OF GENUS LUNELLA (TROCHIDEA: TURBINIDAE) FOUND ALONG THE COAST OF PAKISTAN

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Pakistan's rocky coastlines are home to enormous colonies of gastropods and other benthic species. Dispersed along the coastlines on different tidal zones, gastropods are highly noticeable and well-known intertidal invertebrates that gather for a variety of uses. Due to its higher species richness, the phylum Mollusca is the most diverse and has caused a significant taxonomic issue. Furthermore, due to their high phenotypic variability, morphologically cryptic taxa, and life stage differences, marine mollusks pose a serious challenge to morphological techniques to specimen identification. Members of the family Turbinidae are noticeable gastropod species found on Pakistan's rocky shores. The samples of *Lunella* for this study were collected during

the 2022 to 2024 from the coastal sites of Sandspit, Buleji, Manora and Mubarak village. However, similar to other gastropods found along Pakistan's coastline, this genus has only undergone taxonomic investigation based on physical characteristics. Morphological data based on shell colour, pattern, coiling and shape of shell opening were collected for each specimen for confirmation of species. The four species of genus *Lunella* were identified from the collection and three confirmed species data are presented in this study. *Lunella coronata* was the most abundant species along the coast. Statistical analyses of morphometric data for correlation was performed based on individual metrics of the body weight, shell weight and shell dimensions. The positive correlation was observed for the length and the weight of the gastropod shell and as well as the weight of animal and gastropod shell.

FEWFM-31
Marine Biology

QUANTITATIVE AND QUALITATIVE CHARACTERIZATION OF PROTEIN IN TWO COMMERCIAL SPECIES OF FAMILY SCIAENIDAE

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The marine teleost fishes in the genus Otolithes, which belong to the family Sciaenidae, are also referred to as "drum fish" or "croaker fish" due to the two noticeable canines on each jaw. Because of their similar morphologies, certain species in the Sciaenidae family are hard to distinguish at the species level. The genus *Otolithes* is where the name "tiger tooth croaker" originates. The purpose of this study was to examine the proximate composition (protein, carbohydrate and lipids) with special emphasis on quantitative and qualitative protein estimation. The SDS PAGE electrophoresis was used for the protein assessment according to biomass for two commercial species of Sciaenidae (*Otolithes cuvieri* and *Otolithes ruber*). The significant variations were observed in the protein percentage in biomass occurrence. For dietary advice and food planning, this data offers important insights into the nutritional value of these two fish species. It also influences food preservation techniques to extend the shelf life and quality of food and has consequences for fisheries management, aiding in the sustainable exploitation of this resource. These results emphasize how important it is to take into consideration the biochemical makeup in order to support sustainable fisheries and maximize their use in a variety of dietary and nutritional applications.

FEWFM-32
Marine Biology

PROTEIN VARIATIONS IN THE TWO SPECIES OF GENUS *ASTROPECTEN* THROUGH SDS PAGE ELECTROPHORESIS FOUND IN COASTAL WATER OF PAKISTAN

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The pentaradial body form of *Astropecten*, one of the most prevalent starfish genera, makes these species robust and flattened. They typically have five or more broad and short arms. With deeper patterns

on the arms, the color typically falls between green, yellow, and orange, though it can vary widely. The modest size and off-center location of the madreporite on the central disc is a common feature of this species. The SDS PAGE was employed as an identification tool for taxonomical variations, such as morphology and morphometry, in order to better comprehend the species within the genus *Astropecten*, which is a genus of sea stars or starfish. In the intertidal zone at low tides in 2023–2024, specimens of *Astropecten* were gathered from two sites (Sea View, and Clifton) Pakistani coastal waters from, Samples of Asteroidea will be manually selected from the selected sampling locations. Following collection, the samples will be sent to a lab for further examination and kept in an ice box. Using established taxonomic keys, specimens were recognized morphologically. The significant variations were found in the fresh specimen colour, marginal spines, madreporite structure and Banding pattern of the three species (*Astropecten indicus, Astropecten polycanthus* and *Astropecten sp.*). The species, *Astropecten polycanthus* and *Astropecten indicus* have already been documented in Pakistan and this study report one new species existence along the Pakistan coast.

FEWFM-33
Marine Biology

ESTIMATION OF GROWTH CONDITIONS OF *MACTRA AEQUISULCATA* (BIVALVE: MACTROIDEA; MACTRIDAE) ALONG PAKISTAN COAST

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Bivalvia is one of the most significant members of the freshwater and marine ecosystems and the second most diverse class of Mollusca in terms of species diversity. Their two lateral halves, which are calcareous shells that are hinged dorsally and articulated with one another by an elastic or chitinous, internal or exterior ligament, make bivalves easy to identify. The species *Mactra aequisulcata* in the class Bivalvia, which is frequently referred to as surf clams, belong to the family Mactridae representing nearly 180 species under 35 genera worldwide. The present study aims at describing the growth patterns and environmental conditions through length weight relationship and relative condition factor of the bivalve which belongs to Mactridae family of Class Bivalvia within Phylum Mollusa, along Pakistan Coast. A total of 120 specimens were collected randomly during 2023, having length range between 4.7 cm and 7.6 cm with mean length as 6.13 cm and weight ranges in between 14.6g and 61.6g with mean weight as 35.152g. The length weight relationship has been estimated using $W=aL^b$(Le Cren 1951). The result showed negative allometric growth. The degree of correlation (R^2) was calculated to be 87% (0.8701). Relative condition factor (Kn) was estimated which resulted as 1.00, which indicates good growth conditions for the animal.

3. PALEONTOLOGY

FEWFM-34
Paleontology

FIRST RECORD OF *SIAMOTRAGULUS* (TRAGULIDAE, ARTIODACTYLA, MAMMALIA) DENTITION FROM THE SIWALIK GROUP OF INDIAN SUBCONTINENT

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The present study deals with the description of a mandibular fragment having p2-m3 of *Siamotragulus*. This specimen was recovered from the Chinji Formation outcrops (Middle Miocene) of Dhok Bun Ameer Khatoon, district Chakwal, Punjab, Pakistan. The dentition is characterized by selenodonty, premolars with very sharp, molar preproto- and premetacristids are longer than the postproto- and postmetacristids, labial cusps are flat without any prominent bend or rib and lack *Dorcatherium* platform. These characters differentiate it from the genus *Dorcatherium* and help to associate the mandibular fragment with the genus *Siamotragulus*. Based on the small size, it is referred to as *Sianotrigulus minus* comb. nov. Previously, this genus was known by postcranials from the Siwalik Group, hence it represents the first ever description of the dentition from the Siwalik Group of Pakistan.

FEWFM-35
Paleontology

PROPOTAMOCHOERUS FROM THE DHOK PATHAN FORMATION, SIWALIKS, PAKISTAN

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The new material of *Propotamochoerus* was recorded from the Dhok Pathan Formation, Siwaliks, Pakistan. The age of this formation is from 10.2-3.4 Ma. The samples include upper and lower dentition. The samples were thoroughly cleaned at the Paleontological Laboratory, Department of Zoology, University of Gujrat, Gujrat, Pakistan. The sample measurements were taken in millimeters with a digital Vernier caliper. The recovered samples were compared with the already studied samples of the *Propotamochoerus* from the Siwalik Group of the same age. In family Suidae, dentition is bunodont with thick enamel. All the premolars and molars are elongated having more than one accessory conules/conulids. The paleoenvironment of Dhok Pathan Formation was dry; as a result, grassy woodlands appeared during that time.

4. WILDLIFE, DIVERSITY AND CONSERVATION

FEWFM-36
Wildlife

DIVERSITY AND RELATIVE ABUNDANCE OF MAMMALIAN FAUNA INHABITING MURREE-KOTLI SATTIAN-KAHUTA NATIONAL PARK

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Murree-Kotli Sattian-Kahta National Park (MKKNP) was declared as protected area in the year 2009, however, its complete mammalian fauna is yet undocumented. The current study investigated the diversity and relative abundance of mammal species inhabiting this national Park. Field sign surveys and camera trapping were employed as methods to record the mammalian species of the park. A total of 22 camera traps with infra-red flash were installed for 116 days, and it resulted in a total of 5201 photographs. Field surveys, sampling efforts, and camera trapping confirmed 21 different mammalian species recorded in the study area mainly including the Common leopard (*Panthera pardus*), Asiatic jackal (*Canis aureus*), red fox (*Vulpes vulpes*), leopard cat (*Prionailurus bengalensis*), barking deer (*Muntiacus vaginalis*), rhesus monkey (*Macaca mulatta*), wild boar (*Sus scrofa*), Indian crested porcupine (*Hystrix indica*), yellow-throated marten (*Martes flavigula*), Jungle cat (*Felis chaus*), Asian palm civet (*Paradoxurus hermaphroditus*), small Indian civet (*Viverricula indica*), Grey mongoose (*Herpestes edwardsii*) and small Indian mongoose (*Urva auropunctatus)*, Indian pangolin *(Manis crassicaudata*), house rat (*Rattus rattus*), bats (*Chiroptera*), and Flying squirrel (*Pteromyini*). The Common leopard was recorded at 4 sites, all within the altitudinal range between 648 m-1533 m. Distribution of Asiatic jackal and red fox was recorded positive at all sites surveyed in the park with altitudinal ranges between 498 m-1287 m and 433 m-2049 m, respectively. Leopard cats were recorded at two sites only within the altitudinal range between 498 m-894 m. Jungle cats were recorded at 3 sites within an altitudinal range between 498 m-846m. Asian palm civets and small Indian civets were both recorded at 3 sites. The grey mongoose and small Indian mongoose were both recorded at 4 and 3 sites, respectively. Otter was recorded in Kahuta near river side. In addition, a total of 75 scats of different mammal species were found on the tracks. Moreover, Indian pangolin burrows were recorded at two different sites. Diversity index (H'=2.36), and Species Evenness Index (E=0.81) were also computed. Wild boar (*Sus sucrofa*) was the most abundant mammal species among all, in the study area. The study concludes that the Murree-Kotli Sattian-Kahuta National Park harbors healthy and diverse mammalian fauna, including some endangered species, which need to be looked after and conserved properly through developing management plan of the national park.

FEWFM-37
Wildlife

STUDIES OF VERTEBRATE FAUNA DIVERSITY IN BAHRIA TOWN ZOO DISTRICT, NAWABSHAH (SBA) SINDH, PAKISTAN

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Wildlife fauna plays a crucial role in maintains ecosystem balance. This study aimed to investigate the diversity of vertebrate fauna in Bahria town zoo. The present study was carried out between August 2024 to December 2024. A comprehensive survey was conducted total number of population vertebrate fauna observed birds and mammals (271) sort out (7) Orders, (8) Families (13) Genus and (15) species were reported including: *Anas platyrhnchos, Anser anser, Anser albifrons, Biziura labata* belong to order (Anseriformes), *Pavo cristatus* belong to order (Galliformes), *Pisttacula erithacus, Pisttacula krameri, Melopsittacus undulates* and *Nymphicus hollandicus* belong to order (Pittaciformes), *Antilope cervicapera, Ovis orientalis* belong to order (Artiodactyla) *Equus quagga* belong to order (Perissodactyla) *Chlorocebus pygerythrus* belong to order (Primates), *Panther tigris tigris*, and *Panthera tigris* belong to order (Carnivora), The results highlight the presence of species and emphasize the need for conservation efforts to protect the zoos vertebrate fauna. This study provides valuable insight into the diversity of vertebrate fauna in bahria town zoo district Shaheed Benazirabad, Sindh, Pakistan.

FEWFM-38
Wildlife

STUDY ON THE POPULATION AND CONSERVATION STATUS OF ANTELOPES AT MEHRANO WILDLIFE SANCTUARY, KHAIRPUR, SINDH, PAKISTAN

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Antelopes play a crucial role in maintaining ecological balance, yet their populations face significant threats due to habitat loss, poaching, and environmental changes. This study assesses the population status

and conservation efforts for antelopes at Mehrano Wildlife Sanctuary, Khairpur. Field surveys were conducted using direct and indirect observation methods to estimate population density, distribution patterns, and habitat preferences. Data on threats, such as human interference and predation, were also recorded. The results indicate a stable but vulnerable population of antelopes, with seasonal fluctuations influenced by resource availability and environmental factors. Conservation efforts, including habitat protection and anti-poaching measures, have contributed to sustaining the population; however, challenges remain due to encroachment and limited awareness among local communities. Recommendations include strengthening conservation policies, enhancing community involvement, and implementing sustainable management strategies to ensure long-term protection. This study provides valuable insights into the status of antelopes in Mehrano Wildlife Sanctuary and serves as a foundation for future conservation initiatives aimed at preserving biodiversity in the region.

FEWFM-39
Wildlife

STUDY ON THE HABITAT AND POPULATION OF CATTLE EGRET IN DIFFERENT AREAS OF KHAIRPUR DISTRICT

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The cattle egret (*Bubulcus ibis*) is a widely distributed wading bird known for its association with livestock and agricultural landscapes. This study investigates the habitat preferences and population dynamics of cattle egrets in different areas of Khairpur District. Field surveys were conducted across diverse habitats, including wetlands, agricultural fields, and urban settings, to assess population density, roosting sites, and foraging behavior. Data were collected through direct observations, point counts, and habitat assessment methods. The findings indicate that cattle egrets are most abundant in agricultural areas and near water bodies, where they benefit from food availability and nesting sites. Seasonal variations in population size were observed, influenced by breeding cycles and migratory patterns. The study also highlights potential threats, such as habitat degradation, pesticide use, and human disturbances, which may impact their population in the long run. This research emphasizes the importance of habitat conservation and sustainable agricultural practices to maintain healthy cattle egret populations. The findings provide a baseline for future studies and conservation efforts aimed at preserving avian biodiversity in Khairpur District.

FEWFM-40
Wildlife

MORPHOMETRIC ANALYSIS OF *FALCO PEREGRINUS PEREGRINUS* RESCUED IN PAKISTAN

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Peregrine falcon is recognized as the migratory species in the world. This falcon is one of the four subspecies of *Falco peregrinus.* These birds are poached in Pakistan during their migration. Fortunately, they were rescued by Pakistan Customs, SWD, and RCCRP and were observed for this study. Several parameters were studied in the rescued birds for morphometric measurements including total length, wingspan, bill depth, bill width, bill length and tarsus in both male and female Peregrine falcon. Bill volume was also calculated with the given parameters which resulted in showing difference between the groups. Male and female individuals were also compared on the basis of body size and bill volume. The objective of this study was to determine the diversity among the individuals which will benefit in comparing adaptive radiations in avian fauna. This research can also be associated with diversification in birds for instance the structure of bill, wingspan, and total length which enables different functions in both sexes including feeding habits and flight patterns.

FEWFM-41
Wildlife

ROOSTING HABITAT SELECTION OF PHEASANTS IN MARGALLA HILLS NATIONAL PARK

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Roosting habitat selection is vital for the survival and reproductive success of Kalij pheasants, influencing energy conservation and predation risk. Declining pheasant populations worldwide, due to habitat loss, predation, and inbreeding, highlight the importance of understanding roosting habitat preferences for conservation efforts. This study investigated seasonal roosting habitat selection by Kalij pheasants in Margalla Hills National Park (MHNP), with field surveys conducted from November 2023 to July 2024. Roosting sites were identified through direct sightings and signs such as calls, feathers, and droppings. Key habitat features tree species, height, diameter at breast height (DBH), and roost branch height were recorded. Analysis revealed that Kalij pheasants favored dense, shrubby areas with low human disturbance, which provided cover and safety from predators. Roosting trees averaged 10.06 m in height,

with a mean DBH of 39.8 48cm and a roost branch height of 5.7 m. Preferred species included *Cassia fistula*, *Acacia modesta*, *Bauhinia variegata*, and *Olea ferruginea*. Pheasants showed a slight preference for southern-facing slopes, likely due to increased sunlight. Significant differences were found in shrub and tree cover, leaf litter, and trail distance between breeding and non-breeding seasons, while slope and elevation showed no significant effect. This study provides insights into the roosting habitat preferences critical for the conservation and management of Kalij pheasants in MHNP.

FEWFM-42
Wildlife

ANALYSIS OF MALARIA AND DENGUE FEVER AND ITS IMPACT ON HEMATOLOGICAL FINDINGS IN THE POPULATION OF HYDERABAD, SINDH

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Mosquitoes have been widely responsible for the spread of two major diseases in the underdeveloped world malaria and dengue fever. Almost 700 million people contact a mosquito-borne illness every year resulting in greater than one million deaths. According to the World Health Organization (WHO), mosquito-borne diseases account for about 17% of the total burden of all infectious diseases. Important vectors of the pathogens causing Mosquito-borne diseases are mosquitoes belonging to the genera Aedes, Culex, and Anopheles. There is variation in prevalence from province to province and area to area. Changes in blood cell counts are a well-known feature of malarial and dengue infections. The present study aims to find out the prevalence of malaria and dengue fever in Hyderabad and also the effect of both infection on blood cells in general. The statistics was collected from the studied population through a questionnaire with three parts. Part 1 demographic section comprised variables like age and sex, part 2 clinical section included clinical data in which inquired about fever, headache, nausea, Part 3 hematological parameters included hematological findings documented about complete blood counts (CBC), plasmodium type, RBCs, WBCs, and Platelet's count. In this regard a total of 50 malarial patients who had malarial symptoms and 60 dengue patients were examined questions according to designed questionnaire at Civil Hospital Hyderabad Sindh. Out of 50 malarial patients 41 (82%) had *Plasmodium vivax*, 9 (18%) had *Plasmodium falciparum*. No case of *P. malariae* and *P. ovale* detected. With regard to the age the highest positive cases 50% were found in the age group 1-10 years. Fever was observed in 100% cases. Majority had decreased Hb in 68% had less than 9g/dl. A total of 60 patients with serologically proven Dengue fever were observed with NS1 identification. Male individuals were more affected 36(60%). Fever was observed in 100% cases and headache 78% cases. The most dominant age group among the confirmed dengue patients was 21-40 years. Conclusion: Mosquito borne diseases (MBD) rate is greater in overall Sindh province after the monsoon season. Anaemia and Thrombocytopenia have been the most common haematological abnormalities in the malarial patients. The most common hematological abnormalities were thrombocytopenia and leucopenia in dengue fever patients.

FEWFM-43
Wildlife

ETHNOMEDICINAL USE OF WILD FAUNA BY THE LOCAL COMMUNITY OF CHAKWAL

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The research involved engaging with traditional healers, indigenous community members, and individuals knowledgeable about ethno medicine. A combination of survey-based methods and semi-structured interviews was used to gather comprehensive data. This approach facilitated an in-depth understanding of how traditional medicine is applied in this region. The findings highlighted that local communities in Chakwal utilize a remarkable variety of 67 animal species, including mollusks, reptiles, birds, insects, arachnids, and gastropods. Among these, mammals and birds were identified as the most commonly used animals. The animal parts employed in medicinal practices were diverse, encompassing meat, fats, skin, milk, horns, bones, and blood. Medicinal applications included both oral and topical methods, with raw preparations being particularly common. This suggests a preference for using unprocessed or minimally processed animal products in treatments. The range of conditions treated with these animal-derived medicines was broad, covering ailments such as typhoid, coughs, influenza, skin disorders, hemorrhoids, respiratory issues, and epilepsy. The study also identified 48 different animal families involved in traditional medicine, with *Passer domestics* (house sparrow) and *Columba livia* (rock pigeon) being the most frequently used species. This indicates a significant reliance on these birds in local medicinal practices. Overall, the study underscores a strong cultural inclination toward using organic, animal-based remedies in Chakwal, reflecting a broader preference for traditional methods that are perceived as safer and less likely to have side effects compared to synthetic alternatives.

FEWFM-44
Wildlife

DISTRIBUTION, ROOSTING BEHAVIOR AND HABITAT PREFERENCES OF *PTEROPUS MEDIUS* IN PUNJAB, PAKISTAN

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Indian flying fox (*P.medius*) plays vital role in forest regeneration through seed dispersal and pollination, and are economically important worldwide. Nine different roost sites were carefully observed from District Kasur and District Lahore to access the diversity of Indian flying fox and to the check the peculiar relationships between roost characteristics and habitat preferences of *P. medius*. In terms of roost characteristics, the study identified both permanent and temporary roosting sites. Permanent sites included Nurseries and gardening stores in Pattoki, Field No. 56 in Changa Manga Forest, Mustafabad (bank of canal), Kacha Pakka, Bagh-e-Jinnah, Lahore, Lahore Wildlife Park (Bat Island) and Lalazar Park in

Thokar Niaz Baig, Lahore. Temporary sites were Eucalyptus forest near GT-Road and the Government boy's school in Kot Sardar Muhammad Khan, Kot Radha Kishan. Throughout the one year study, highest average numbers of bats were observed in changa manga jungle (7285), Bagh-e-Jinnah (2470), Lahore Wildlife Park (Bat Island) (2105) and Mustafabad (1815) respectively, while their numbers were significantly lower in Lalazar Park (35). The results indicated Indian flying fox prefers to roost in protected areas like Changa Manga Forest, Bagh-e-Jinnah and Lahore Wildlife Park (Bat Island), while roosting sites in other areas have fewer bats due to anthropogenic activities like hunting and other environmental factors (extreme temperature and humidity). The Pearson correlation analysis indicated a significant positive correlation between bat abundance and tree height (m) ($p < 0.025$) and Canopy cover (%) ($p < 0.037$). Water bodies ($p = 0.001$) also influenced the selection of roosting sites of Indian flying fox. The results highlight the importance of protected areas in supporting higher bat populations, and protecting tall trees and large groves would be beneficial to the conservation of *P.medius*.

FEWFM-45
Wildlife

ASSESSMENT OF URBAN WILDLIFE DIVERSITY IN MUZAFFARABAD CITY, AZAD JAMMU AND KASHMIR

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Urban wildlife supports ecosystem balance through pollination, pest control, and psychological benefits, but unplanned urbanization threatens their survival through habitat loss, vehicle collisions, toxins, and invasive species, highlighting the need for scientific data-driven conservation strategies. Therefore, the correct study was carried out to assess the wildlife biodiversity in the Muzaffarabad city during 2023-2024. Transect and point count methods were used to collect data on species diversity in 13 different localities of the study area, while questionnaire method was used to explore the information on human-wildlife interactions. A total of 97 bird and 17 species of mammals were found from various localities of Muzaffarabad City. The highest numbers of avian species were recorded in order Passeriformes with 63 species, while the highest numbers of mammalian species were belonging to order Carnivora (n=9). Among 97 species of birds, 41 species were residents, while 56 species were summer (n=40) or winter (n=16) migrants. House crow (57.67 individuals/km2), House sparrow (52.08 individuals/km2), and Common myna (46.75 individuals/km2) have the highest population density while Brown wood owl (0.17 individuals/km2), Eurasian coot (0.08 individuals/km2) and Western jackdaw (0.08 individuals/km2) were the least found species in the area. The majority of bird species (n=95) were Least Concern (LC), while White-backed Vulture (Gyps africanus) is globally listed as Critically Endangered. The overall value of Shannon-Wiener Index (H Index) for birds was recorded 3.85, with the evenness value of 0.8416. The H-index values for birds was highest in Lower Chatter (H=3.983), while the lowest in Main City (H=2.141). The H index values were higher in summer (H=3.24), than winter (H=2.45; Table 4.3). Among habitats, scrubby forests have the highest species richness (n=71) and abundance (1917 individuals) of birds, while the urban areas showed the lowest species richness (n=18) and abundance (318 individuals). The overall value of Shannon-Wiener Index

(H Index) for mammals was 2.13, with the evenness value of 0.754. Asiatic jackal (n=99), wild boar (n=98) and black rat (n=64) were the most commonly found species among mammals. Among localities, Chella had the highest number of mammalian species (n=15) followed by Lower Chatter (n=14) and Ambore (n=10). Among different threat factors, habitat loss and deforestation were regarded as the severe threat with high over all threat scores of 46 and 42, respectively. Regarding the interaction of the locals with wildlife, the majority of responding individuals (=52) had not encountered wildlife within Muzaffarabad city while other encounter various mammalian species (n=25) followed by birds (n=18) and reptiles and majority (51%) of which also experienced conflicts with wildlife in term of crop damage (n=29), property damage (n=12) and posing threats to human lives (n=10). Localities adjoining the surrounding forests, e.g., Ambore, Chella and Gojra have higher wildlife diversity and thus experienced more intensity of conflicts with wildlife species. Resultantly, maximum (51%) respondents had negative perceptions toward wildlife. The findings of the current study provided insights about the urban wildlife in Muzaffarabad City. These findings will be helpful to develop strategies to ensure preserving wildlife to maintain ecosystem function, minimize property damage, reduce safety risks, and promote coexistence between humans and wildlife by minimizing human-wildlife conflicts.

FEWFM-46
Wildlife

OCCURRENCE PATTERN AND DISTANCE BASED POPULATION SIZE OF BLACK FRANCOLIN (*Francolinus francolinus*) IN SCRUB FOREST, HARIPUR

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The Black Francolin (*Francolinus francolinus*), a ground-dwelling galliform bird, faces increasing anthropogenic pressures, including overhunting, habitat degradation, and illegal trade. Understanding its spatial distribution and population density is crucial for informed conservation strategies. We conducted systematic line transect surveys across five selected study sites within Pind Hashim Khan Game Reserve, covering a total area of 20.97 km². A total of 15 transects (3 6 km in length, 20–35 m in width) were surveyed, yielding 15 direct sightings and one indirect call detection at elevations of 500–700 m. Using distance sampling analysis (DISTANCE v7.3), we estimated a mean density of 8.1 individuals/km² and a total abundance of 209 birds, with a detection probability of 89% and an encounter rate of 76.3%. Our findings indicate an uneven distribution of Black Francolins, likely driven by habitat fragmentation and

human disturbances. Effective conservation measures, including strict regulation of hunting, habitat restoration, and sustainable land-use practices, are urgently needed to mitigate population declines.

FEWFM-47
Wildlife

HABITAT ECOLOGY OF COPPERSMITH BARBET (*Psilopogon haemacephalus*) IN DISTRICT BAHAWALPUR

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The Coppersmith Barbet (*Psilopogon haemacephalus*) is a cavity-nesting bird species commonly found in South Asia, known for its distinctive vocalization and habitat preferences. This study investigated the habitat preferences, breeding ecology, feeding behavior, and the effects of human activities on Coppersmith Barbet populations across three distinct sites in the Bahawalpur district: Lodhran, Lal Suhanra National Park, and Islamia University. Data were collected through systematic field surveys, with a total of 120 observations recorded at each site. Key findings indicate that Neem (*Azadirachta indica*) and Sheesham (*Dalbergia sissoo*) were the most frequently used tree species for nesting, while Banyan (*Ficus benghalensis*) was more dominant in the natural environment of Lal Suhanra. Breeding success rates varied across the sites, with Lal Suhanra showing the highest success at 72%, compared to 70% at Islamia University and 68% at Lodhran. Feeding behavior was dominated by fruits (55–65%) across all sites, with insects playing a secondary role. Human activities, particularly urbanization and agricultural practices, significantly impacted habitat quality, with higher nest abandonment and lower population densities observed in more fragmented landscapes. The study also assessed the impact of climate change, noting moderate vulnerability to temperature increases and reduced rainfall, particularly at Lodhran and Islamia University. These findings emphasize the need for habitat conservation and management to ensure the long-term survival of the Coppersmith Barbet, particularly in urban and agricultural landscapes.

FEWFM-48
Wildlife

HABITAT ECOLOGY OF INDIAN ROLLER (*CORACIAS BENGHALENSIS*) IN BAHAWALPUR

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This study explores the habitat ecology of the Indian Roller (*Coracias benghalensis*) in three locations: Lodhran, Lal Suhanra, and Islamia University in Bahawalpur District. Field observations and ecological assessments were conducted, focusing on habitat preferences, nesting ecology, feeding

behavior, and environmental interactions. Results indicated that the Indian Roller predominantly used open farmlands (10 birds/km² in Lodhran, 8 birds/km² in Lal Suhanra) and riparian zones (8-10 birds/km² across sites). Nesting preferences varied, with clutch sizes averaging 3.5±1 eggs in Lodhran, 3.8±3 eggs in Lal Suhanra, and 3.3±1 eggs at Islamia University. Fledging success rates were highest at Lal Suhanra (70%) and lowest at Islamia University (60%). Feeding behavior showed a preference for large insects (55-60%) in spring and a shift toward small vertebrates (30-35%) in autumn and winter. Temperature influenced nesting success, with optimal conditions between 25°C and 30°C yielding success rates of 70-75%, while temperatures above 35°C reduced success to 50-55%. Human activities, such as pesticide use and land clearing, had a high impact in Lodhran and Islamia University, influencing habitat usage. Overall, the Indian Roller exhibited adaptability to both natural and urban environments. Future research should investigate the long-term effects of urbanization and climate change on its behavior. These findings enhance understanding of species adaptability in semi-arid regions.

FEWFM-49
Wildlife

FROM VAGRANT TO RESIDENT: CO-EXISTENCE OF LEOPARD WITH HUMAN-INFLUENCED LANDSCAPE IN THE MARGALLAH HILLS RANGE OF HIMALAYAN FOOTHILLS

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Leopard (*Panthera pardus*) populations have become isolated, declined, and been extirpated from many parts of their historic range in Africa and Asia. To our knowledge, this is the first robust effort to record the occurrence of the common leopard (*Panthera pardus*) using trail cameras in Margalla Hills National Park (MHNP). The objective of this study is to document the presence of leopards, identify their sympatric mammalian species, and monitor the leopard population to determine whether it comprises vagrant individuals or represents a resident population in the park. Additionally, we investigated the level of human-leopard conflict in the park. Trail cameras were installed at 15 potential locations in Margalla Hills National Park, each operating for 21 days during every season: spring (March–April), summer (May–August), autumn (September–October), and winter (November–February) over four years, from June 2021 to December 2024. Leopards were recorded 71 times out of 420 sampling occasions using camera traps, with sightings observed in all seasons. A total of 15 sympatric mammalian species were also captured by the cameras alongside leopards. Between 2018 and 2024, four leopards were found dead in the park. We found no recorded leopard attacks on humans or livestock in the past ten years. However, eight encounters between visitors and leopards were reported, none of which resulted in aggression or retaliation. Our findings will assist conservationists, policymakers, and wildlife departments in developing effective monitoring and management strategies to ensure the coexistence of humans and leopards.

FEWFM-50
Wildlife

HUMAN-LEOPARD CONFLICT AND ITS MITIGATION THROUGH AWARENESS AND CAPACITY BUILDING OF FRONTLINE STAKEHOLDER

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The leopard (*Panthera pardus*) faces multiple threats, including habitat loss, human-wildlife conflict, and climate change. Every year, a significant number of leopards are killed across their range. As a keystone species in Margalla Hills National Park (MHNP), the leopard plays a vital role in maintaining a balanced and healthy ecosystem. This study aims to assess human-leopard conflict in MHNP and explore mitigation strategies through community awareness and capacity building for wildlife guards. Structured, closed-ended questionnaires were used to collect data from local communities. Village meetings were conducted to educate and raise awareness about leopards. A total of 250 participants from various communities within MHNP were surveyed. No leopard attacks on humans were reported, and five human-leopard encounters occurred without any retaliation. Furthermore, no incidents of leopard-related livestock depredation were recorded. The findings suggest that human-leopard conflict in MHNP is minimal, making it a successful example of human-wildlife coexistence.

FEWFM-51
Wildlife

EVALUATION OF STRESS IN NEWLY IMPORTED WILD ANIMALS IN SAFARI ZOO LAHORE THROUGH THE FOCAL METHOD OF BEHAVIOR MONITORING

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The stress levels of newly imported wild animals at Safari Zoo, Lahore, were assessed by the focal method of behavioral observation and fecal cortisol analysis. Behavioral data was collected during and after-quarantine utilizing an ethogram to document aggressive, submissive, active, and passive behaviors. Confinement in isolated enclosures during quarantine significantly increased signs of stress. Aggressive behaviors, including shoving and head shaking, were most prevalent during quarantine, especially in blue bulls (2.97 ± 0.22), whereas submissive behaviors, including as head lowering, were notable in Arabian oryx (1.87 ± 0.16). Active behavior, such as self-play and movement, were limited across all species, indicating stress associated to confinement. After-quarantine, there was a significant reduction in the incidence of aggressive behavior (1.96 to 0.53) and its duration (1.93 to 0.81) suggesting improved adaptation to enclosures. Passive behaviors, including resting, emerged in animals like ostriches and addax, whereas active behaviors, such as movement and feeding, intensified. Cortisol levels, a

physiological indicator of stress, significantly decreased post-quarantine: from 133.06 ± 0.11 to 115.31 ± 0.19 in ostriches, from 376.08 ± 0.16 to 343.52 ± 0.01 in addax, from 283.16 ± 0.12 to 127.92 ± 0.01 in Arabian oryx, and from 576.16 ± 0.23 to 400.01 ± 0.00 in blue bulls. The results indicate that quarantine affects the behavior and stress levels of wild animals, highlighting the necessity of integrating ethological observations with fecal cortisol assessments to improve their wellbeing during acclimation.

FEWFM-52
Wildlife

HUMAN-PARAKEET CONFLICT, THREATS AND CONSERVATION IN DEVA VATALA NATIONAL PARK BHIMBER, AZAD JAMMU & KASHMIR

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Human- parakeet conflict is an emerging issue that has intensified over time, contributing to a continuous decline in parakeet populations. This study aimed to investigate the extent of human-parakeet conflict in Deva Vatala National Park and its surrounding areas in Azad Jammu and Kashmir, Pakistan. Data were collected on economic losses incurred by farmers, parakeets poaching and trade dynamics using prescribed questionnaires. Results revealed the presence of 04 parakeet species in the study area. The primary cause of parakeet attacks on crops was food scarcity due to habitat destruction. According to 28% of respondents, Parakeets attacked crops on a regular basis, and 40% reported that they had suffered annual economic losses of less than 5000 PKRs. However, these losses were generally insignificant in the context of overall farm revenue, indicating the parakeets do not pose a severe economic threat. Crop and fruit losses were found to be directly linked to fluctuation in parakeet population. The data on poaching and illegal hunting revealed a fluctuating trend, with notable peaks in 2018 and 2024. The low number of cases in 2021 suggests either the effective enforcement of conservation measures or a significant decline in parakeet populations, warranting further investigation. To mitigate illegal hunting and ensure threatened parakeet conservation, continued monitoring and habitat restorations are recommended as a part of an adaptive management strategy. These efforts will be crucial in maintaining parakeet populations and reducing their conflict with human in the study area.

FEWFM-53
Wildlife

POPULATION DENSITY AND DISTRIBUTION PATTERN OF GREY FRANCOLIN AND BLACK FRANCOLIN IN MANG GAME RESERVE, DISTRICT HARIPUR

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Grey Francolin and Black Francolin are the key game birds of Mang Game Reserve in District Haripur. The present study was conducted to find out the comparative population density, distribution pattern, habitat

preference of both species in Mang Game Reserve. The study area was divided into four sub sites, representing all types of major habitat. Line Transect Method was used to study the habitat preference in the selected sites and relationship between habitat and. Francolin population. The results showed that the overall population density of Grey and Black francolin was 2.8birds/ km² and1.9 birds/km² respectively. The habitats of Rocky area support the highest population density i.e. 0.8 birds /km² of Black francolin followed by Plain areas i.e. 0.6 birds/ km², streams birds 0.2birds/km²,and agriculture land 0.4 birds/km². They preferred to live in separate population patches within the same habiatat. The major threats included illegal hunting, poaching, overgrazing, use of pesticides and fertilizers in the study area. The baseline study will be helpful to advice better conservation strategies of game birds of Mang Game Reserve, District Haripur to enhance conservation efforts.

FEWFM-54
Wildlife

BURROWING ECOLOGY OF INDIAN PANGOLIN IN MIRPUR, AZAD JAMMU AND KASHMIR

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Burrowing ecology of the Indian pangolin (*Manis crassicaudata*) was investigated through field surveys conducted in Mirpur division, AJ&K. The study aimed to assess the ecological role of pangolin burrows in the environment their significance for other life form. Burrows were randomly selected and measured for morphometric (length, height & width), humidity and temperature. A total of 75 burrows were studied, of which 45 were feeding burrows and 30 were dwelling burrows. Dwelling burrows were deeper and more rounded than feeding burrows, while the average length recorded was 58.64 + 10.05 inches as compared to average length of feeding burrows (19.6 + 1.46 inches). Statistical analysis using a paired t-test revealed a highly significant ($t= 9.64$; $df= 33$, $p<0.001$) difference between the internal burrow temperature and the ambient temperature. The mean ambient temperature was recorded as (37.14 + 0.76 °C) while the mean temperature inside the burrows was (33.8 + 0.69 °C). However, there was no significant difference ($p=0.63$) in humidity levels inside and outside the burrows. Pangolins excavated burrows ranging from 13 to 192 inches in length, displacing an average of 0.150 m^3 of soil per tunnel. The cumulative soil displacement reached 5283.62 m^3, extending to the depth of 5 m, underscoring the pangolin's role as an ecosystem engineer. The analysis showed a pangolin burrow distribution was strongly associated with sparse coniferous forests and dense mix forest. A total of 329 individuals were observed utilizing pangolin burrows. Hymenoptera were the most abundant comprising 36% (n=119) of the total fauna. Arachnids accounted for 22% (n=74), while serpent were the least represented (n=2). Rodent presence in the burrows was found to be mainly dependent on the humidity levels and burrow diameter. This study highlighted the critical role of pangolins in soil turbation and emphasized their role in providing the potential environmental features for other life forms in the study area.

FEWFM-55
Wildlife

EVALUATING THE ROLE OF FALCONRY (A TRADITIONAL PRACTICE) IN BIODIVERSITY CONSERVATION IN AZAD JAMMU AND KASHMIR

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Falconry, the ancient art of hunting with raptors, is globally recognized as a cultural tradition, particularly in Asia. This intangible cultural heritage has multifaceted dimensions, ranging from the economic impacts to contributions to wildlife conservation. Pakistan is home of numerous raptor species, some of which are utilized in falconry; however, research on falconry, particularly in Azad Jammu and Kashmir (AJ&K), remains limited. This study aimed to gather data on falconers, trappers, trainers, species used in falconry, and its role in conservation within the Mirpur Division. Data were collected from June 2023 to April 2024 using the snowball sampling method. Results revealed that falconry is practiced on a limited scale. Demographic data revealed that the average falconer age was 62 years; majority (40%) were landlords, and 85% were literate. A significant proportion (77%) pursued falconry out of personal interest, although it also represents a strong familial heritage. Six falcon species were identified as used in falconry, among them, *Accipiter gentilis* being the most commonly used. Trappers were often reluctant to share information, occasionally withdrawing consent due to various concerns. The survival rate of trapped falcons was high (90%). Most falconers reported a decline in falconry over the past two decades, primarily due to government regulations. Monthly cost for a falcon ranged from 40,000 to 100,000 PKR. Notably, 60% of falconers reported releasing 20 falcons back into the wild, indicating a potential contribution to biodiversity conservation in the natural ecosystems of the study area. This study provides baseline information on falconry in AJ&K and is a valuable addition to the state's wildlife database.

FEWFM-56a
Wildlife

ESTIMATING PAST AND CURRENT DISTRIBUTION RANGE OF BARKING DEER (*MUNTIACUS VAGINALIS*)

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Barking deer belongs to the genus *Muntiacus*, commonly known as Northern Red Muntjac, and is at present distributed in several countries of southeast and south-central Asia. The current study aimed at investigating, reconstructing and comparing the historical range of the species with its current range. Data about the past occurrence of barking deer were collected from all kinds of published and unpublished literature. The search engines like Google, Google Scholar, Firefox etc. and websites like Global Biodiversity Information Facility (GBIF), all academic, Open Access Thesis and Dissertation (oatd.org), Research rabbit and Sci- Hub, were used for collecting published literature on the occurrence of barking deer in the past on the globe. After downloading the full text of the articles about past locations and saving in the folder of literature survey, the barking deer occurrence were identified and then were fed into "Google Earth" Pro software, to get their geographic coordinates. These location data were then imported to Quantum Geographic Information System, desktop software, to process and analyze. Barking deer distribution was also analyzed in terms of protected areas present in its past and present distribution ranges. Analysis revealed that in the past, the barking deer occupied a wider distribution range covering a total of 8.28 million km^2 on the globe, while the current distribution range of the barking deer occupies an area of 5.59 million km2 with 32.55%. range contraction. There were N = 1454 protected areas present in the past distribution range of barking deer whereas this number has got reduced to N = 1283 in the current range of barking deer with a reduction of N = 171 protected areas.

FEWFM-56
Wildlife

SEASONAL AND ENVIRONMENTAL INFLUENCES ON ABUNDANCE, RECRUITMENT, AND DETECTION OF *Allopaa hazarensis* TADPOLES IN MONTANE POND HABITATS

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Studies on population dynamics of amphibian tadpoles and association of population parameters with characteristics of breeding ponds help understand their natural history. We conducted this study in 15 breeding ponds along three permanent freshwater streams in the District Buner, Khyber Pakhtunkhwa,

Pakistan. The ponds were visited during pre-breeding (April-May), breeding (July-August) and post-breeding (October) season of Hazara Frog (*Allopaa hazarensis*) for two consecutive years (2021-2022). At each pond, total tadpole count was made. The tadpole developmental stages were identified using Gosner (1960). The data on pond depth (m), perimeter (m), humidity (%) water temperature (°C) was recorded using a measuring stick, measuring tape and a hand-held weather meter, respectively. We used the Dail-Madsen model or the dynamic N-Mixture model model to estimate parameters of tadpole population dynamics such as initial abundance (λ), recruitment (γ), survival (ω) and detection (p). A contingency table of developmental stages G-G5: G1 (26–30), G2 (31–35), G3 (36–40), G4 (40–43), and G5 (44–46) was made for the three seasons, and their frequencies were compared using Fisher's exact test ($\alpha = 0.05$). The pond water temperature (°C) and humidity (%) differed significantly among the studied seasons during both years: 2021 and 2022. The water temperature during breeding (2021: 26.98± 1.44; 2022: 26.40± 1.41) and post-breeding period (2021: 29.54±0.95; 2022: 26.40±1.34) was higher than pre-breeding (2021: 22.56±0.40; 2022: 18.22±0.33). The air humidity during breeding (2021: 59.72±2.27; 2022: 65.04±1.96) and post-breeding period (2021: 63.38±2.26; 2022: 46.60± 1.98) was higher than pre-breeding in 2021 (49.44±2.13) but lower in 2022 (47.50±4.42). The pond depth (m) differed among the seasons in 2022. The pond depth in the breeding season (1.49± 0.12) was higher than the pre-breeding season (1.05± 0.13). The dynamic N-Mixture model ($\lambda \sim$ season, $\gamma \sim$ season+ perimeter, $\omega \sim$ pond water temperature, $p \sim$ depth) showed that initial abundance (λ) was significantly influenced by pre-breeding season ($P = 0.04$) and post-breeding season($P < 0.001$); recruitment (γ) by post-breeding season ($P < 0.001$) and pond perimeter ($P < 0.001$); detection (p) by pond depth ($P < 0.001$) while pond water temperature had no effect on tadpole survival (ω) ($P = 0.745$). The tadpole abundance was higher in pre-breeding season (28 tadpoles) than breeding (25) and post-breeding (20). The tadpole recruitment was also higher in pre-breeding season (6 tadpoles) than breeding (5) and post-breeding (3). The recruitment and detection are expected to increase with pond perimeter and pond depth, respectively. The occurrence of tadpole developmental stages Gosner (31–35), Gosner (36–40), Gosner (40–43), and Gosner (44–46) varied significantly across the seasons ($P < 0.05$). These stages were more frequently observed during the pre-breeding and post-breeding periods compared to the breeding period. In contrast, Gosner (26–30) stages were present in all three seasons.

5. ECOLOGY

FEWFM-57
Ecology

THE ECOLOGICAL STUDY OF ROSE -RINGED PARAKEETS OF DISTRICT KHAIRPUR, SINDH, PAKISTAN

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The ecological study of rose-ringed parakeets (*Psittacula krameri*) in district Khairpur, Pakistan, provides critical insights into their habitat preferences, population dynamics, feeding ecology, and nesting behavior. This study examines the parakeets' role in the local ecosystem and their interactions with both natural and agricultural environments. Field surveys were conducted across diverse habitats, including orchards, agricultural fields, and urban landscapes, to assess their distribution and abundance. Behavioral observations revealed that rose-ringed parakeets are highly adaptable, with a diet predominantly comprising fruits, seeds, and cultivated crops, which sometimes leads to conflicts with farmers. The study also highlights their nesting preferences, with a tendency to use tree cavities in indigenous species such as neem (*Azadirachta indica*) and shisham (*Dalbergia sissoo*). Furthermore, seasonal variations in their activities and breeding patterns were documented, reflecting the influence of climatic conditions and resource availability. The research underscores the importance of conserving natural habitats and mitigating human-wildlife conflicts through community-based strategies. This ecological assessment contributes to the broader understanding of rose-ringed parakeet ecology and serves as a baseline for future conservation and management efforts in the region.

FEWFM-58
Ecology

SEASONAL VARIATIONS IN THE TIME – ACTIVITY BUDGET OF ROYLE'S PIKA (*OCHOTONA ROYLEI*) IN JAGRAN FOREST RANGE, DISTRICT NEELUM, AZAD JAMMU AND KASHMIR, PAKISTAN

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The time–activity budget of a species holds significant ecological importance, as natural selection often favors individuals that utilize their time efficiently. Analyzing the details of time–activity budgets provide insights into how animals allocate time to various activities throughout the day and across

different seasons, enabling them to cope effectively with fluctuating energy demands and environmental changes that may threaten their survival. This efficient time management is particularly crucial for alpine small mammals, which inhabit highly seasonal environment with limited periods for energy acquisition and successful reproduction. In this study, in Jagran Forest Range of district Neelan, we analyzed the time–activity budget of the high-elevation lagomorph, Royle's pika (*Ochotona roylei*), across three different seasons from June 2021 to May 2022. We recorded eight behavioral states (foraging, feeding, grooming, vigilance, chasing, calling, musing, galloping) in adult and juvenile pikas through daily focal scan sampling between 0600 and 1900 hours. Our findings revealed that Royle's pika exhibited bimodal activity patterns, being most active during the morning and early evening while remaining relatively inactive during midday hours. During summer and monsoon, adult pikas allocated the largest proportion of their time to feeding (25.08 ± 0.43% and 30.14 ± 1.56% respectively), with the smallest proportion dedicated to chasing (2.00 ± 0.06% and 0.84 ± 0.11% respectively). Greater food availability during these seasons encouraged increased feeding. Conversely, in autumn, the shortage of vegetation led adult pikas to spend more time musing (39.57 ± 0.79%). Musing and foraging were the predominant behaviors of juvenile pikas during summer and monsoon. Notably, prominent food hoarding activities were not observed in either age group. This information on time allocation provides a baseline for future behavioral ecology and bioenergetic analyses of pikas, aiding in understanding their potential adaptation to climate change in the Kashmir Himalayas.

SECTION – V I

POSTER SESSION

POSTER-1

PREVALENCE OF APHIDOPHAGOUS HOVERFLIES IN KARACHI, PAKISTAN

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This study explores the prevalence and ecological significance of aphidophagous hoverfly species in Karachi, Pakistan, focusing on their role as biological control agents. Two hoverfly species, *Episyrphus balteatus* and *Baccha elongata*, were collected from two distinct sites: Memon Village and Hawks Bay Beach Karachi. A total of 366 specimens were randomly sampled from diverse host plants, including *Brassica*, lemon, cabbage, onion, and mangrove forests. Among the collected species, *Episyrphus balteatus* was found to be significantly more abundant compared to *Baccha elongata*, highlighting its dominance in the study area. The specimens were transported to the Advanced Entomological Research Laboratory at the Department of Zoology, University of Sindh, Pakistan, for further examination and taxonomic identification. This research provides important insights into the diversity, distribution, and ecological roles of these hoverflies in the region. It underscores the importance of *Episyrphus balteatus* as a potential natural predator of aphids, which could contribute to sustainable pest management strategies in agricultural ecosystems. Additionally, this study emphasizes the need to conserve these beneficial species and their habitats for maintaining ecological balance.

POSTER-2

ECOLOGICAL DYNAMICS AND CONSERVATION STRATEGIES FOR THE ASIATIC BLACK BEAR IN THE HINDU RAJ MOUNTAINS

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The Asiatic black bear (*Ursus thibetanus*), a threatened species in Pakistan, faces significant conservation challenges due to habitat degradation, human-wildlife conflict, and climate change. This study explores the ecological dynamics and conservation needs of this species in the Hindu Raj Mountain range, focusing on its distribution, diet, activity patterns, habitat suitability, sympatric interactions, and population dynamics. Camera trap surveys revealed that the bears predominantly occupy forested areas

and display activity peaks during periods of low human presence, indicating their sensitivity to human disturbance. Habitat suitability analysis identified forest cover and temperature as key determinants for sustaining populations. Interactions with sympatric species and avoidance of human-prone areas underscore the complex ecological relationships in the region. Local communities reported significant livestock and crop losses, highlighting the need for community-based conflict mitigation strategies, including compensation schemes, electric fencing, and awareness campaigns. Conservation measures emphasize protecting and restoring forest habitats, particularly those rich in native vegetation such as Quercus species, while addressing human pressures through legal protections, alternative livelihoods, and sustainable land-use practices. This research provides critical insights for developing targeted conservation strategies to ensure the long-term survival of the Asiatic black bear and the ecological integrity of the Hindu Raj Mountain range.

POSTER-3

COMPARATIVE ANALYSIS OF MICROWAVING FOOD IN DIFFERENT CONTAINERS: IMPACTS ON *OREOCHROMIS NILOTICUS* HEALTH

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Advancements in unhealthy lifestyles have led to reduced lifespans and an increase in emerging diseases. A major concern is the migration of contaminants from household containers, particularly with microwave use. This study examines the effects of microwaving feed in plastic versus glass containers on the health of fish (Oreochromis niloticus). Feed was microwaved in plastic and glass containers for 3 and 5 minutes, and fish health was assessed. Haematological and endocrinological changes were analysed from blood samples, and organ tissues were examined histologically. Results showed decreased haemoglobin (Hb g/dl) ranges from 6.18±0.002-8.66±0.003, platelet count (PLT), and red blood cells (RBCs 10^6/µl) were 0.60±0.007-1.43±0.007, with increases in white blood cells (WBCs), mean corpuscular haemoglobin concentration (MCHC), mean corpuscular haemoglobin and significant alterations were identified in fish exposed to feed microwaved in plastic and glass for longer durations, with histological changes in organ tissues. These findings suggest that repeated ingestion of feed microwaved in plastic may impair reproductive function and overall health, potentially leading to infertility. Although using plastic containers regularly may also be risky, microwaving in plastic is particularly problematic. Therefore, using glass containers is a safer alternative for food preparations.

POSTER-4

HELMINTHS OF *RATTUS RATTUS* (RODENTIA: MURIDAE): A RISK OF ZOONOSIS WITH FARMERS IN DISTRICT SWAT, PAKISTAN

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Residential settings and agricultural ecosystem bridge the gap to pose risk of zoonotic transmission of pathogens. The agricultural areas provide proper habitat for rats of zoonotic importance in Swat, valley, Pakistan. Farming activities have increased the risk between humans and rats. Present research was aimed to assess the association of helminth parasitic infections in farmers and rats in district Swat, Pakistan. Occupation based cross sectional study was conducted in farmers of district Swat, Pakistan from March 2010 to November 2013. We monitored helminth parasites in rats (n = 269) and in farmers (n = 316) fecal samples to assess the risk of helminth transmission. Evidence of the helminth parasitic infection was noted by the presence of eggs. Little difference was observed in helminth parasites of rats and farmers of agricultural areas of Swat, Pakistan. Although *Trichuris trichura*, *Enterobius vermicularis* and *Hymenolepis nana* were found in farmers while the rats were found infected with *Trichuris* sp., *Enterobius* sp., and *Hymenolepis diminuta*. The slight differential morphological features of the eggs between the hosts according to egg size and shapes were noted. Thus, no evidence of helminth transmission between farmers and rats was found. Farmers and rats in agricultural settings share the same habitats, the parasites of zoonotic importance may easily be transferred from rats to farmers and then to the local people. Public awareness on parasitic infection and provision of adequate and clean water supply are the primary factors to be promoted in the region.

POSTER-5

COMPARATIVE ANALYSIS OF HEMATOLOGY AND PROXIMATE COMPOSITION OF WILD AND CULTURED BROWN TROUT (*SALMO TRUTTA*) FROM NEELUM VALLEY, AZAD JAMMU AND KASHMIR

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Brown trout (Salmo trutta) is a cold-water fish species introduced from Europe for aquaculture due to its exceptional nutritional value. This study compares the hematological parameters and proximate body composition of wild and cultured brown trout in Neelum Valley, Azad Jammu and Kashmir (AJK). The present experiment was conducted in March 2023. A total of 20 wild brown trout from the Neelum River and 20 farmed brown trout from a

nearby fish hatchery were analyzed. Hematological parameters assessed include WBCs, RBCs, Hb, Platelets, Hct, MCV, MCHC, and MCH. The body composition analysis focused on moisture, crude protein, crude lipids, and ash content. Findings revealed that wild trout exhibited significantly superior nutritional and hematological quality compared to cultured trout ($p < 0.05$). Wild trout had higher WBCs (3.10 ± 0.12/µl), RBCs (2.50 ± 0.09/µL), and Hb (6.95 ± 0.24 g/dl), whereas cultured trout had lower values WBCs (1.35 ± 0.08/µl), RBCs (0.90 ± 0.06/µL), and Hb (4.20 ± 0.18 g/dl). The proximate composition of wild trout also indicated significantly greater ($p < 0.01$) protein content (67.10 ± 1.52 g/dl) compared to cultured trout (52.85 ± 1.34 g/dl). Conversely, farmed trout had higher crude fat content (22.30 ± 0.85 kcal/g) compared to wild trout (16.45 ± 0.72 kcal/g). These substantial differences can be attributed to the contrasting environmental conditions and feeding regimes between the two groups. The results reinforce that wild brown trout from the Neelum River possess superior meat quality and overall health status compared to their Cultured counterparts, making them a more desirable choice for consumption.

POSTER-6

EVALUATION OF THE PLASTIC DEGRADATION POTENTIAL OF FUNGAL STRAINS AND THEIR ROLE IN PLASTIC WASTE MANAGEMENT

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Plastic is one of the major threats to the environment, causing harm to humans, plants, animals, and marine life. The present investigation evaluated the biodegradation capability of two fungal strains i.e., *Aspergillus niger*, and *Trichoderma viride* along with their consortia on Low-Density Polyethylene (LDPE) bags. The action of the fungi was assessed in two media: Potato Dextrose Broth (PDB) and Czapek Dox Broth (CDB). The weight loss index in each medium for *A. niger, T. viride*, and consortium was recorded to be 54.04%, 51.06%, and 54.68% for the former medium. The values fluctuated to 40.42%, 29.78%, and 48.94% for the latter. The GC-MS analysis of the supernatant suggested different compounds that helped degrade plastics into smaller particles. The compounds obtained from GC-MS analysis were Hexadecanoic acid, 1,3-propane diamine, chlorobenzene, etc. Later, FTIR analysis of the plastic samples confirmed the scission and breaks in the strips, indicating that both fungal strains proved to be excellent bio-remediators of the contaminated environment.

POSTER-7

UTILIZATION OF CITRUS FRUIT PEELS AS ANTIBACTERIAL, ANTIFUNGAL, AND PLANT GROWTH PROMOTION

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Citrus fruit extracts are a robust source of bioactive compounds that confer anti-fungal, antibacterial, and phyto-enhancing properties. Current research was conducted to utilize citrus fruit peels for a pharmacological benefit as antimicrobial resistance has immensely increased. So, considering this green chemistry, this study examined the antifungal and antibacterial potential of citrus fruit peels and juices and their synergistic effect with fungal strains on wheat growth. Activity was assessed using well-diffusion and agar dilution methods, and

antioxidant potential was determined through DPPH assay. Afterward, phenolic and flavonoid content was ascertained, which was later screened out by GC-MS analysis. The profile of fungal role in plant-growth promotion was checked by phosphate-solubilization and nitrogen fixation assay. The cell viability percentage was checked by conducting an MTT assay. Results indicated that peels exhibited a superior bioactive potential compared to their juice counterparts. Lemon showed more efficacy in terms of its antibacterial and antifungal activity, but grapefruit demonstrated exceptional antioxidant potential and wheat growth enhancement. GC-MS analysis revealed many significant bioactive compounds like gamma-sitosterol, linoleyl methyl ketone, tocopherol, longifolene, guaiacol, and pentamethoxy flavone etc. Statistical analysis showed that citrus fruit extract concentration has a direct relation with the Inhibition zone while extract type and fungal species didn't affect the inhibition zone. So, emphasis should be given on integrating natural remedies into conventional therapies to mitigate the emergence of drug-resistant pathogens. Moreover, their inculcation in conventional fertilizers helps to promote optimum plant growth and signaling with fewer side effects.

POSTER-8

REMOVAL OF HEAVY METALS AND AZO DYES BY BACTERIA ISOLATED FROM INDUSTRIAL WASTEWATER

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Industrial wastewater is a major source of environmental pollution, containing toxic heavy metals and azo dyes that threaten ecosystems and human health. This study focuses on the isolation and characterization of bacteria capable of resisting and reducing heavy metals such as arsenic, lead, cadmium, and chromium, as well as degrading azo dyes like methylene blue and methyl orange. Bacterial isolates were obtained from industrial effluents and identified biochemically, revealing the presence of Gram-negative cocci (Neisseria spp.), Gram-negative Bacilli, and Gram-positive cocci (Staphylococcus spp.). The isolates exhibited varying resistance to metal concentrations of 30 mM, 50 mM, and 70 mM and azo dyes resistance to almost 100 mM. Metal reduction and azo dye decolorization were assessed over 24-hour intervals, alongside evaluations of minimal inhibitory concentrations (MICs), antimicrobial activity, and biofilm formation. While preliminary biochemical tests suggest these species, further molecular confirmation through 16S rRNA sequencing is pending. The study highlights the potential of these environmental bacteria for bioremediation, offering insights into their resistance mechanisms and possible applications in sustainable wastewater treatment. Bioremediation using native, non-pathogenic bacterial strains offers a sustainable and cost-effective approach to mitigate these pollutants. The findings contribute to the development of eco-friendly bioremediation strategies, reducing the environmental impact of industrial pollution.

POSTER-9

TRENDS IN THE ONLINE TRADE OF PYTHONS (FAMILY: PYTHONIDAE)

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Wildlife trade, a multibillion-dollar industry involving over 100 million plants and animals annually, has emerged as a major driver of species decline globally. However, the lack of comprehensive assessments for many

taxa limits our understanding of the global scale and patterns of wildlife trade. In this study, we investigated the global online trade dynamics of pythons (family Pythonidae), which are popular worldwide as pets, trophies and status symbols. We conducted extensive web searches on Google Chrome, using the phrase 'python for sale' in different languages, to compile a list of websites involved in the python species trade and the selling price of each python species. We identified websites from different countries in the world, involved in buying and selling python species. The required data was manually extracted from each website and added to spreadsheets, and analyzed in R Studio (4.4.1). We provided a framework for analyzing online python trade, which can be adapted for other taxonomic groups. Our results emphasize the need for improved monitoring to assess the origin (captive-bred or wild-sourced) and legality of the trade. Immediate conservation actions, including population monitoring, are crucial to ensure that the wildlife trade does not threaten the survival of python populations in the wild. We also suggested the monitoring of traded pythons to ensure they do not become established as invasive species.

POSTER-10

APTNESS OF BEE VENOM COLLECTION ON VARIOUS BEHAVIOURAL TRAITS OF APIS MELLIFERA L. HONEYBEE COLONIES UNDER FIELD CONDITIONS

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This study investigates the effect of bee venom collection on hygienic and hoarding behaviour of honey bee colonies. The assessment of hygienic behaviour reveals a modest but notable improvement in hive cleanliness following Bee Venom Collector (BVC) installation, the hygienic behaviour of honey bee was increased at three different times 5, 10 and 15 min after bee venom collection, the mean percentage of hygienic behaviour increased in three treatments by 2.70 ± 0.35, 4.20 ± 0.47 and 4.44 ± 0.47 respectively. Secondly the study investigates hoarding behaviour, uncovering a significant increase from 879.00 ± 4.83 ml to 951.70 ± 12.49 ml before and after installation of BVC respectively, revealing a notable impact on hoarding behaviour. Thirdly, the research examines the fecundity of queen bees, with results indicating a substantial post-installation boost with mean fecundity of queen bee on a single frame increased significantly from 2383.83 ± 44.88 eggs to 2949.33 ± 79.92 eggs before and after venom collection respectively. Lastly, the study considers the influence of queen presence on bee venom collection, finding that queen-right colonies yield significantly more venom (0.0848 ± 0.0032 mg) than queen-less ones (0.0359 ± 0.0042 mg) emphasizing the pivotal role of queens in this process. Collectively, these experiments underscore the potential benefits of bee venom collection while emphasizing the importance of responsible and sustainable practices. The research not only opens promising paths for optimizing collection methods and exploring therapeutic applications but also underscores the need to balance technological advancements with pollinator conservation efforts, all within the framework of ethical and sustainable beekeeping practices.

POSTER-11

EFFECTS OF PROBIOTIC SUPPLEMENT FOR THE TREATMENT OF POLYCYSTIC OVARIAN SYNDROME IN FEMALE WISTAR RATS

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This study aimed to determine the effect of probiotic supplementation on hormonal profile, lipid parameters, Homeostatic Model Assessment for Insulin Resistance (HOMA-IR) index, and cystic follicles to develop an alternative approach in the letrozole-induced polycystic ovarian syndrome (PCOS) model of female Wistar rats. To induce PCOS letrozole at the dose of 1mg/kg was given orally for approximately 21 days. Conformation analyses of PCOS comprised vaginal cytology and Oral Glucose Tolerance Test (OGTT). Probiotic supplementation using *Lactiplantibacillus plantarum* (8.25 ×10 ^{12}/ml), *Lacitcaseibacillus rhamnosus* (8.40 ×10 ^{9}/ml), *Enterococcus lactis* (8.5 ×10 ^{6}/ml), their synergist and a commercially available medicine Diane-35 (4.5mg/kg) was used. PCOS rats showed a disturbed estrous cycle and high levels of androgens and lipids. They had impaired insulin resistance, enhancing the HOMA-IR assessed by the OGTT test. Histopathological analysis showed many cystic follicles with no corpus luteum in PCOS rats. Hormonal profile improved significantly using synergist ($P<0.05$, CI=95%). However, regarding lipid profile, triglyceride levels were reduced considerably via synergists (76± 1.73^{ab}, P=0.001, CI=95%). The HOMA- IR index also stated that insulin resistance was managed substantially (0.03± 0.003^{ab} P=0.001, CI=95%). The no of cystic follicles was also reduced via ovarian histomorphological studies, Cystic follicles were reduced (1.00 ±0.00^{a}, p= 0.001, CI=95%). Overall, probiotic supplementation, especially their synergist, had very potent effects on the symptoms associated with PCOS. The HOMA-IR parameter was also improved. Reduction in the ovarian weight and cystic follicles was also noticeable.

POSTER-12

FIRST DOCUMENTED OCCURRENCE OF BLUE-AND-WHITE FLYCATCHER (*CYANOPTILA CYANOMELANA*) IN PAKISTAN: CONSERVATION SIGNIFICANCE FROM MEHRANO WILDLIFE SANCTUARY, SINDH

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Pakistan is known to be a home to many migratory birds, primarily receiving an influx of migratory species in winter through the central Asian flyway (CAF) and from neighboring countries. This year, Pakistan welcomed a new record- Blue-and-White Flycatcher (*Cyanoptila cyanomelana*), a migratory songbird, of the family Muscicapidae- on 11 January, 2025, at the Mehrano Wildlife Sanctuary in Sindh (GPS coordinates: 27°18'16"N 68°41'09"E). Four flycatchers were photographed for evidence-based documentation and were closely compared using sonogram and taxonomical attributes. The Blue-and-White flycatcher is a summer visitor to India, where it is rarely sighted. This marks the first time the species has been observed in Pakistan, supported by direct field observations and photographic evidence. This notable discovery represents a significant addition to the region's avifaunal diversity and highlights the conservation efforts of the Sindh Wildlife department. This rare and elusive record of Blue-and-White

Flycatcher provide valuable insights to understand the migration patterns of avian species in South Asia to emphasize the monitoring and conservation of critical habitats in protected areas.

POSTER-13

THE EFFECT OF TIDES ON THE DIVERSITY AND DISTRIBUTION OF COPEPODS IN THE SONMIANI BAY WATERS, PAKISTAN

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The floating living community of plants and animals that drift in the ocean is known as plankton, and zooplankton is the animal element of this population. Copepods (subclass Copepoda) are any member of the Copepoda subclass of crustaceans, which is widely dispersed. Copepods are extremely important to the environment since they are a food source for many fish species. Throughout the world's oceans, the majority of the 13,000 recognized species are free-living marine organisms. The majority of commercially significant fish species eat copepods directly or indirectly, making them essential parts of marine food systems. The purpose of this study was to examine the variety of Copepod species found in Sonmiani waters, as well as the relationship and effects of tidal variations on these species. From May 2021 to August 2021, samples were taken from Sonmiani Bay in Pakistan between high and low tide. Following formalin preservation, each sample was brought into the laboratory. To assess the distribution and diversity of Copepods, two subsamples were taken from each sample and viewed under a microscope. Significant tidal fluctuations were noted in the variety and abundance of several groups, primarily copepod species of Calanus and Paracalanus. This is the first observation of its kind showing dynamic variability in Copepod populations across the Sonmiani Bay waters' tidal cycle, which runs from high tide to low tide. The abundance of Calanus copepods was higher at high tide than at low tide.

POSTER-14

MICROBIOLOGICAL ASSESSMENT OF EXPORT-GRADE *PARASTROMATEUS NIGER* AND *EPINEPHELUS COIOIDES* FISH SPECIES TO ENSURE GLOBAL COMPETITIVENESS

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Pakistan contributes significantly to the country's economy and is a major exporter of seafood. Seafood buyers occasionally deal with problems relating to the caliber and quality of fisheries products. This study is specially designed to evaluate microbial contamination, hygienic condition and freshness of two different fish species i.e., Parastromateus niger and Epinephelus coioides commonly known as Black Pomfret and Grouper. The samples were gathered from a well-known fish landing location known as Karachi Fish Harbor West Wharf, Pakistan. To examine the bacterial load and pathogenic contamination, five distinct microbiological parameters were applied. According to this investigation, results of Total Viable Bacterial Count were found within the permissible limits (3.0×104) in Black Pomfret, the count of *E.coli* recorded as (<3 MPN/g), while *Listeria monocytogenes, Salmonella* spp. and *Vibrio* spp. were not detected. On the other side, Total Plate Count (4.2×104) and *E.coli* (<3 MPN/g) were observed in low amount in Grouper Fish whereas, *Listeria monocytogenes, Salmonella* spp. and *Vibrio* spp. were absent. These findings suggested that globally commercial fishes (i.e., Black Pomfret and Grouper) are free from pathogenic

contamination and meet the international standards while sustainable development is recommended to improve the quality and freshness of seafood and boost exports.

POSTER-15

ASSOCIATION OF ESR1XBA1 (RS9340799) WITH MALE INFERTILITY: A META-ANALYSIS

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Males are responsible for 50% cases of infertility that can include several causes which can either be morphological or genetic defects. Estrogen hormone was previously believed to relate only to females but it also does impact on men and their reproductive system. There are two major studies estrogen receptors to be present i.e. estrogen receptor alpha (ESR1) and estrogen receptor beta (ESR2). The targeted gene ESR1 is present on chromosome 6. Single polymorphism nucleotide (SNP Xba1 rs9340799) can be related with male infertility. Number of case control studies from different regions has been studied in this meta-analysis to conclude the results. The present study aims to determine the effect of ESR1 Xba1 (rs9340799) in male infertility. Different case control studies were searched through sites like PUBMED, Google scholars to regarding the SNP Xba1 and male infertility. This meta-analysis shows that for rs9340799 a significant association in comparison for AA vs. GG (OR= 0.65, 95% CI: 0.43, 0.98) in Asian population whereas in Caucasian population it is (OR= 0.71, 95%, CI: 0.54, 0.92) for A allele vs. G allele model, OR= 0.49, 95% CI: 0.28, 0.83) for AA vs. GG model and OR= 0.04 95% CI: -0.15, 0.23) for AG + GG vs. AA model. This meta-analysis suggests that SNP Xba1 rs9340799 indicate a protective effect against male infertility and of oligospermic condition

POSTER-16

IN SILICO ANALYSIS OF CPB2 GENETIC VARIANTS ASSOCIATED WITH CVD

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In the present study, a personalized drug was designed for cardiovascular disease due to mutation in genetic variants using an *in silico* approach. Polymorphism in genetic variants rs1926447 and rs3742264 of the CPB2 gene is involved in several heart diseases including coronary heart disease, acute myocardial infarction, stroke, angina pectoris, and hypercholesterolemia. The best phytochemical was selected for particular SNPs to check the response of mutant proteins of specific SNPs towards a specific ligand. The phytochemical was selected using in silico testing, molecular docking, and by evaluating different drug-like properties. In this study, three phytochemicals ursolic acid, salvianolic acid, and limacine were selected for both variants of mutated protein depending upon the highest binding energy, number of interactions, low toxicity, and drug-like properties. These phytochemicals were then compared

with the standard drug Rivaroxaban which is orally given anticoagulant to CVD patients. The selected phytochemicals have the potency to be used in animal model trials to check their better response in the human body in the future.

LATE RECEIVED ABSTRACTS

CBGP-166
Biotechnology

BIOPROSPECTING OF EXTREMOPHILES AND THEIR POTENTIAL USE IN INDUSTRIAL PROCESSES

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Agro-industrial waste is naturally rich in nutrients and promotes microbial development. The majority of agricultural wastes are lignocellulosic in origin, with sugars accounting for a significant portion. Agricultural leftovers can thus be used to make a variety of high-value products like industrially important enzymes. The majority of current prospective bioprospecting is focused on the research of extremophiles and their possible applications in industrial processes. Microbial cellulases have recently found applications in a variety of industries, and they now make up a significant group of industrial enzymes. Microbial cellulases have gotten a lot of attention recently, especially with the return of interest in biomass ethanol production using cellulases and the usage of cellulases in the textile and paper industries. The most efficient lignocellulosic biomass hydrolysis process is using cellulases for enzymatic saccharification. There has also been a significant amount of information acquired concerning the physiology of thermophilic cellulase producers and enzyme production process development and saccharification of biomass.

CBGP-167
Toxicology

Evaluation of Nutraceuticals from Camel Milk

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Camel milk is a valuable source of nutrition having wide range of therapeutic effects. Due to its unique composition, it helps in regulating the blood glucose level. Diabetes is a severe health problem with increasing prevalence in the world. This study aims to evaluate the antidiabetic, hepatoprotective effects, and lipid profile restoration of camel milk in diabetic mouse model. The results showed that camel milk significantly reduced blood glucose, HbA1c (p <0.001), aspartate transaminase (AST), alanine transaminase (ALT) (p <0.01), triglyceride (TG), and cholesterol (p <0.01) compared to the diabetic control group. Moreover, the therapeutic effects of camel milk were completely comparable with the antidiabetic drug glibenclamide. This is the first study which evaluate the therapeutic effects of camel milk in diabetic mice by simultaneously measurement of blood glucose, HbA1c, ALT, AST, TG, cholesterol, and histopathological studies. The results of this study suggested and confirmed that camel milk can be used as a proper alternative treatment regimen for diabetes therapy. Due to the presence of insulin like proteins, bioactive peptides and poly-unsaturated fatty acids, the camel milk might be a good source for the treatment of diabetes and cardiovascular diseases.

CBGP-168
Toxicology

HISTOPATHOLOGICAL EFFECT OF PERMETHRIN ON GILLS, LIVER AND INTESTINE OF SILVER CARP (*Hypophthalmichthys molitrix*)

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The aim of the present study was, to evaluate the histopathological effect of permethrin as biomonitoring marker by taking fish (*Hypophthalmichthys molitrix*) as a model organism. A total of 30 fishes were equally divided in to 5 groups, mean total length 11.95cm and mean weight 16.45g. Four treatment groups, Treatment 1, Treatment 2, Treatment 3 and Treatment 4 were exposed to 30ppb, 35ppb, 40ppb and 45ppb solution of permethrin respectively for 24 hours. One group was kept as control. Several histopathological alterations were observed in gills, liver and intestine of silver carp by using histological analysis through microtome technique. In this study the histopathological changes observed in gills at different concentrations of permethrin were; disruption of gill arches, primary lamellae, secondary lamellae and gill epithelium, accumulation of calcium, fusion of lamellae, detachment of secondary lamellae from primary lamellae, fusion and folding of secondary lamellae, degeneration in the secondary lamellae, desquamation of the goblet and mucosal cells. While in liver from mild to severe congestion, cellular shrinkage, increased sinusoidal spaces, pycnosis, cellular degeneration, severe hemosidrosis, accumulation of inflammatory cells at the border and around the blood vessels, disorientation of the hepatic cell plates and fibrosis. The histopathological changes examined in intestine were accumulation of inflammatory cells, mucosal disruption, severe necrosis and shredding of the mucosal cells. The acute toxicity study revealed that fish in all treatment groups showed completely abnormal behavior like loss of equilibrium, severe slime secretion, bulging out of eyes, rapid gill movement etc. It is concluded that permethrin is highly toxic and causes histopathological damages in gills, liver and intestine of fish. It was further concluded that silver carp (*Hypophthalmichthys molitrix*) is a good biomonitoring organism.

CBGP-169
Cell & Molecular Biology

REGULATION OF TGFB SIGNALING IN CANCER CELLS USING PLANT BIOACTIVE COMPOUNDS

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TGF beta family have biphasic nature having both tumor suppressive as well as tumor promoting activity. Downregulation of transforming growth factor beta receptor (TGFβR) signaling pathway can provides better therapeutic strategy to control oncogenesis. Natural products are best known for their safety, less toxic nature, antioxidant characteristics making them a promising candidate to inhibit TGFβR signaling pathway. Keeping in view the present study is designed to investigate the inhibitory effects of crude extracts

from sixteen reported Pakistani medicinal plant species. Plants methanolic extracts (sixteen selected plants) were prepared by using maceration method and subjected to phytochemical assays for identification of major phytometabolitse. Free radical scavenging activity and total flavonoid contents of crude extracts were determined through DPPH assay and aluminum chloride method respectively. MTT colorimetric assay was performed to determine anticancer activity of medicinal plants against HUH and MCF-7 cell lines followed by expression analysis of potent extracts through quantitative RT-PCR analysis. The comparative results showed that *C. intybus* contain highest amount of total flavonoid content 0.53 mg/ml while *M. oleifera* revealed the maximum scavenging activity having IC_{50} value of 2.03µg/ml and that of standard ascorbic acid IC_{50} was 5.67µg/ml. The nine active plant extracts i.e. *F. arabica, A. Mexicana, R. fructicosus, M. oleifera, P. granatum, C. Intybus, X. strumarium, C. opaca, C. rotundus*. were identified based on their high antiproliferative activity against cancer cell lines inhibition (%) >50. *F. arabica* and *A. mexicana* significantly downregulated the expression of TGFβR (1,2 & 3) and receptor associated complex protein SMAD3. These relative expression studies for TGF beta pathway is a new addition to this field.

CBGP-170
Physiology

NORMALIZATION OF HUMAN-BEHAVIOR THROUGH HOMEOPATHIC MEDICINES

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Human mind possesses special centers that control specific activity. Any derangement in a mind center's activity creates a related change in one's behavior. Specific Homeopathic medicine can normalize the physiology of related specific portion of our mind and in turn, normalization of such behavior is observed. As regards the normalization of human behavioral activity, the Homeopathy gives miraculous and prompt results. Though each and every homeopathic medicine possesses its effects over patient's mind but some elucidate rather pronounced results, I may quote a few instances in this aspect of human issues.

a. A lady of round about fifty was weeping while explaining her health problem. I enquired the cause of her misery as to why she was weeping she didn't disclose any sound cause of her sorrow leading to weep. I gave her a single dose of *Pulsatilla pratensis* 200, after few minutes she started smiling while discussing her same health hazards.

b. A child of about eleven years died, naturally, his mother went unconscious owing to this psychosomatic trauma. She was provided *Ignatia amara* 30. After few minutes she was behaving quite normal.

c. An adolescent of 16 was to go mad for suicide, he was duly prescribed *Aurum metallicum* 30 and he reclaimed his normality within one month.

d. The most interesting and extremely useful use of a homeopathic medicine for foolish passion of so-called frantic romance of -teen agers. I successfully treated over a thousand boys and girls, with the hundred percent successes, through a single homeopathic medicine named *NATRIUM MURIATICUM* 200 or Sodium Chloride 200 (medicine prepared from table Salt) that normalized their behavior regarding foolish passion of crazy-love of youngsters. This medicine gives miraculous results whenever the person is under the stress of any sort of this psychological problem. In this regards an interesting example can explain the miraculous aspect of the action of this homeopathic medicine. A usual victim of ailing customs in the sub-continent was coerced to suffer the pangs of infructuous marital life. A newly married life maiden was denied the merriment of the first night by no one else but the bridegroom himself who

whimsically deserted her for good. She had to lead a melancholic life of a condemned spinster. A magician of a homeopath helped restore her spirits and developed an angelic lust for life through a wonder drug *Natrium muriaticum* 200 on symptomization of her other health problem without knowing her long standing marital issue. The wronged bride after over a decade of frustration, demanded deliverance from conjugal yoke and zestfully made preparations for another chess of locating joyous tactility-more than the good-luck to the victim and boosting tribute to the efficient prescriber, the talismanically efficacious prescription ought to be eulogized to do justice in the matters of cause and effect.

CBGP-171
Toxicology

HEAVY METALS IN THE ECOSYSTEM OF RIVER SWAT: BIOACCUMULATION IN FRESHWATER FISH AND ASSOCIATED HUMAN HEALTH RISK ASSESSMENT

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Heavy metal contamination threatens aquatic ecosystems and human health. This study investigates the bioaccumulation of copper (Cu), chromium (Cr), cadmium (Cd), and zinc (Zn) in water and freshwater fish (*Carassius auratus, Schizothorax plagiostomus, Channa punctata*) from the Swat River and ponds at the University of Malakand. Samples were obtained from Chakdara, Landakay, Mingora, and the University of Malakand. Heavy metal concentrations were determined using Flame Atomic Absorption Spectrometry (FAAS). Compositional Data Analysis (CoDA) was employed, utilizing Principal Component Analysis (PCA) on clr-transformed data. At the Chakdara site, PC1 accounted for 80.28% of the total variance; at Landakay, PC1 explained 95.15% of the variance; at Mingora, PC1 accounted for 85.45%; and at the University of Malakand Pond, PC1 explained 77.83%. Zn was the most common metal, with significant bioaccumulation in fish gills, followed by liver and muscles. These findings emphasize health hazards in future for local populations consuming contaminated fish, underscoring the need for regulatory measures, waste management, and public awareness to reduce heavy metal contamination. Future research should focus on longitudinal investigations of the river.

FEWFM-59
Wildlife

ECOLOGY AND HUMAN-WILD BOAR CONFLICT PATTERN IN MUZAFFARABAD DISTRICT, AZAD JAMMU AND KASHMIR, PAKISTAN

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Wild boars (Sus scrofa) are a significant ecological and agricultural concern in Muzaffarabad District, Azad Jammu and Kashmir, within the western Himalayan range (582–4,473 m a.s.l.). This study (April

2020–October 2022) aimed to assess wild boar distribution, population status, habitat preferences, dietary composition, economic losses to local communities, and public perceptions of human-wild boar conflict. The study area was categorized into three elevation-based zones and subdivided into twelve localities based on topography and vegetation. Wild boar populations were estimated using line transect sampling, and indirect signs (footprints, fecal matter) were recorded for relative abundance. Vegetation was analyzed using the quadrat method, and species diversity was assessed with the Shannon-Wiener and Simpson's Diversity Indices. Stomach contents of 42 wild boars were examined using standard stomach content analysis to determine dietary composition. Economic losses were assessed through structured surveys (900 respondents), and human-wild boar conflicts were evaluated using incident frequency analysis. The estimated wild boar population was 489 individuals, with an average density of 6.03 individuals/km². The highest density was in Zone B (6.1 individuals/km²), and the lowest in Zone C (5.3 individuals/km²). Wild boars were most active in subtropical broad-leaved forests (24.39%) and least in urban areas (9.76%). Vegetation analysis (340 quadrats, 143 transects) identified 221 plant species from 71 families, with Poaceae (10.41%) and Asteraceae (5.88%) being dominant. Pinus wallichiana (IVI: 17.99) and Pinus roxburghii (IVI: 13.65) were the most prevalent tree species. Biodiversity indices indicated a stable ecosystem (Simpson's Diversity Index: 0.95, Shannon-Wiener Index: 3.39). Dietary analysis identified 31 food items, predominantly plant matter (84.46%)—including cultivated (42.77%) and uncultivated plants (41.69%). Animal matter contributed 8.65%, with garbage (5.51%) and soil (1.38%) as minor components. Grasses and roots (25.93%), Zea mays (16.37%), and Triticum aestivum (13.71%) were the most frequently consumed. Seasonal variations showed the highest dietary diversity in autumn (23 items). Agricultural damage was substantial, with wild boars affecting 17.87 acres (16.78%) of cultivated land, reducing crop yield by 14.59 tons (17.65%), and causing economic losses of 1,117,200 PKR (4,215.83 USD). Maize was the most affected crop (88.53%). Retaliatory killings resulted in 26 wild boar deaths, mainly due to gunfire (65.38%) and electric fencing (30.77%). The study underscores the growing human-wild boar conflict, necessitating sustainable conflict mitigation strategies to protect local livelihoods while ensuring ecological balance. Effective management interventions, such as community-based control programs and habitat modifications, are essential to mitigate the conflict.

FEWFM-60
Marine Biology

SUPPORTING SEAWATER AQUARIUM MAINTENANCE BUSINESS WITH KARACHI COAST RESOURCES

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Seawater aquarium maintenance was started in the early 1980's in Lahore by Shah Sahib (fish Land) and in Krachi by Najmuddin (Rainbow aquarium). It was strengthened by the Ph.D. thesis by Dr. Nadeem Ahmed on economy of aquarium fishes. Up to the year 2025 seawater aquarium ae comes on sale by couple of aquaria fishes' shops, Lahore, Karachi, Hyderabad and Rawalpindi cities. On the contrary 2000 shops of freshwater aquarium ae present in Pakistan. Local hobbyist did not know how to maintain seawater aquarium. This study explains the problems faced by local hobbyist to keep a seawater aquarium. Interviews of 100 hobbyist was taken on a questionnaire. From the results of interview, it is observed that

local hobbyist does not know how t9aintain seawater aquarium. Hence, this study wrote an Urdu language booklet that will explain the very basic problems faced by Pakistani hobbyists. This booklet explores the physical property of Karachi seawater. The necessary instruments required for a seawater aquariums are also noted therein. Functions of instruments are also noted, along with notes, why these instruments are necessary.

FEWFM-61
Marine Biology

ORNAMENTAL MARINE FAUNA (ZOA), CHECKLIST, CULTURE, MARKETING, DISTRIBUTION AND THREATS IN PAKISTAN

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Marine polyps (Zoa) are the most color full animal among all marine life. Un luckily, it was not explored in Pakistan. There is no published record on ornamental Fauna & Flora. Accept a M.sc. term report of Salaha Khatoon, Zoology Dept. Karachi University and Ph.D. thesis of Karachi University by Nadeem Ahmed (1996) on Economy of ornamental Marine Fishes. A research paper on checklist of marine ornamental fishes was also published in 1991 in the proceeding of conference of Pakistan Coastal Zones Management, MRCC, Karachi University by this Ph.D. author. Culture: The authors are culturing polyps, in sea as well as in Laboratory at Lahore and Karachi. Imported color full species of zoa has not yet been introduced in our local sea, due threat of foreign disease. To made zoa more value added, we are pasting 5/6 color full species at the single disk. These disks are made by cutting the dead corals. Dead coral pebble and cobbles are collected from the Mubarak Village to made disks during the moon soon (JUNE AND JULY). Checklist: The authors found 21 species of Zoa in Pakistan, of which few are collected from non tidal rocks. The non tidal polyps look like the flower pot coral (*Gynia),* it is observed during diving. But on collection, it was identified as a soft coral (ZOA). Luckily, Pakistan has 5 species of most color full Polyps that are ranked among, the top ten color full polyps of the world, like eagle eye, Bam Bam, etc. Distribution: In 1200 km long coastal belt polyps are very abundant, at 40% of the rocky shores. Amazingly, some of the rock shores are totally minus with zoa like Jiwani coast (IRAN BOARDER). Gawar Coast is also containing 2/3 species of Zoa. Gadani Coast containing 4/5 species. Where, it is abundant at Karachi Coast. Our sea is situated along the Sindh and Baluchistan, out of 4 provinces. The 90% of polyps are distributed at Karachi at the tide zones at Manora, Kaka Village, Sands spit, Buleji Village, Pacha Bunder (Juma/Hajji Goath), Mubrak Village, Light House of Sonehara Beach, Light house of Mubarak Village and Gidany ship breaking coast (at extreme eastern side). Marketing: Marketing of reef is ban under the wild life act. On the other hand, cultured Corals are not ban to sell. International rate lists are published. In it prices for polyps are per polyps. But in Pakistan a bunch of 3 inches diameter contains prices in Pak Rupees 150 to 300 only. Threats: The polyps and other reef items are not very much abundant in world, specially in Pakistan. If marketing starts it will wash the local fauna. For instance, in the year 2013 sea water aquariums keeping practices was taken boom. Due to this boom a pressure on wild polyps was increased. Few species of polyps were eradicated from our coast. Like 100% green polyps. They were eradicated from the Kaka Village, as it was only distributed there. But, in the

year 2023 few colonies of green polyps were observed at western hill rocks of Mubarak village. Now in the year 2025, few small colonies of 10-inch diameters are also observed at the Kaka Village.

FEWFM-62
Fish Biology and Fisheries

IMPACT OF TEMPERTAURE FLUCTUATIONS ON GROWTH OF COMMON CARP *(Cyprinus carpio)*

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Temperature is a key environmental factor that significantly affects the growth and metabolism of fish, impacting nearly all aspects of their life. This study aims to measure the impact of water temperatures ranging from 20°C to 30°C on the growth of cultured fish species Common carp, *Cyprinus carpio* for fresh water aquaculture. Each aquarium was equipped with a 100W automatic heater with a thermostat to maintain specific temperatures, which were regularly checked with an alcoholic thermometer. The temperature was monitored and recorded over a 45-day period. Throughout the experiment, fish were fed a commercial diet twice daily at 3% of their total body weight. The three temperature ranges were 20°C, 25°C and 30°C studied in three intervals. The study compares treated groups (exposed to controlled temperatures) and control groups (natural conditions), measuring weight, total length (TL), standard length (SL), width, condition factor (K), and specific growth rate (SGR). In the first interval (09–24 Dec 2024, 20°C), treated groups showed significant weight gains, with the highest growth rates (SGR: 17.46%). Total length, standard length, and width also increased, with statistical significance ($p<0.01$). The control group displayed less pronounced growth but no significant initial weight differences ($p=0.1119$). During the second interval (24 Dec–07 Jan 2025, 25°C), treated groups demonstrated further growth by achieving the highest SGR (18.93%) Initial weight disparities were significant ($p=0.0003$). The control group also showed growth (16.53%) though initial weights varied significantly ($p=0.0002$). In the third interval (08–22 Jan 2025, 30°C), treated groups exhibited moderate growth with SGR (11.3%). Statistical significance was noted for weight ($p=0.0027$). The control group displayed significant growth in weight ($p=0.0009$). The research suggests the temperature ranges between 22°C – 26°C for the optimal growth of Common carp, *Cyprinus carpio*.

ENT-76

IMPACT OF CLIMATE CHANGE ON MONARCH BUTTERFLY IN SINDH, PAKISTAN

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The term global change wrap a range of natural and anthropogenic environmental change According to Intergovernmental Panel on Climate Change, global change is defined as “Change in climate over time, either due to natural variability or as a result of human activity”. Changes in climate and weather could profoundly affect the status of

insect pests of crops. These may arise not only as a result of direct effects on the distribution and abundance of pest populations but also indirect impact on the pests' host plants, competitors and natural enemies. Insects are among the groups of organism most likely to be affected by climate change because climate has a strong direct impact on their development, reproduction and survival. In this research paper, the special focus is on monarch butterfly that how global change affect the larval and pupal development of monarch butterfly. In general, 400 eggs can be laid by one adult butterfly or moth. Out of those 400 butterfly eggs, only about 8 live to become adult butterflies. Nature kills about 98% before they become adults. Monarch butterflies are among the endangered species assessed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). Once numbered at over one billion in the 1990s, monarch butterflies declined to approximately two hundred million individuals in 2015-2016. A number of traits make them vulnerable to a changing climate. Like most butterflies, monarchs are highly sensitive to weather and climate: They depend on environmental signals (temperature in particular) to trigger reproduction, migration, and hibernation. They also face a decline in their overwinter habitat, and the effects of an increasing frequency of extreme weather events such as drought and severe storms, and extremes in hot and cold temperatures. This study serves as a foundation for further entomological research and provides valuable insights into biodiversity conservation strategies for monarch butterfly in Sindh, Pakistan.

PC-25

EFFECT OF CLIMATE CHANGE ON VEGETABLE PEST POPULATIONS IN HYDERABAD, SINDH

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In Hyderabad, Sindh, insect pests that harm vegetable crops are changing dramatically in terms of population dynamics, distribution, and severity due to climate change. Aphids (*Aphis gossypii*), whiteflies (*Bemisia tabaci*), Thrips (*Thrips tabaci*), and fruit borers (*Helicoverpa armigera*) are among the principal pests that have proliferated due to rising temperatures, erratic rainfall patterns, and higher humidity. Longer insect reproductive cycles, higher infestation rates, and the emergence of pesticide-resistant pest strains are all results of these environmental changes. Higher temperatures can speed up the metabolism of pests, increasing feeding activity and causing crop damage. Sustainable pest management has become increasingly difficult due to the unpredictability of weather patterns, which has also affected the efficacy of conventional pest control techniques. In order to lessen the negative effects, this study examines the relationship between insect outbreaks in vegetable crops and climate change. It highlights the necessity of adaptive pest management techniques such biological control, integrated pest management (IPM), and climate-resilient agricultural practices.

PC-26

EVALUATION OF CONVENTIONAL AND BIO PESTICIDES AGAINST GREEN BUG SCHIZAPHIS GRAMINUM IN WHEAT GENOTYPES AND THEIR IMPACT ON YIELD AND YIELD COMPONENTS, IN PESHAWAR VALLEY

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This research was conducted on three wheat genotypes, Wadan-2017, Gulzar-2019 and Serin-2010, at Malakandher Research Farm, Agricultural University Peshawar during 2024, to evaluate the effectiveness

of conventional and bio-pesticides against aphid's complex infestation on wheat genotypes, and their influence on yield and yield components. Wheat cultivars; Wadan-2017, Gulzar 2019 and Serin- 2010, were used during this experiment. The selected pesticides (Lymbda-cylotrine Neem Oil and Tobacco leaf extract) were used during this research. The experiments were conducted in randomized complete block design with three replications. Population trend of aphids on Different wheat genotypes was observed from seedling to maturity of the plants or till harvesting. The insect appeared first in the last week of January. The number of aphids gradually increased up to the third week of February. During last week of February, the aphid's population increased gradually and reached its peak. with an average of 81.44 aphids per plant. During this period, the aphids posed a potential threat to the wheat crops due to their high numbers. However, reaching to its peak, chemicals treatments were initiated to keep aphid population before reaching the EIL. The application of tested pesticides Lymbda-cylotrine Neem Oil Tobacco leaf extract By using pesticides the number of green bugs decreased significantly, and by the end of March, insect population decline minimum where the selected cultivars showed clear response to the aphid population in terms of wheat cultivar Wadan 2017 sustained 30 aphids per plant compared to cultivar Gulzar-2019, sustained (58.32) aphids per plant and Serin-2010 attracted (81.44) aphids per plant. The tested cultivar, Wadan-2017, showed strong response to aphid population compared to the other tested cultivars. Among the tested pesticides, Lymbda-cylotrine proved highly effective and minimized significantly low number of aphid compared to the other tested pesticides. Growth parameters indicated that Lambda Cyhalothrin-treated plots exhibited enhanced spikes and grains per spike, along with the highest thousand grains weight (38.3 g). Tobacco leaf extract-treated plots also showed substantial improvements (37.2 g), while control plots displayed the lowest weight (34.4 g). Among wheat genotypes, Wadan-17, genotypes demonstrated maximum thousand grains weight (37.4 g), while, cultivar Serin-10 had the lowest (35.2 g). It is concluded that Lambda-cyhalothrin may be used during wheat growing season against green bug for effective control of aphids and enhancing yield of wheat.

PC-27

EFFICACY OF DIFFERENT PESTICIDES ON CANOLA GENOTYPES AGAINST APHID LIPAPHIS ERYSIMI UNDER FIELD CONDITIONS

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An experiment was conducted at the New Developmental Research Farm, The University of Agriculture, Peshawar, Pakistan, to study the population trend and assess the efficacy of different insecticides on canola genotypes against *Lipaphis erysimi* under field conditions. Results showed that maximum mean population of 66.42 aphid plant^{-1} was recorded on canola genotype WY-48, while lowest mean population of aphid i-e (41.80) aphid plant^{-1} was recorded from Rokhana variety. Similarly, mean population of aphid showed that aphids appeared initially at1.44 aphid plant^{-1} during the first week of January and peaked to 173.11 aphid plant^{-1} during 8th week (26-February) post emergence; however, after 8th week it start declining and this trend continued for till 13th week (02-April). At the seedling stage, flowering and pod stages Bifenthrin, Neem Oil and Thiamethoxam treatments showed the highest efficacy in reducing aphid populations across most Genotypes and time intervals. Specifically, Bifenthrin treatment significantly reduced number of aphids in HC-09 Genotype at all observed time intervals (1 DAT, 3 DAT,

7 DAT and 14 DAT). Similar positive response was recorded in the WY-48 Genotype. Regarding sub-branches, Bifenthrin treated Genotypes i-e HC-09, WY-48 and Rokhana showed significantly maximum sub-branches in all three canola Genotypes. Neem Oil and Thiamethoxam treatments resulted in comparatively lower sub-branch counts, with Neem Oil displaying the lowest sub-branch development among the insecticide treatments. Similarly, Bifenthrin treated HC-09, WY-48 and Rokhana yielded the highest pod counts for all Genotypes followed by Thiamethoxam. On the other hand, control group in each genotype exhibited significantly lower pod numbers for all genotypes. Data regarding Yield (kg/ha) revealed that Bifenthrin treated all genotypes (HC-09, WY-48 and Rokhana) yielding the highest quantities. Thiamethoxam treatments also led to relatively high yields, while the control group exhibited notably lower yield. Bifenthrin treatments constantly displayed positive impacts on sub-branch development, pod formation, and yield across all canola Genotypes, followed by Thiamethoxam treatments. Neem Oil treatments were ineffective in promoting sub-branch and pod development, and yield.

FEWFM-63
Wildlife

NATURAL NESTING OF BIRD SPECIES IN BAGHDAD-UL-JADEED CAMPUS, THE ISLAMIA UNIVERSITY OF BAHAWALPUR, PAKISTAN

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The study examines the natural nesting patterns of bird species at the Baghdad-ul-Jadeed Campus of The Islamia University of Bahawalpur, Pakistan, highlighting the ecological significance of tree species in supporting Fauna biodiversity. Random survey and use of digital camera to natural nesting identification. A total of 59 bird species were documented, with the Common Myna, Black Kite, House Sparrow, and House Crow being the most prevalent. Eucalyptus (*Eucalyptus commendlensis)* and *Acacia nilotica* emerged as the dominant nesting trees, hosting 80% of observed nests due to their tall canopies, sturdy branches, and protective cover, which are crucial in Bahawalpur's arid climate. Key nesting hotspots included the nursery, CIDS area, hostels, staff colony, and sports complex, with GPS-mapped nest locations revealing species-specific preferences. Cavity-nesting birds, such as woodpeckers and parrots, demonstrated higher reproductive success compared to open-nesting species, aligning with global trends. The findings underscore the importance of conserving these tree species to maintain wildlife habitats and recommend sustainable urban green space management to mitigate predation risks and climate challenges effects for natural nesting of birds' species. The current study helped to assess the fauna diversity of the campus and will further be helpful for studies in future for conservation and sustained use natural nesting of the fauna diversity.

FEWFM-64
Wildlife

ARTIFICIAL NESTING OF BIRD SPECIES IN BAGHDAD-UL-JADEED CAMPUS, THE ISLAMIA UNIVERSITY OF BAHAWALPUR, PAKISTAN

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Artificial nesting plays a crucial role in sustaining biodiversity by providing safe nesting sites for various bird species. In recent decades, global biodiversity has been threatened by anthropogenic activities, leading to habitat fragmentation, species extinction, and environmental degradation. The Baghdad-ul-Jadeed Campus of The Islamia University of Bahawalpur, has undergone rapid development,

significantly altering its flora and faunal composition. This study was conducted to investigate and document artificial nesting within the campus. The study area was divided into three major habitat types: cultivated land, infrastructural zones, and desert regions. Total 156 nests were installed at different selected sites. Comprehensive surveys were conducted to assess bird diversity in artificial nests. The results showed that total 60% nests are occupied by the birds. Inhabitation of birds inside artificial nest was affected by environmental and anthropogenic factors such as water availability, nearby food source, human activities, nest site, and predation. Artificial nesting plays a pivotal role in the future of bird conservation, especially as natural habitats face increasing threats from urbanization, agriculture, and climate change. Artificial nesting is increasingly vital for bird conservation as natural habitats decline due to urbanization, population growth, and climate change. As trees and traditional nesting sites diminish, artificial nests offer alternative safe havens for birds to breed and raise their young. These structures are particularly crucial in urban areas, where natural nesting options are scarce. However, it's important to design and place artificial nests thoughtfully, as improper implementation can lead to ecological traps, attracting birds to suboptimal or unsafe environments. The findings of this study provide valuable insights into artificial nesting practices on the campus and will serve as a foundation for future conservation efforts and the sustainable management of local birds by artificial nesting.

FEWFM-65
Marine Biology

DINOFLAGELLATES ON THE EDGE: DIVERSITY AND TOXICITY ALONG THE BALOCHISTAN AND SINDH COASTAL WATERS

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Dinoflagellates are primary producers, play a significant role in maintaining the ocean's health and are indicators of climate change. Mostly occurring in marine habitats, but also found in freshwater and estuary environments. The Seawater samples were collected monthly for one year from Gadani and Sandspit to analyze Dinoflagellates on board using Niskin bottles. The significant number of cells/L of Dinoflagellates was recorded in April 39360 cells/L in Gadani and in August 65540 cells/L in Sandspit. The dominant species observed in Gadani were *Ceratium, Noctiluca, Prorocentrum and Pyrocystis,* whereas in Sandspit *Ceratium, Noctiluca, Prorocentrum and Scrippsiella.* In the foregoing study, toxic species of *Dinophysis caudata, Dinophysis miles, Gonyaulax spinifera,* and *Alexandrium,* have been reported from Gadani and Sandspit. The abundance of Dinophysis caudata and Prorocentrum micans in Gadani and Sandspit shows an alarming situation as they cause diarrhetic shellfish poison in humans. The results showed variation in the species composition of phytoplankton in two coastal sites along with the difference between shore, middle shore and open ocean. Dinoflagellate communities are susceptible to change in their environment due to their Harmful bloom activity that may cause fish mortality and shellfish poisoning.

POSTER-17

ROOSTING SITE SELECTION AND SEASONAL DYNAMICS OF THE INDIAN FLYING FOX (PTEROPUS MEDIUS): INFLUENCE OF ENVIRONMENTAL AND ANTHROPOGENIC FACTORS

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This study investigates the roosting site selection of the Indian Flying Fox (*Pteropus medius*), examining factors such as tree species, environmental variables, seasonal population fluctuations and anthropogenic influences. A total of 15 roosting sites were analyzed, encompassing 202 trees across 19 species from 10 families. Results revealed that roosting sites with higher bat populations were dominated by *Bombax ceiba* (16.34%), *Eucalyptus* (9.9%), and *Pinus strobus* (8.42%) with more number of bats in winter while *Syzygium cumini* (7.92%), *Swietenia mahagoni* and *Ficus benjamina* (6.4%) were more frequently occupied by *P. medius*, with a higher number of bats observed in summer compared to winter. Significant seasonal fluctuations were observed in bat numbers, with protected sites showing minimal changes, while non-protected sites saw higher bat populations in winter. Principal component analysis (PCA) identified temperature, humidity and vegetation as key factors influencing roost site selection, with anthropogenic activities, including tree cutting and hunting, negatively affecting bat populations. According to PCA analysis, protected permanent roosting sites in natural habitats with minimum human interference scored highest points followed by permanent protected sites in urban areas and temporary non-protected sites were on lowest scores. Correlation of number of bats with category of roost site, protected areas (r=0.38), permanent roost site (r=0.37), number of trees (r=0.99) and roost site area (r=0.77). The study also found a 1.68% decline in bat populations between the 2022-2023 and 2023-2024 seasons, with substantial declines at certain sites due to unsustainable human activities. These findings highlight the relationship between natural environmental conditions and human impacts on roosting site suitability, emphasizing the need for conservation measures to protect critical roosting habitats for *P. medius*.

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This index enlists only the names of the oral presenter, who is also the first author in the Abstract

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