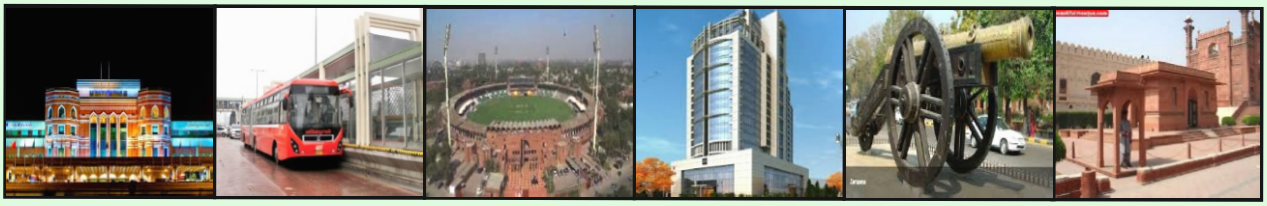

ABSTRACTS

41st

PAKISTAN CONGRESS OF ZOOLOGY

(INTERNATIONAL)

March 16-18, 2023

Organized by:

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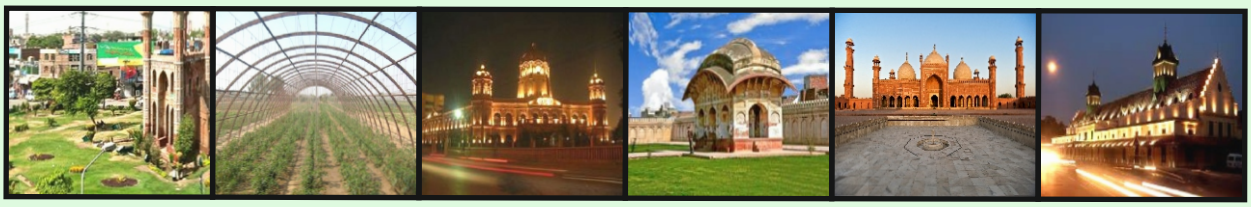
University of the Punjab, Lahore



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ABSTRACTS

ZOOLOGICAL SOCIETY OF PAKISTAN

C O N T E N T S

PLENARY LECTURES

PLENARY LECTURE-1

VAGINAL MICROBES AND FEMALE INFERTILITY

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The vaginal microbiota plays an essential role in female health and reproduction. A healthy reproductive tract environment helps support successful embryo implantation and maintains pregnancy. The vaginal microbiota composition of females with different infertility diagnoses, such as polycystic ovarian syndrome (PCOS), premature ovarian insufficiency, hydrosalpinx, and endometritis, and the influence of vaginal microbiota on the outcome of in vitro fertilization treatment are still unclear because of the paucity and inconsistency of published data. Here we profile the vaginal microbiota of 1,411 women by sequencing the V3-V4 region of the 16S ribosomal RNA gene. We further clarify the relationship of vaginal bacterial composition with female infertility and 11 clinical and biochemical measurements. Lactobacillus (~78%) dominated the vaginal microbiome and clustered into five types. Type III had higher Gardnerella abundance. Type V women with higher abundances of Streptococcus and Prevotella. Type III and Type V women had poorer pregnancy outcomes. Furthermore, microbiome features associated with infertility were: Prevotella nigrescens with endometriosis, Alloscardovia omnicolens with scarred uterus and Prevotella with adverse pregnancy outcomes. The control and PCOS (polycystic ovarian syndrome) groups had relatively higher IVF outcomes. The vaginal microbiome is associated with fertility, suggesting that vaginal microbes could be used to detect infertility and potentially improve IVF outcomes. The study provides insight into the nature of the vaginal microbiome and its relationship with hormones and IVF outcomes, and the findings suggest that surveying the vaginal microbiota might be useful for the detection of some types of infertility. These profiles will undoubtedly increase our understanding of female vaginal bacteria and their impact on reproductive outcomes.

PLENARY LECTURE-2

ZOONOTIC AND ZOOANTHROPONOTIC TRANSMISSION OF SARS-COV-2

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The emergence of multiple variants of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) highlights the importance of possible animal-to-human (zoonotic) and human-to-animal (zooanthroponotic) transmission and potential spread within animal species. A range of animal species have been verified for SARS-CoV-2 susceptibility, either in vitro or in vivo. However, the molecular bases of such a broad host spectrum for the SARS-CoV-2 remains elusive. We structurally and genetically analysed the interaction between the spike protein, with a particular focus on receptor binding domains (RBDs), of SARS-CoV-2 and its receptor angiotensin-converting enzyme 2 (ACE2) for all conceivably susceptible groups of animals to gauge the structural bases of the SARS-CoV-2 host spectrum. Data will be presented in the context of existing animal infection-based models to provide a foundation on the possible virus persistence in animals and their implications in the future eradication of COVID-19.

PLENARY LECTURE-3

FUNCTIONAL GENETIC AND COMPUTATIONAL APPROACHES FOR COMPLEX PHENOTYPES AND DRUG SCREENS

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The advent of next generation sequencing technologies and ever decreasing cost of sequencing have made it possible to sequence tremendous amount of genomes. The genome sequencing efforts have already revealed millions of genetics variations of all sorts. The mutant genes found in various disease genomes, contribute to the various complex phenotypes and their contribution and mechanisms remain to be investigated in majority of the cases. The revolutionary CRISPR-Cas based genome editing technologies have facilitated the rapid generation of large number of isogenic models of the various genetic alterations. We have implemented CRISPR-Cas based genome editing to develop various cellular disease models to investigate the contribution to overall phenotype and the mechanism of action of various mutations found in different cancer types. The various omic-approaches were implemented to reveal the differential transcriptomes, proteomes, metabolomes, and chromosomal conformations of the disease models. The mutually exclusive *KRAS* and *BRAF* mutations in colorectal cancer cells were modelled in *BRAF* and *KRAS* driven cancer cells, respectively. These cellular models revealed the differential regulation of carnitine metabolic pathway. The genome sequencing and functional genetics of the variations revealed various potential drug target proteins. The computer aided *in silico* drug screening was successfully used to screen FDA approved drug molecules. The promising drug molecules were successfully validated *in vitro*, by using various biochemical assays. The whole transcriptome analyses were used to study the differential transcriptional regulation after drug treatment to uncover the mechanism of the drug.

PLENARY LECTURE-4

EXTINCTION CRISIS OF ORTHOPTERA: STRATEGIC CONSERVATION PLAN AND FUTURE PROSPECTS

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Orthoptera are a diverse group of insects, which consists of about 29396 (OSF: 2022) hitherto described species. The distribution of the Othoptera is worldwide, occurring in both the new and old worlds. Pakistan stands with 263 well-known species within 49 genera in 8 superfamilies: Tettigonioidea, Schizodactyloidea, Grylloidea, Acridoidea, Pyrgomorphoidea, Tetrigoidea, Eumastacoidea and Tridactyloidea. The majority of species don't cause any significant damage with exception of Desert locust. DL swarms caused 3.4 billion US$ to 10.21 billion US$ over the two agricultural seasons in 2020 and 2021 in Pakistan. In fact, Orthoptera are known to be good indicators for environmental monitoring and assessment, being herbivorous/ carnivorous, they are important for ecosystem functioning, they also provide aestethic value as the songs of crickets and bush-crickets and sound production is also helpful for species identification, some species are burrower maker, which helps in soil aeration. Unluckily, Orthoptera species are threatened with extinction in globally. This is mainly due to habitat loss as a result of agricultural intensification i-e use of fertilizers, heavy machinery, transformation of grassland, overgrazing, use of pesticides, frequent mowing, land abandonment, increasing wildfire frequencies, and touristic development and urbanisation. According to the IUCN Red list, Orthoptera are the most threatened group in invertebrates particularly: *Gryllotalpa* and *Schizodactylus* face a huge risk to survival due to anthropogenic activity globally. Some Indian peoples used *Schizodactylus monstrosus* (Drury, 1773) for traditional beliefs that various parts of their body help to cure several diseases. Lucky, we have 4 representatives amongst 11 in Pakistan. As *Schizodactylus* species have a high level of endemism, with (36.36%) and *Gryllotalpa krimbasi* (11.11%) being endemic to Pakistan. As these species are found nowhere else in the world, Pakistan has a big responsibility to conserve them. This study is an attempt to (i) provide insight into the knowledge gaps regarding the conservation status of Orthoptera, (ii) briefly assess its local impact on the existing fauna, and comparison of diversity loss changed over time (iii) clarify the lack of awareness in taxonomy, distribution, population trends, ecology and major threats to species (iv) analysis of regional conservation planning through identification of priority geographic areas and habitats. I believe this study will help, making orthoptera a higher conservation priority not only for scientists and decision makers but current knowledge already offers a solid basis for action to increase awareness and conservation of these species on the ground. The data generated from the HEC Project No.14787.

PLENARY LECTURE-5

PRUNUS ARMENIACA A POTENTIAL AGENT FOR DRUG FORMULATION AGAINST CUTANEOUS LEISHMANIASIS: AN EMERGING TROPICAL DISEASE IN PAKISTAN

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Cutaneous Leishmaniasis (CL) is widely scattered manifesting a noticeable epidemiological pattern around the globe, while documented reports are limited in Pakistan, and control strategies are at infancy. The present study aimed to investigate the molecular-epidemiology, associated risk factors, and experimental strategy of the leaves extract fractionated of *Prunus armeniaca* for anti-leishmanial activity. The strategies involved (1) a questionnaire for the collection of information and clinical diagnosis (microscopy and semi-nested PCR) of CL symptomatic patients in District Dir, and Kashmir, Khyber Pakhtunkhwa, Pakistan, (2) previous records of CL in Pakistan was studied, and spatial analysis was performed on elevation and agro-ecological maps using Arc-GIS v10.3.1, and (3) fraction characterization by FTIR, UV–Vis, and GC-MS analysis. Active lesions were found predominant than scars, and infected age groups were found significantly different. Majority of the lesions were dry, single, and frequently infecting facial region. Avoiding bed nets, living in mud houses and animal shelters were highly associated with CL infection. Microscopically, less cases were positive, while the PCR assay revealed *Leishmania tropica* in all cases. Throughout Pakistan, prevalence of CL ranges between 5-95% and the main causative agent was *Leishmania tropica*, followed by *L. major* while fewer cases were infected with *L. infantum* and *L. donovani*. Geographically, ZCL due to *L. major*, were more prevalent in the lowland regions of Pakistan, while ACL due to L. tropica was predominant in the highland regions. Dry mountains and plateaus of northwestern and southwestern regions are spatially at high risk. All derived fractions exhibited toxicity in the safety range IC50 > 100 µg/ml. The fraction (F7) showed significantly the highest antipromastigotes activity with IC5011.48 ± 0.82 µg/ml and antiamastigotes activity with IC50 21.03 ± 0.98 µg/ml compared with control i.e. 11.60 ± 0.70 and 22.03 ± 1.02 µg/ml respectively. The GC–MS chromatogram exhibited the presence of nine essential compounds in which the 1, 2-benzenedicarboxylic acid, diisooctyl ester bound well to the PTR1 receptor. Measures should be taken to reduce CL infection by eliminating the associated risk factors, promoting PCR-based diagnosis and basic medical facilities, and the in vivo studies are required for further unravelling of therapeutic drugs.

PLENARY LECTURE-6

SCIENTIFICALLY STRENGTHENING THE DWINDLING TRADITIONAL MEDICINAL PRACTICES AND LOCAL WISDOMS

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Before the advent of rapid transportation and communication systems which have now been culminated to the Global village world; indigenous/regional knowledge was well in practice and had evolved through human experiences and observations. Such practices formed the basis of established usage of natural resources for sustaining human health as well as to treat diseases. However, the invasion of our region by British empire certainly brought scientifically and experimentally supported solutions to the health sectors, specifically. During the mid of last century provisions of the antibiotics really challenged almost all the available local remedies. Whereas, it was required to scientifically verify and screen the locally established medicinal practices; as they had long been experienced by human wisdom. Now due to rapid information storm through internet facilities our traditional medicinal practices and wisdoms are dwindling from our memories. It is high time to record such folk wisdoms and colour them with scientific progress and verification. Through such efforts, scientifically proven practices will be having a support of already tested human trials. In this paper some examples of traditionally practiced / well known health sustaining and treatment practices will be explained in the light of modern scientific developments which will provide hypotheses for future research to be done in this regard.

PLENARY LECTURE-7

ROLE OF SLIT2-ROBO1 AND RhoA cAMP SIGNALING IN CANCER CELL TYPE DEPENDENT METASTATIC PHENOTYPE

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Epithelial to mesenchymal transition (EMT) is considered as a prerequisite for metastatic dissemination of cancer. The propagating cancer cells attain mesenchymal traits in a multistep process mediating several structural and functional alterations. This process of proliferation in particular is characterized by loss of epithelial markers including E-cadherin and gain of mesenchymal markers expression (e.g., N-cadherin, vimentin, etc). The regulatory events induce amendments in cell-cell and cell-matrix adhesion followed by degradation of extra cellular matrix leading to an increase in migration and augmented invasiveness. Multiple soluble factors, chemokines and growth factors facilitate these transformations. Slit-Robo signaling was reported to play key roles in regulation of these events by mediating expression of Rho GTPases as well as EMT marker genes. But the role of Slit in particular is paradoxical in cancer. As in some cancer types Slit 2 acts as anti-tumorigenic while in others it is contributing towards the metastatic phenotype. The present study was aimed at deciphering the ambivalent metastatic attribute of Slit2 by analyzing the role of different modulators on Slit-Robo mediated carcinogenesis, in particular emphasizing the role of cAMP/RhoA signal transduction. In our study IBMX (3-Isobutyl-1-methylxanthine) and two growth factors (TGF-β and FGF2) were used and their potential effect was evaluated on the carcinogenic capacity of Slit2. Upon results interpretation it was unraveled that the cell migration and proliferation was increased in colon cancer cells after Slit2 administration and decreased in cervical cancer cells. But Slit2 is definitely playing important role in cancer regulation as its exposure affected cell morphology as well as cell progression in both cancer types. The oncogenic phenotype was further increased in presence of TGF-β and FGF2. IBMX however contributed to decrease Slit mediated migratory elevation. The anti-tumor idiosyncrasy of Slit2 though is cancer type specific and various neighboring regulatory elements are involved in mediating Slit-Robo signaling. Our data however concluded that Slit2 is definitely a potential biomarker in cancer diagnosis and therapeutic targeting and along with the regulatory molecules it can be employed in strategic prognostic procedures.

PLENARY LECTURE-8

AIR POLLUTION: EFFECT OF TOXIC ELEMENTS ON HEALTH IN PAKISTAN

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Pakistan's contribution to climate change in terms of greenhouse effect is less than 1%, however this country has become the 5th most vulnerable country in the world to changes in climate. The unprecedented unseasonal heavy rains and floods during 2022 have confirmed our vulnerability to climate change. Environmental pollution, especially the air pollution has been the cause of millions of premature deaths in this region. A recent study by the University of Chicago has shown a decrease of 3.8 years in life expectancy of Pakistanis due to air pollution alone. Smog resulting from emissions of vehicles, industry, brick kilns and crop stubble burning has been the major cause of respiratory diseases, allergies and eye diseases during the winter season. The most lethal components of smog include fine particulate matter PM2.5 and PM10 and "soot"-an impure carbon. In addition to fine particulate matter, toxic heavy metals emitted from vehicles, industry and mining activities further add to the environmental pollution in the country. These include, arsenic, cadmium, mercury, lead, iron, chromium, copper and nickel. Intake of some of these heavy metals cause GI problems, cardiovascular diseases, leukemia and cancer. These toxic metals are not only affecting the health of people of Pakistan, but are also damaging the crops and harming the aquatic life. The only way to mitigate the ill-effects of these toxic elements and air pollution is to make Pakistan "Clean and Green". This would require a multi-pronged approach in which all stakeholder would be expected to play a proactive and significant role to protect the future generations in Pakistan from devastations of climate change.

PLENARY LECTURE-9

ECOLOGICAL SERVICES PROVIDED BY SPIDERS IN AGROECOSYSTEMS OF PAKISTAN

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Spiders are a diversified, abundant and ubiquitous group of invertebrates in terrestrial and aquatic ecosystems. They have a wide insect host range and can kill large numbers of insect pests in agroecosystems. Their habitat preferences, prey searching ability, and polyphagus nature make them good biological suppressors of insect pests. Our studies provide strong evidence that spiders are effective in natural pest control and improve crop performance. However, the efficacy of spiders differed among crops. Spider pest suppression efficacy increased with taxonomic diversity and density of active hunters in the fields. The effects of spiders cascaded down and improved crop performance. However, their biocontrol functioning is influenced by characteristics of crops, climatic conditions and different agricultural practices. Our agroecosystem is continuously loaded with different xenobiotics released by different anthropogenic activities. Biosensors or organisms that respond to these xenobiotics in some measurable ways are useful tools to study the effects of these chemical pollutants at different levels of biological organization. Spiders are excellent bioindicators of pollutants in ecosystems because they are sensitive to natural and anthropogenic disturbances. Studies of my lab propose that spider species provide trustworthy evaluation of the habitat status in relevance to the heterogeneity and disturbance gradient. Spider assemblages are well appropriate to differentiate habitat quality, since many spiders depend on a distinct complex of environmental and habitat factors with regard to species-specific ecological demands and tolerance. In Pakistan, studies related with the functioning of spiders in agroecosystems are very few. Further studies are required to use the potential of spiders as biomonitoring and biocontrol

PLENARY LECTURE-10

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PLENARY LECTURE-11

RESEARCH PROGRESS OF LIVER AQUAPORINS

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Aquaporins (AQPs) are cell membrane integral proteins that mediate efficient transmembrane water transport. There are 13 members of the mammalian AQP family (AQP0~AQP12), which are selectively expressed in the form of homologous tetramers on the plasma membrane and intracellular membrane structures of certain types of cells in various organs, where they mediate efficient transmembrane water moving pathway driven by osmotic pressure or facilitate sensitive volume regulation. In addition to the efficient transport of water molecules, some AQP family members can also permeate some neutral small molecule solutes such as glycerol and urea and designated as aquaglyceroporins. In recent years, it has been found that many AQP family members can efficiently transport H_2O_2 and mediate the flow of H_2O_2 inside and outside cells or between organelles and cytoplasm. These AQPs are now called peroxiporins.

The expression and function of AQPs in the liver have attracted increasing interest in the field. Some studies suggested that AQP family members may have a key role in the regulatory mechanisms of hepatic bile secretion, glycose/lipid metabolism and oxidative stress. Our laboratory has conducted a series of studies on the expression and function of liver aquaporins in recent years. Our studies revealed important roles of AQPs AQP8 and AQP9 in the mechanisms of bile secretion, gallstone formation, liver regeneration and alchoholic liver injury. In addition, we found AQP7 expression in hepatic stallete cells where it regulats fat metabolism and vitamin A release and is involved in cholestatic liver injury and fibrosis. These findings demonstrated that AQPs are involved in broad physiological and pathological mechanisms of liver by facilitating cellular water, glycerol and H_2O_2

PLENARY LECTURE-12

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SECTION - I

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

1. **HERBAL MEDICINE, BIOCHEMISTRY, BIOTECHNOLOGY AND BIOINFORMATICS**
2. **CELL AND MOLECULAR BIOLOGY, CELL BIOLOGY, GENETICS**
3. **HUMAN AND ANIMAL DISEASES**
4. **MICROBIOLOGY**
5. **MOLECULAR BIOLOGY**
6. **PHYSIOLOGY**
7. **TOXICOLOGY**
8. **VIROLOGY**
9. **ANATOMY**

1. HERBAL MEDICINE, BIOCHEMISTRY, BIOTECHNOLOGY AND BIOINFORMATICS

CBGP-1

GENOMIC AND PROTEOMIC INSIGHTS INTO THE HEAVY METAL BIOREMEDIATION BY THE CILIATE *PARAMEMECIUM MULTIMICRONUCLEATUM*

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Microbial-mediated bioremediation has a substantial potential to successfully restore the polluted environment, however, the limitation of data availability and the presence of few research-based studies hampers the implication of microbial-mediated bioremediation in the contaminated environment. The emergence of transcriptomics, proteomics, and metabolomics (referred as OMICS) at the whole genome level represent a promising toolkit to address these questions. In this context, we used a mass spectrometry-based quantitative proteome profiling approach to define the differential protein abundance in metal-ion treated *Paramecium multimicronucleatum*. The total cellular protein was extracted, digested with trypsin, labeled with Tandem Mass Tag (TMT), fractionated by basic pH reversed-phase liquid chromatography, and analyzed on an Orbitrap Fusion Lumos Tribrid Mass Spectrometer coupled with the EASY-nLC 1200 nano-flow liquid chromatography system (Thermo Fisher Scientific) for proteome profiling. The proteome profiling generated a total of 7,416 peptide spectral matches (PSMs), yielding 2,824 total peptides, corresponding to 1,210 proteins using a stringent criterion (5% false-discovery rate). The Proteome discoverer software (v2.2, Thermo Scientific) was used to identify and quantify the proteins. Our analysis revealed that a small portion of the proteome was perturbed in metal-ion treated *Paramecium multimicronucleatum* compared with the control. Of these 1210 proteins, we identified a total of 31 proteins exhibiting significant ($q < 0.05$) differential levels including the higher abundance of 24 proteins, and the diminished levels of 7 proteins in metal-ion treated *Paramecium multimicronucleatum*. Overall, the current study revealed multiple interesting proteins covering a wide range of molecular functions i.e., proteins related to stress response, energy metabolism, protein degradation, cell growth, and hormone processing. The molecular characterization of these proteins will lead to novel findings that could bring new insights into the detailed mechanisms of the metal uptake ability of *Paramecium* species and its role in bioremediation. In short, we have established a comprehensive protein profile of control and metal-ion treated *Paramecium.* This resource will be helpful in current and future studies to identify critical components involved in the bioremediation and detoxification of metal ions in the environment.

CBGP-2

PHYTOCHEMICAL ANALYSIS OF SEVEN MEDICINAL PLANTS AND EVALUATION OF ANTI-OXIDANT AND ANTI-DIABETIC ACTIVITIES

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According to the report of world health organization, 80% population utilized medicinal flora to treat various diseases. *Antirrhinum majus, Citrus colocynthis, Allium sativum, Momordica charantia, Zingiber officinale, Cinnamomum*

verum, Eugenia jamolana and Moringa trees have a wide range of therapeutic as well as nutritional benefits. Specific phytochemical components found in plants including alkaloids, flavonoids, saponins, sterols, phenols, and tannins, which act on metabolic activities as well as best antioxidants. By scavenging free radicals like hydro peroxide and peroxides an antioxidant slows down or prevents oxidative damage to organisms' cells, lowering the risk of degenerative illnesses. Whereas, diabetes mellitus causes abnormalities in insulin secretion or function, which alters the equilibrium of lipid and glucose metabolism. Majority of plant extracts control diabetes by inhibiting alpha amylase. This study evaluates the phytochemical analysis of seven medicinal plants and evaluation of anti-oxidant and anti-diabetic activities by qualitative phytochemical analysis of plant extracts by preparing plants extract in ethanol and dried in oven to get powdery extract, then used the techniques of the Fehling's Solutions and Wagner's Reagents to investigate the phyto-constituents of plants. Whereas, antioxidant activity was performed by the determination of total phenolic and total flavonoids content by using Gallic acid and Quercetin as standards. Spectrophotometric technique was used to evaluate the results by graphical representation of results. Assessment of antioxidant potential was carried out by free radical scavenging of DPPH with ascorbic acid as a standard. Similarly, α-amylase inhibitory activity was assessed by decrease in maltose. A verified Dinitrosalicylic acid technique was used to compute the maltose equivalent. Initially, plant extracts were incubated with Alpha-amylase (1U/mL) for thirty minutes, then starch solution were added to determine the micromoles of maltose liberated from the standard curve. The solution was kept for 10 minutes at 37°C. Afterward, 1 mL of DNS reagent was mixed to stop this reaction. Mixture was further heated for five minutes in boiling water bath and 540 nm was used as the wavelength to test the absorbance which was then graphically represented. As a result, phytochemical screening of plants showed the presence of alkaloids, flavonoids, saponins, sterols, phenols and tannins. Whereas, the plant extracts of Garlic, and Bitter Apple exhibited strong antioxidant activity. As well as, the plant extract of Cinnamon sticks, Bitter gourd and blackberry showed excellent inhibition of Alpha amylase enzyme, whereas rest of plants showed least activity. So, this study strongly suggested the use of natural flora, fruits and herbs to cure various illnesses.

CBGP-3

NUTRITIONAL MIRACLES OF *MORINGA OLEIFERA* FOR BETTERMENT OF HUMAN HEALTH

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Moringa oleifera is a multi-purpose herbal plant used as food supplementation and medicinal purposes for the betterment of human health. Recent researches have declared Moringa *oleifera* leaves with wide applications as nutraceutical agents in food supplementation industry. It exhibits significant role to manage malnutrition and improve lactation in the women. As malnutrition is considered a life threating health issue in young population in various parts of world. Moreover, biological activities of different parts of plant like anti-inflammatory, antibacterial, anti-cancerous, and anti-diabetic have been reported as prominent aspects among other health benefits. Experimental studies proved its significant role as water purifier agent as 90-95% of the bacterial population also cleared from the contaminated water. *Moringa oleifera* tree also plays a very important role for the betterment of climate and reduce the negative effects of climate change. The great range of nutritional and therapeutic usages of *Moringa oleifera* proves it as a valuable source of potential phyto-constituents with diverse functionality. Due to its significant role in nutritional, industrial and medicinal fields, *Moringa oleifera* has great economical values. It can be declared as "Miracle Tree" because of the presence of abundant nutrients with an excellent feeding impact and a high protein biological value. Moringa tree is useful tool in the prevention of global warming because it sequesters more atmospheric carbon with its all parts. Hence, by planting such important tree in various parts of the country will mitigate the effects of climate change which is a serious matter of concern now-a-days in Pakistan.

CBGP-4

ROLE OF *NIGELLA SATIVA* OIL (NSO) IN REGULATION OF MONOCYTE CHEMOATTRACTANT PROTEIN (MCP-1) IN HYPERLIPIDEMIC MICE

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Nigella sativa, renowned as a universal healer and Prophetic medicine, is extensively used to treat a large number of ailments. The current study was designed to explore the preventive role of *Nigella sativa* oil (NSO) against high-fat diet-induced inflammation and its potential to regulate the monocyte chemoattractant protein (MCP-1) in the hyperlipidemic mice model. Mice were divided into three groups and animals in one group were fed on a cholesterol-rich, high fat diet (HFD) for 12 weeks to develop hyperlipidemia. In the second group, mice received the HFD along with an oral dose (2ml/Kg body weight) of NSO for the same period. Control group mice were fed on a normal standard diet. Lipid profile and serum MCP-1 were measured and compared in all three groups. High fat diet, on one hand, led to an increase in serum cholesterol, triglyceride, and LDL concentration, while on the other hand, it led to a significant increase in the level of MCP-1. However, NSO treatment prevented the increase in serum cholesterol, triglycerides, LDL, and MCP-1 concentration. Our results suggest the effective role of NSO in precluding the HFD-induced hyperlipidemia in mice which subsequently prevented the resultant inflammation as depicted by a decrease in MCP-1. This preventive effect could significantly contribute to prohibiting the development of inflammation-related endothelial dysfunction and resultant atherosclerosis.

CBGP-5

GCMS STUDIES ON THE LIPOPHILIC METABOLITES AND CONTAMINANTS OF THE BLUBBER FROM BLUE WHALE, *BALAENOPTERA MUSCULUS*

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The blue whale, *Balaenoptera musculus* (Linnaeus, 1758), is the biggest animal recognized to exist today throughout the globe. High commercial value of lipids has made this species vulnerable. Blubber, a crucial adaptation for mammals living in water, serves as energy reservoir. Surplus energy is deposited in the form of triacylglycerides (TAGs) consisting of variety of fatty acids (FAs) esterified with glycerol and therefore the blubber was analyzed. The compositional analysis also helps in understanding the dietary and structural role of FAs in blubber. Lipid analysis of blubber from stranded, dead blue whale through thin layer chromatography (TLC) has resulted in identifying 6 constituents. These constituents were a TAG, 2 steroids, and 3 free FAs. Approximate analysis of waxy constituents has also been attempted exploiting TLC. Gas chromatography-mass spectrometry (GC-MS) analyses of blubber sample from various locations has resulted in identification of 86 compounds, which were further confirmed through the Retention Indices (RIs), accounting to a total concentration of 85.7, 86.1, 84.8 and 89.7% in jaw, abdomen, peduncle, and fluke, respectively. Although 17 SFAs including 4 Branched FAs, 5 MUFAs and a PUFA were identified. The main reasons for the low quantitative and qualitative content of PUFAs were susceptibility of PUFAs towards oxidation, due to the putrefaction and rancidity, as the specimen was dead and washed ashore. Altogether presence of 8 FAlds, 4 FAlcs and 3 other oxygenated FAs, making a total of 2.7, 0.9, 1.3 and 5.2% in jaw, abdomen, peduncle, and fluke, respectively, were

justified. Further the chromatographic region where PUFAs are expected to resolve has been found masked with significant concentration of anthropogenic compounds – the contaminants. These contaminants accounted to 43.4, 35.6, 34.6 and 30.7% in jaw, abdomen, peduncle and fluke, respectively. These pollutants included 25 hydrocarbons, 4 phthalates, 2 Siloxane, 2 bisphenols, and diphenyl carbonate. Four natural Prenols were also identified. 16 constituents with concentration of 14.2, 8.0, 15.7 and 10.8% in jaw, abdomen, peduncle and fluke, respectively, were remained unidentified. A few constituents were justified through food chain.

CBGP-6

BLUE WHALE (*BALAENOPTERA MUSCULUS*) LIVER OIL GCMS PROFILE, ANTIOXIDANT AND ANALGESIC ACTIVITY

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The blue whale, *Balaenoptera muscuclus* (Linnaeus, 1758), is the largest surviving mammal on earth and have a cosmopolitan distribution. Though, poorly understood, International Whaling Commission (IWC) has listed six stock areas across globe. The pharmaceutical values associated with liver oils are abundant; they form the active ingredients of many different formulations ranging from vitamin supplements to skin-based ointments and creams. The results obtained from GCMS shows total 91 compounds. These included 43 fatty acids in which 26 were saturated fatty acids, 15 monounsaturated fatty acids and 2 polyunsaturated fatty acid. Being sampled from a drifted specimen, 13 oxidized derivatives of fatty acids were also observed in that 3 were fatty aldehyde, while 8 were fatty alcohols. 29 pollutants were also recorded containing 21 hydrocarbons and 8 pollutants other than hydrocarbons. 6 miscellaneous compounds were also identified. The crude lipid sample (BWL) as is sampled from liver and (BWS) (preparation made following the ethnozoological information from local coastal community) were subjected to the Antioxidant activity and DPPH % inhibition in BWL was found high (20.4 ± 3.2) as compared to BWS (19.2 ± 1.5). Analgesic activity was determined using two separate methods using doses of 25 mg/kg and 50 mg/kg administered in albino mice. In Tail flick method, BWS doses showed highly significant ($p<0.001$) results as compared to the standard aspirin. While, in hot plate method, BWS results were highly significant ($p<0.001$). Thus the hot plate method was in analogy to the ethnozoological information (preparation from whale liver oil) while the tail flick method, showing higher activity was following other set of ethnozoological information (to use whale liver oil as it is).

CBGP-7

ANTIOXIDANT, HET-CAM ASSAY, AND ANTIMICROBIAL ACTIVITY OF *CROSSOBAMON ORIENTALIS* BODY OIL EXTRACTS AND GC-MS COMPOSITION OF OIL

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Introduction: Traditionally, Geckos and their products are used as medicine in Asian countries. *Crossobamon orientalis,* a desert dwelling Gecko species is a poorly studied for its medicinal value. Methods: Oil extracts of *C.*

orientalis were tested for their antioxidant, toxicity, antiviral, and antibacterial properties by utilizing the stable 1,1-diphenyl-2-picrylhydrazyl (DPPH) free radical assay, the HET-CAM assay, the *In Ovo* antiviral assay, and the disc-diffusion technique, respectively. Gas chromatography mass spectrometry (GC-MS) analysis was done to determine the chemical composition of the oil. Results: *C. orientalis* body oil's *n*-Hexane extract demonstrated the maximum level of DPPH radical inhibition (70%) whereas the high antiradical activity was reported in the methanol extract (63.3%). In these findings, *C. orientalis* extracts in 1-Butanol, methanol, diethyl ether, and n-Hexane were completely active in inhibiting NDV and H9N2 development. These extracts had a hemagglutination (HA) titer of 0. The methanol and 1-Butanol extracts of *C. orientalis* oil greatly reduced IBV production with HA titer values of 2. With HA values of 4 and 8, separately, ethyl acetate and diethyl ether extracts were effective against the development of IBV. IBDV activity was effectively inhibited by diethyl ether extract, and its indirect hemagglutination (IHA) titer remained 0. Methanol, ethyl acetate, and 1-Butanol extracts all substantially reduced IBDV development, with IHA titer levels of 4 for each extract. Inhibition zones shown by extracts in different solvents like as methanol, ethyl acetate and diethyl ether for bacterial strains were shown for *E. coli* (13.65±0.57 mm), *K. pneumoniae* (5.31±0.57 mm) and *P. aeruginosa* were (3.09+0.17 mm) respectively. There were forty different compounds found in *Crossobamon orientalis* body oil upon GC-MS analysis. Conclusion: Current findings concluded that the *C. orientalis* body oil was found as an antioxidant, and antimicrobial agent to pathogenic viruses and bacteria due to its bioactive constituents without any side effects.

CBGP-8

AMELIORATIVE EFFECT OF RHAMNAZIN ON BISPHENOL AN INDUCED KIDNEY DAMAGE IN RATS

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Bisphenol A (BPA), an industrial chemical that has been used to make variety of polymers, but in addition to this advantage it is reported to have various adverse effects on multiple organs including kidneys in rats. Rhamnazin (Rhz) is a flavonoid naturally found in plants, which possesses high antioxidant and anti-inflammatory properties. The aim of this study was to examine the ameliorative effect of Rhamnazin on Bisphenol A which induced renal toxicity in rats. The experiment was conducted by taking 24 male Albino Sprague-Dawley rats, which were divided into 4 groups; each group contained 6 rats. The 1st group served as the control group. BPA (50 mg/kg) was given to 2nd group. In 3rd group BPA (50 mg/kg) was co-administrated with Rhz (10 mg/kg). 4th group was treated with Rhz (10 mg/kg). The experimental duration was of 30 days. BPA-induced damaging effects and their alleviation by Rhz were evaluated by protein estimation, antioxidant enzymes (SOD, GPX, CAT, GST, GSH and GSR) and inflammatory markers (IL, IL-6, NF-KB, COX-2, TNF-X). In addition, samples of renal tissues were observed for histological analysis. Data obtained by these trials was statistically analyzed by Mean ± SEM and ANOVA.

CBGP-9

CLONING, EXPRESSION, PURIFICATION AND CHARACTERIZATION OF THERMOSTABLE XYLOSE ISOMERASE FROM *BREVIBACILLUS FORMOSUS* NF1

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Xylose isomerase (E.C# 5.3.1.5) is also known as glucose isomerase. It reversible isomerizes xylose to xylulose and glucose to fructose. A ~980bp gene of thermostable xylose isomerase was amplified from *Brevibacillus*

formosus NF1. It was cloned in pTZ57R/T cloning vector using DH5α as host and expression in pET28(a)+ expression vector using BL21 (DE3) as expression host. The gene sequence xylose isomerase shows 95% resemblance with *Brevibacillus Brevis* B011 and X23. Xylose isomerase enzyme was purified using Fraction precipitation and UNOsphere Q anion-exchange column chromatography. Isoelectric point and molecular weight of xylose isomerase was theoretically calculated as 5.56 and 36.83KDa respectively. The molecular weight of xylose isomerase was enzyme is determined to be ~38KDa using SDS-PAGE. The optimum pH and temperature determines to be 7.0 and 55°C. Xylose isomerase retains its activity from pH range 6.5-7.5 for 40min and it retains its activity at temperature range of 45-50°C for 120min and at 55°C it retains its activity for 80min. It shows high activity (~500%) in the presence of 0.5mM Co^{2+} and lesser active (~300% and 150%) in the presence of Mg^{2+} and Mn^{2+} respectively. It is significantly inhibits in the presence of Ca^{2+}. V_{max} of xylose isomerase for xylose and glucose is to be 385 and 91.74 µmol/mg/min respectively. catalytic affinities (K_m) of the enzyme for xylose and glucose to be 0.96 and 8.04mM respectively. The turnover number (k_{cat}) of enzyme for xylose and glucose is 5259 and 1249min^{-1} respectively. The thermodynamic parameters (E_a, Q_{10}, ΔH^*, ΔG^*, $\Delta G^*E\text{-}T$, ΔS^*) were calculated to be 88.19KJ.mol^{-1}, 3.47K^{-1}, 88.18KJmol^{-1}, 8.27 KJmol^{-1}, -13.77KJmol^{-1} and 310J$mol^{-1}K^{-1}$ respectively. The xylose isomerase is stable at slight acidic to slight neutral pH and is thermostable. Its high activity in the presence of Co^{2+} and 53.67% of fructose was achieved using xylose isomerase from *Brevibacillus formosus* NF1. Thus, it has industrial applications and can be used potentially for the production of High fructose Corn Syrup.

CBGP-10

PREVALENCE OF METABOLIC SYNDROME IN KARACHI, DISTRICT OF KORANGI

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The purpose of the study was to identify the prevalence of metabolic syndrome on the basis of the new guidelines of The International Diabetes Federation IDF definition in subjects 315 from the metropolitan city of Karachi (District Korangi). Also to see the comparison of MS controlled over low, moderate and high which categorized through the number of presence of factors that diagnosed metabolic syndrome. To determines the factors that increase the intensity of metabolic syndrome. Study Design: Cross-sectional study. Place and Duration: Sindh Government Hospital Korangi#5 and Landhi Cardiac Centre. The data was collected in May 2022 to October 2022. Patients and Methods: Patients who attended the medicine outpatient department (OPD) check-up and giving informed consent were included in the study. Data was collected through a structured questionnaire administered to those eligible to participate. Metabolic syndrome was defined according to IDF guidelines. Results: A total of 315 patients were included in the study, and the majority of patients were 248(78.7%) female and minority of male 67(21.3%). Moreover, results showed that Intensity of Metabolic Syndrome of controlled were 37(11.7%), low 101(32.1%), moderate 118(37.5%) and high 59 (18.7%). The prevalence of metabolic syndrome in this sample was 88.2%. This study showed that the prevalence of Metabolic syndrome significantly higher in age between the age of 40 to 59. Our estimated finding indicates that the majority of patients in this study are overweight and BMI above than 30kg/m^2 that show significant effect on metabolic syndrome. Risk factor associated with MS: Our estimated finding indicates that the factor of SBP significantly increases the higher metabolic syndrome. Similarly, the factor of HbA1c elevated the chances of metabolic syndrome go higher. While the factor of HDL decline that increase the metabolic syndrome. In our estimated finding observed that the factor of TC increased metabolic syndrome also increases. Similarly, the increase of pulse rate also effects the metabolic syndrome.
Histogram graph showing that no physical activity seen significantly higher the metabolic syndrome while the physical activity increases that decreased the metabolic syndrome. Similarly, the non-smoker effect less on metabolic syndrome than smoker. Conclusion: The prevalence of metabolic syndrome according to IDF was 88.2% Our finding showed that

these factors of MS are SBP, HbA1c, HDL, BMI, TC, smoking, physical activity, and age significantly increased that in favor of the intensity of MS.

CBGP-11

AN OPTIMIZATION APPROACH FOR BACTERIAL DECOLORIZATION OF AZO DYE USING RESPONSE SURFACE METHODOLOGY

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Colored substances must be removed from the textile wastewater effluents before discharging them into the water ecosystem. The degradation of azo dyes has been a major environmental concern because of the hazards these dyes pose to human health and the ecological environment. At present, Response Surface Methodology (RSM) acts as a powerful tool for optimizing multivariate factors through step-wise experimentation that influences dye color removal. One of the experimental designs of RSM is the Box Behnken Design which identifies potential interactions between different factors and optimizes each factor into 3 levels. In contrast to other designs, BBD is time-saving, requires lesser runs, and gives maximum dye decolorization values. In this study, the degradation efficiency of Levafix Fast CA Red Reactive by bacterial strains, the parameters dye concentration, time of incubation and yeast extract were optimized using RSM. A proposed model of RSM including total of 20 experiments was conducted which indicated that a dye concentration of 100 ppm, 0.34% of yeast extract gives a maximum decolorization rate of 85% after 72 h of incubation. The value of R2 = 0.914 showed an outstanding assessment of experimental data through the polynomial regression model. The possible combinations of three parameters designed by RSM were confirmed through experiments and indicated that the bacterial strains has the decolorizing ability for the bioremediation of textile effluents.

CBGP-12

EFFECT OF DIETARY INTAKE OF FRESH FISH ROHU (*LABEO ROHITA*) ON THE LIPID PROFILE IN FEMALE POPULATION OF LAHORE

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Globally, among highly prevalent diseases, cardiovascular disease (CVD) is the most important and usually leads to death; even more prevalent in the developing world. High cholesterol levels cause 18% of strokes and 56% of ischemic heart diseases globally resulting in 4.4 million deaths annually. We hypothesized that higher fish consumption on a regular basis might be associated with a better lipid profile by lowering cholesterol due to the presence of HUFAs. This cross-sectional study included 50 healthy human female consumers from young to middle age (22 to 45 years) of district Lahore to assess the relationship between fish intake frequency and serum lipid profile. A total of 44 subjects were randomized into two groups: experimental (n,22) who reported eating 250g of uniform grilled fish Rohu fortnightly, and control (n=22) who did not report eating fish at all during the 12-week study. Detailed information regarding physical and atherogenic parameters was collected from each participant. Fasting blood samples were collected for lipid profile estimations with Beckman Coulter AU 680 automated Analyzer by using lipid profile kits. We performed an independent T-test and one-way ANOVA statistical analysis to estimate the parameters of the lipid profile. The subjects in the fish group demonstrated a significant reduction (11%; p=0.002) in BMI, (16%; p=0.01) in TC, (15%;

/3=0.004) in TG, and (9%; p=0.000) in LDL-C. There was a trend toward an increase in HDL-C by (20%; p= 0.000) as compared to the non-significant change in the control group. The combined benefits of fish consumption on lowering TC, TG, LDL-C, BMI, and rise of HDL-C levels improve overall lipid profile in the healthy female population.

CBGP-13

GROWTH PATTERN OF *PARAMECIUM CAUDATUM* AT DIFFERENT CONCENTRATIONS OF REACTIVE RED 3BS DYE

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Effluents from the textile industries contain hazardous azo dyes causing a severe threat to life. Existing effluent treatment procedures are unable to remove recalcitrant azo dyes completely from effluents. Ciliates have the ability to decolorize these harmful azo dyes even showing good growth patterns. The purpose of the present study was to determine the optimum temperature and pH at which *Parameciu caudatum* showed maximum growth, at different concentrations of reactive red 3BS (RR 3BS). Optimum pH and temperature for maximum growth of *P. caudatum* were 7.2 and 25℃ respectively, at different concentrations *i.e.,* 10, 20, 30, 40 and 50 ppm of RR 3BS dye with respect to control. It also indicated that 35℃ temperature is fatal for both control and dye treated species. *P. caudatum* showed maximum decolorization of reactive red 3BS dye at 50 ppm concentration under optimum conditions of pH and temperature. The results for growth pattern and decolorization showed that *P. caudatum* is a useful ciliate for the decolorization of RR 3BS dye present in textile-dying industry effluents.

CBGP-14

GROWTH PATTERNS OF CILIATES IN THE PRESENCES OF COPPER OXIDE NANOPARTICLES

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In the present era toxicity of water bodies by metal nanoparticle is of great environmental concern. Protozoans, specifically *Paramecium* species are used as valuable tool for environmental evaluation either as biomarkers to analyze the impacts of toxic compounds or as bioindicators of environmental pollution. The present study was aimed to assess the toxic effects of copper nanoparticles on the growth of *Paramecium jenningsi*. *Paramecium* was exposed to copper nanoparticles when optimum growth conditions were attained. The minimum inhibitory concentration found for this species was 1µl. Under different pH (7.1-7.4) and different temperatures (25°-30°C) *P. jenningsi* showed increasing trend towards glucose 553.58%. In contrast, the glycogen content showed a decreasing trend 21.01% as compared to control. Elevated content of amylase, trehalose, invertase and trehalase was observed up to 528.57, 90.89, 119.67 and 333.97%,

respectively. In this regard, *Paramecium* is considered to the potential to decontaminate the toxicity caused by heavy metal and their nanoparticles in the industrial wastewater.

CBGP-15

TOLERANCE AND UPTAKE OF COPPER, CADMIUM, LEAD, AND ZINC BY A CILIATE *PARAMEMECIUM MULTIMICRONUCLEATUM*

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Burgeoning industrialization and rampant throw out of industrial effluents in water bodies, particularly heavy metals is a threatening alarm for our environment. Bioremediation is an inexpensive technique as an alternative to chemical methods for wastewater treatment. The present study investigates the ability of *Paramecium multimicronucleatum* in terms of tolerance and uptake of heavy metals including copper, cadmium, lead, and zinc. Wastewater samples were collected from stagnant water ponds receiving effluents from the industrial zone of Kot Lakhpat, Lahore (Pakistan). *Paramecium* species was isolated and characterized using histone H4 and 18SrRNA biomarkers. This ciliate showed best growth at 25°C±1°C and pH 7±0.1. The growth patterns of *Paramecium* were observed with and without metal stress in wheat grain medium. The minimum inhibitory concentration of copper, cadmium, lead, and zinc was 70, 60, 160, and 110µg/mL, respectively. The maximum uptake by *Paramecium* for Cu and Cd was recorded as 82% and 90% respectively after exposure of 96 h. In case of zinc, it was 93% at 96 h of exposure, while 90% of lead ions were absorbed by *Paramecia* after 48 h of exposure. The order of uptake ability by *Paramecium multimicronucleatum* was Zn^{2+}>Cd^{2+}>Cu^{2+}>Pb^{2+}. The study of exploring bioremediation ability of this unique ciliate would be helpful to investigate it further by using advanced molecular techniques.

CBGP-16

MOLECULAR CLONING AND EXPRESSION OF BOVINE CHYMOSIN IN *ESCHERICHIA COLI*

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Chymosin(renin), a key component of rennet, is proteolytic enzyme commonly used for curding of milk in cheese industries. It is an aspartic protease secreted in the abomasum of new born ruminants. Chymosin is secreted as inactive zymogen known as prochymosin. This prochymosin loses 42 amino acid sequence of propeptide from N-terminal in acidic environment of animal stomach and active chymosin is formed. This active chymosin is composed of 323 amino acids with molecular weight of 35.6kDa. The rising cheese demand, the scarcity and expensive cost of calf rennet on the global market, as well as religious convictions, have prompted researchers to look for other milk coagulant sources. Enzyme heterologous expression is a common approach to obtain a high quantity of enzymes for advantageous applications. The preferred expression system for the creation of recombinant proteins has traditionally been bacteria. In this research, designed chymosin gene of *Bos Taurus* was synthesized in pUC57 vector. The *E. coli* DH5α was used as cloning host and *E. coli,* BL21C+ was used as an expression host. Prochymosin gene amplified by *Taq* DNA polymerase

was ligated in pTZ57R/T cloning vector and transferred in DH5α strain of *E. coli.* Restrictions sites and overhangs were added to both ends of synthesized gene by PCR using primers. The integration of inserts was also checked by restriction digestion followed by gel electrophoresis. The gene construction of pET-prochy was made by restriction digestion of pTZ-prochy and pET22b vector and transferred in *E. coli* DH5α. The expression cassette pET-prochy was than integrated in *Ecoli.* BL21C+.The protein's expression levels were analyzed on 15% SDS-PAGE, to evaluate the potential of BL21C+ to express chymosin. Post induction expressed recombinant bovine chymosin was analysed and confirmed through SDS PAGE and post induction conditions i.e, time, temperature and IPTG concentration were optimized. Studies on its purification and quality of milk curds will be performed to confirm its usefulness in diary industry.

CBGP-17

IMPACT OF DIAMIX BLUE XF DISPERSE DYE ON PHYSICOCHEMICAL AND METABOLIC ACTIVITIES OF CILIATES

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The anthropogenic activities and increased in industrialization are becoming a major cause of water pollution. The contaminated water from these sources release dyes in large amount in which harmful azodyes are also included. These dyes imparts harmful impacts on the health of the living organisms. In the present study, *Paramecium* sp. were used to decolorize the azodyes, the degradation potential of the Diamix blue XF disperse dye was obtained with the help of two *Paramecium* species *i.e., P. multimicronucleatum* and *P. caudatum*. The degradation potential checked at different temperatures and pH. *P. multimicronucleatum* and *P. caudatum* showed optimum growth at temperature 25 °C and 30 °C as well as at pH 6.5 and 7, respectively. In the same way the degradation of dye in the beginning was slow but on 10th day degradation rate measured up to 100%. The biochemical analysis performed with trehalose, trehalase, invertase and glucose showed positive results except glycogen which showed negative result. This study indicates that *Paramecium* can be used as an efficient source for the bioremediation.

CBGP-18

RECOMBINANT PRODUCTION AND CHARACTERIZATION OF THERMOSTABLE L-ASPARAGINASES FROM *GEOBACILLUS THERMOPAKISTANIENSIS*

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L-Asparaginases catalyze the conversion of L-asparagine to L-aspartate and ammonia. These enzymes are being used for clinical and industrial applications. They have potential to treat leukemia and mitigate acrylamide in baked and fried foods. In the present study the gene encoding L-asparaginase from *Geobacillus thermopakistaniensis* was amplified by polymerase chain reaction. DNA sequencing of the amplified product did not show any unwanted mutation. *In silico* studies demonstrated that this enzyme is similar to bacterial type-2 L-asparaginase. The gene was cloned and heterologously expressed in *Escherichia coli*. Recombinant L-asparaginase was produced in soluble and active form. The recombinant enzyme was purified by ion exchange and hydrophobic interaction column chromatographies. Purified recombinant L-asparaginase displayed optimum enzyme activity at 52° C and pH 9.5. Divalent metal cations and EDTA

did not show any significant effect on the enzyme activity while the activity was enhanced in the presence of thiol group protecting agents like β-mercaptoethanol and Dithiothreitol. The enzyme retained ~ 90% of its activity at 37° C and more than 80% at 52° C after 6 h of incubation. These properties make this enzyme a potential candidate for therapeutic and industrial applications.

CBGP-19

PROBIOTICS AS GUT FLORA WITH METABOLIC BENEFITS

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The microbiota of the large intestine influences health and well-being. Probiotics are described as microbial populations that reach the colon in an active condition and hence have a good impact on gastroenteritis susceptibility, gastrointestinal immunity, anticancer characteristics, blood lipids, and lactose sensitivity. As a result, altering the intestinal microbiota in order to establish, rebuild, and maintain favorable ecosystem balance, as well as the activity of the microbes present in the gastrointestinal tract, is required for the host's enhanced health. A growing number of in vivo and in vitro investigations utilizing traditional and molecular biology approaches back them up. Pro-biotic effects that have been well established include the prevention of rotavirus-induced dysentery, the slight decrease of putrefactive substances in the gut, the relief of irregular and undefined gastrointestinal complaints, the prevention of atopic diseases in newborns, the alleviation of auto-immune illnesses, the potential health benefits on microbiological aberrancies, and the regularization of an irritable intestine. Prebiotics are fermented products of the gastrointestinal microflora that are used as probiotic diet. Only bifidogenic, non-digestible oligomers, particularly inulin, meet all of the prebiotic categorization requirements. Inulin and oligo fructose have been shown in several studies to have bifidogenic properties. The influence of these prebiotic substances on numerous measures of colonic function is most likely due to this bifidogenic change in the constitution of the colonic microbiota. There are evidence, for example, from animal and in vitro investigations, as well as certain human trials, that inulin-type fructans may limit the generation of potentially hazardous metabolites and may generate major immune-mediated effects. This study examines how variations in the makeup and behavior of the colonic microbiota may impact gastrointestinal health in healthy persons, as well as those who may suffer gastrointestinal distress.

CBGP-20

CLONING OF *OBP1* GENE FROM *A. AEGYPTI* WITHOUT SIGNAL PEPTIDE INTO EXPRESSION HOST *E.COLI* BL21

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A. aegypti is a zoonatic vector of dengue fever, zika fever and yellow fever. Modulation of the olfactory signaling cascade via the use of repellents is a major strategy to decrease the chance of dissemination of mosquito borne diseases. Odornat Binding Proteins (OBPs) binds to odorant molecules which deliver odorants across hemolymph to odorant receptors and thus mediate host seeking behavior of the *A. aegypti*. In this research, *AaegOBP1* without signal peptide was PCR amplified from codon optimized *AaegOBP1/*pUC57 and 358bp band was obtained in the gel. This amplified *AaegOBP1* was restricted from cloning vector using *Nde*I and *Xho*I. The restricted band was purified from the gel and

sub-cloned into an expression vector pET28a(+). Confirmation of the cloning into expression vector was carried out using colony PCR. Protein expression was induced using IPTG and protein band of 16kDa was obtained on SDS-PAGE. Further, optimization of expression conditions and purification of the protein should be carried out. This recombinant protein could be used as a bait in ligand binding assay for screening compounds for repellent activity against *A. aegypti*.

CBGP-21

PRODUCTION OF L-LYSINE BY *MICROBACTERIUM LACTIUM*

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L-lysine is an essential amino acid and microorganisms are able to synthesize both essential and non-essential amino acids through fermentation process. Fermentation contributes 80% of the L-lysine that is annually produced worldwide. The present work describes the L-lysine production by local bacterial isolate of *Microbacterium lacticum* through submerged fermentation method. Twelve different fermentation media were used and screened in this study for L-lysine production by *Microbacterium lacticum* strain. Out of these twelve media, FM:5 was found a best one for maximum 1.4 g/L of L-lysine production. This medium contained glucose, ammonium sulphate, dipotassium hydrogen phosphate, potassium dihydrogen phosphate, calcium carbonate, thiamine HCl, biotin, manganese chloride tetrahydrate and casamino acids. For further optimization, this medium was supplemented with different nitrogen and carbon sources to increase the L-lysine production. Glucose, as a best carbon source and ammonium sulphate as a best nitrogen source was optimized. Finally 2.3 g/L of L-lysine was produced by *Microbacterium lacticum* after 72 hrs of incubation in FM:5 medium supplemented with 7% glucose and 2% ammonium sulphate.

2. CELL AND MOLECULAR BIOLOGY, CELL BIOLOGY, GENETICS

CBGP-22

DIFFERENTIAL MYO9B MRNA EXPRESSION IN DIFFERENT REGIONS OF MURINE BRAIN: A COMPUTATIONAL AND EXPERIMENTAL ELUCIDATION OF ITS PUTATIVE ROLE IN NEUROINFLAMMATION

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Neuroinflammation can be defined as the inflammatory process of central and peripheral nervous system, i.e., brain and spinal cord, respectively. Not only this process is implicated in some major neurological disease, the most prominent of which are Alzheimer's, Parkinson's, amyotrophic lateral sclerosis and depression, but also there exist major differences with respect to gender which affect disease progression. Myo9b is an actin based heavy chain molecular motor belonging to the myosin family of proteins. Its involvement in cell death / survival via RhoA inactivation urged us to investigate Myo9b expression in brain under neuroinflammatory insult, as no studies have been done to explore its role in brain yet. Therefore, we presumed that Myo9b might be an important player in the process of neuroinflammation, too. Hence, we have explored the putative role of myo9b, utilizing both computational and wet lab tools, and have found differential expression of myo9b in different brain regions as well as different brain cells, i.e., neurons, microglia and astrocytes. Furthermore, screening of FDA approved drugs targeting myo9b has resulted in the identification of some new targets which present avenues for future research in murine model systems.

CBGP-23

MOLECULAR ANALYSIS OF OSTEOGENIC POTENTIAL OF *CISSUS QUADRANGULARIS* (CQ)

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Natural substances are being used as a principal source of medicines directly or indirectly, for many decades and have proven to be extremely beneficial to human health. *Cissus quadrangularis* (Haddjod) is a medicinal herb reported in Ayurveda literature for its wonderful pharmacological properties. A number of anti-osteoporotic drugs have been used, but a gold standard treatment for the prevention of osteoporotic fractures using single-target drug therapy has never achieved the desired therapeutic effect. Therefore, a better, safe, and more effective treatment is required for osteoporosis and other bone degenerative disorders. Pre-osteoblast cell line MC3T3-E1 was used for molecular analysis of the effective use of *Cissus quadrangularis* for osteogenesis. The dried and powdered form of CQ was mixed with absolute ethanol to make CQ-Ethanol extract. This extract was mixed with n.Hexane to prepare CQ-H extract. A range of concentrations (1 ng/ml, 5 ng/ml, 10 ng/ml, 50 ng/ml, 100 ng/ml, 500 ng/ml, 1000 ng/ml, 5000 ng/ml) was selected to perform neutral red assay and ROS (Reactive oxygen species) activity assay (5, 10, 50, 100, 500, and 1000 ng/ml) to assess the cytotoxicity. After evaluation of results, the concentrations were narrowed down to 1, 5, 10, and 15 ng/ml to evaluate cell proliferation and metabolic activity through MTT and BrdU assay. The results revealed 5 and 10ng/ml concentrations exhibit the best results. These two concentrations were used to examine the molecular expression of genes involved in proliferation, differentiation, and matrix mineralization during osteogenesis along with oxidative stress

minimization analysis via treating cells with H_2O_2. Collectively, gene expression profiling and oxidative stress minimization analysis showed 10 ng/ml as the most efficient dose to enhance osteogenic gene expression and neutralize oxidative stress in MC3T3-E1 cells. CQ-H was subjected to HPLC for fractionation and separation of its active compounds. CQ-H extract was collected in the form of fractions from the HPLC column after regular intervals of time and subjected to lyophilization. Currently, gene expression profiling of MC3T3-E1 cells with isolated fractions is being done.

CBGP-24

MOLECULAR ANALYSIS AND THERAPEUTIC EFFECT OF ETHANOLIC EXTRACT OF *CISSUS QUADRANGULARIS* IN OSTEOPOROTIC (OVARIECTOMIZED) RATS

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Osteoporosis is a systemic skeletal disease characterized by decreased bone mass and increased risk of fragility fractures. *Cissus quadrangularis* has been reported for its antiosteoporotic activity. The objective of this study is to evaluate the protective properties of *Cissus quadrangularis* and its mechanism by which it is beneficial to bone. Female Wistar rats were either sham operated and ovariectomized were fed CQ for 3 months. Relative expression of osteoblastic–related genes were determined by real-time PCR. Trabecular bone microarchitecture of proximal tibia, lumbar vertebrae and femur is measured by microcomputed tomography (μCT). Histopathology of bone samples was evaluated with haematoxyline and eosin staining. Biochemical parameters including serum Ca and vit-D was evaluated by using diagnostic reagent kits. Finding shows that ethanol extract of CQ have antiosteoporotic effect.

CBGP-25

GENETIC ANALYSIS OF MUTANT VARIANTS IN RETINITIS PIGMENTOSA AMONG CONSANGUINEOUS FAMILIES OF LAHORE, PAKISTAN

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Retinitis Pigmentosa (RP) is the most prevalent genetically and clinically inherited form of retinal degeneration. RP occurs as permanent photoreceptor degeneration with extremely varying clinical outcomes. These can be classified according to the severity of rod or cone damage, the age when it initiated, and progression rate. The purpose of this study was to characterize RP in Lahore. Samples were collected and identified from families with RP. This was done with the help of ophthalmologists from different hospitals in Lahore. DNA was extracted from blood samples and molecular analysis of RP-causing genes *PDE6B*, *MYO7A*, and *ABCA4* was performed by whole exome sequencing. The sequencing results demonstrated four unknown homozygous mutations in *PDE6B*, *MYO7A*, and *ABCA4* genes in four families from Punjab, Pakistan. These mutations included two missense and two frameshift deletions: c.2170A>C:p.K724Q, c.1272C>A:p.F424L, c.1938delG: p.L646fs and c.3965delC: p.P1322fs. Four new mutations were identified by whole exome sequencing of the consanguineous families in Pakistan. The molecular genetic analyses performed in this study were helpful in establishing an accurate diagnosis of disease and providing genetic counselling.

CBGP-26

FREQUENCY AND ASSOCIATION OF EPSTEIN BAR VIRUS GENOTYPE IN RHEUMATOID ARTHRITIS PATIENTS OF KHYBER PAKHTUNKHWA, PAKISTAN

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Rheumatoid arthritis (RA) is an immune-mediated, progressive polyarthritis linked with various genetic and environmental causative agents. Among various environmental triggers Epstein Bar Virus (EBV), is considered as a most potent etiological agent of RA. This study aimed to investigate the prevalence of EBV and its genotypes in RA patients and to investigate their association with clinical and laboratory parameters of RA. This study included blood samples of RA and control healthy individuals (100 each). All the Clinical and laboratory parameters of RA patients were collected from their clinical file at department of rheumatology, lady reading hospital, Peshawar. The blood samples were then collected from study population after prior consent for DNA extracted followed by PCR amplification for EBV detection and genotype discrimination using different primers. RA patients were 85 females and 15 males with mean age of 40.13+14.05 years. EBV DNA was detected in 45% RA and 9% control cases. All the positive samples were confirmed with only EBV type-1 genotype. Mean disease duration of RA patients was 6.61+6.23 years. Out of 100 total diseased patients 43% were seropositive rheumatoid arthritis (SPRA) and showed significant correlation with family history of RA in EBV positive individuals (P=0.017). The demographic, clinical and laboratory parameters of RA patients showed non-significant association with EBV. Moreover, only family history of RA showed significant association with EBV (P= 0.00019). It is concluded that EBV- 1 is prevalent and associated with RA. The outcome of this study suggests that EBV might have important role in pathogenesis of RA. Further investigation is required for detailed genetic analysis of EBV determining their possible role in modulating immune system in RA.

CBGP-27

IN-SILICO ANALYSIS OF NSSNPS IN HUMAN *ILR4* GENE ASSOCIATED WITH SEVERE COMBINED IMMUNODEFICIENCY SYNDROME (SCID)

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Severe Combined Immunodeficiency is a genetic disease associated with abnormal development of different structure and function of lymphocytes i.e. B, T or NK lymphocytes. Abnormalities in its genes like *ILR4* cause severity in disease pathogenicity. Non-synonyms single nucleotide polymorphisms (nsSNPs) i.e. replacement of one nucleotide to another and its consequence on protein functions are associated with disorders. SNPs arise 1 in 1,000 bp in whole genetic sequence. In Pakistan, incidence of SCID disease is 22% and associated nsSNPs alters protein function, sequence and structure therefore known to be disease-causing variations. The aim of this study was to investigate the impact of deleterious nsSNPs in the structure and function of *ILR4* proteins. This is first *in-silico* research focuses on the analysis of *ILR4* gene nsSNPs that impact on their structure and function. *In-silico* research was carried out mainly in two Domains i.e. sequences analyses and structure analyses of *ILR4* gene by using state of the art by bioinformatics

algorithms. Among 1050 missense SNPs, 4 nsSNPs (P650L, G834S, E549K and G930W) variants were predicted as the most deleterious and have risk assessment against infectious microorganisms by using Predict SNP. From which, one nsSNP (P650L) was predicted as highly conserved and affect protein stability could be important candidates in the pathological process of immune system. This study also helps in understanding disease phenotype and reveal the procedure of determining biological markers, which are helpful in medical testing and drug delivery of various SCID associated diseases.

CBGP-28

RECURRENT MUTATIONS IN KNOWN OCA GENES ARE ASSOCIATED WITH HEREDITARY OCA

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Oculocutaneous albinism (OCA), is known as a genetic disorder which occurs due to some error in biosynthesis of a pigment called melanin responsible for producing colour in body and it also gives diverse phenotypic appearances. Pathogenic variants in eight genes have been reported to be involved in OCA. In current study two families segregating autosomal recessive Oculocutaneous albinism were recruited from different localities of Mirpur/Bhimber Azad Jammu and Kashmir. Tetra primer analysis was carried out in both families. Family A showed 1045 c.1045-15 T > G mutation in Exon 2 of *OCA2* gene. Family B showed c.649 C>T (p.Arg 217 Trp) in Exon 1 of *TYR* gene. Both variants identified with Tetra primers were confirmed by Sanger Sequencing.

CBGP-29

NONSENSE MUTATIONS IN *ASPM* GENE CAUSED MICROCEPHALY IN CONSANGUINEOUS FAMILIES

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Autosomal recessive microcephaly is a heterogeneous genetic disorder characterized by reduced head circumferences and slopping forehead. Affected individuals also show mild to moderate intellectual disability. To date 27 genes have been identified which are involved in autosomal recessive microcephaly. In Pakistani Population *ASPM* and *WDR62* are most frequently involved genes and mutations in these two genes are responsible for MCPH. In present study two consanguineous families were recruited from AJ&K. Screening of these two families with STS markers followed by Sanger sequencing showed c.4975C>T nonsense mutation with protein modification p.Arg3244* in *ASPM* gene in Family A. Family B showed c.3188T>G nonsense mutation with protein modificationp. Leu1063*.Thus our study correlates with previous data that ASPM gene is major candidate gene responsible for MCPH in Pakistani population.

CBGP-30

WHOLE EXOME SEQUENCING IDENTIFIES KNOWN AND NOVEL MUTATIONS IN PREVIOUSLY REPORTED GENES INVOLVED IN HUMAN HEREDITARY INTELLECTUAL DISABILITY

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Intellectual disability affects 1–3% of the general population and the environmental or hereditary etiology is identified in less than half of patients. Genetic studies have reported mutations in approximately 1000 different genes that may cause intellectual disability. We assessed patients from two consanguineous Pakistani families from Kashmir region, exhibiting non-syndromal intellectual disability and postnatal microcephaly with whole exome sequencing (WES) followed by Sanger sequencing and cosegregation analysis. WES analysis of family MR-27 revealed a homozygous missense variant (c.572A>G, p.Y191C, NM_018027) in the gene FERM domain containing protein 4A (*FRMD4A*, MIM*616305). In the consanguineous family MR22, we identified a novel compound heterozygous variant (c.1358G>A, p.R453H; c.1621C>T, p.P541S, NM_013417) in the isoleucyl-tRNA synthetase 1 gene (*IARS1*, MIM*600709) linked to growth retardation, impaired intellectual development, hypotonia, and hepatopathy (GRIDHH, MIM#617093).

CBGP-31

SNPs VARIANTS IN DEAF1 GENE AND THEIR ASSOCIATION WITH PROSTATE CANCER SUSCEPTIBILITY IN PUNJAB, PAKISTAN

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Prostate cancer (PCa) is a non-cutaneous heterogeneous disorder. The increase in its prevalence was observed in Asian populations, over the past few decades. The deformed epidermal autoregulatory factor (DEAF1) is a transcription factor involved in regulating several genes, including itself as a repressor or transcriptional activator. The main role of DEAF1 encoded protein is important in the regulation of embryonic development. Defective DEAF1 has been linked to autosomal dominant mental retardation, cancer, autoimmune disorder, suicide, human depression, and neural tube defects. As per data generated through computational tools in the Lab of Genomics and Bio-signaling, University of Gujrat, Gujrat it was found that the DEAF1 link was not previously studied for its involvement in PCa, especially in South Asian populations that's why SNPs of this gene were selected to find out their association with PCa in our local population. We expect this final project to lay a foundation for future large-scale novel SNPs association studies in our population. In the first step of methodology, published data was collected which includes genome-wide association studies from the GWAS Catalog then, all the missense variants of DEAF1 were retrieved through Ensemble and evaluated by (POLYPHEN-2, SIFT, Meta-SNP, PROVEAN, Mut-Pred) server to point out most deleterious SNPs. 3D

modeling was executed I-TASSER and verified by Ramachandran Plot analysis through PROCHECK and ERRAT server. While in the second step, after all, bioinformatic analysis Arg530His mutation was selected and the association of selected nsSNPs with the occurrence of PCa was validated by PCR using specific primers. Forty control and forty PCa patient samples were analyzed, and a statistical study showed the significant odd ratio of association of Arg530His mutation with PCa. This first report shows that *DEAF1 Arg530His* polymorphism may be a risk factor for PCa. Moreover, this study suggests that this polymorphism may be an important SNP marker for identifying PC metastasis.

CBGP-32

ASSOCIATION BETWEEN SINGLE NUCLEOTIDE POLYMORPHISMS OF *PCSK9* (RS505151) AND *ANRIL* (RS1333045) AND POTENTIAL RISK FACTORS IN MYOCARDIAL INFARCTION PATIENTS

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There is a substantial rise in the count of individuals having Myocardial Infarction (MI). Single nucleotide polymorphisms (SNPs) of *PCSK*9 and *ANRIL* are found to be associated with MI by modifying various metabolic pathways. Lack of data among different populations has hindered our understanding of different genetic and environmental risk factors among particular ethnicities. The goal of this study was to explore *PCSK*9 SNP E670G/rs505151 and *ANRIL* SNP rs1333045 concerning various risk factors and hence the propensity to MI in Pakistani population. A case control analysis was performed in which 300 angiographically confirmed MI patients and 300 controls were genotyped using ARMS-PCR for different risk factors like age, gender, family history, hypertension, diabetes, smoking, passive smoking, obesity and junk food intake. Data were collected from the four cities viz. Sargodha, Khushab, Mianwali and Bhakkar. Statistical analysis showed a significant distributional pattern for rs505151:A>G (p<0.05) polymorphism among the studied population, however, none of the E670G variant was found to be a risk factor. Moreover, for rs1333045:C>T, C allele was found to be a risk factor in MI patients in the Punjabi ethnicity. The frequency of C risk allele (*ANRIL*) was found to be slightly higher in males showing susceptibility of this gender. This study demonstrates for the very first time the genotypic profile for *PCSK*9 and *ANRIL* SNPs within the healthy controls and MI subjects in this region of Pakistan highlighting the role of C allele as a risk factor for MI occurrence and progression. The microvariant rs1333045 could be used as a potential genetic marker for the screening of MI in general Pakistani population.

CBGP-33

SESQUITERPENE LACTONES AS NOVEL G0/G1 PHASE CELL CYCLE INHIBITORS

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Cancer is second leading cause of mortality for all ages, genders and ethnicities. One of the key features of cancer being uncontrolled proliferation marks it as a disorder of cell cycle. Given that dysregulated cell division is an intrinsic

mechanism of tumorigenesis. Checkpoint regulatory enzymes are most rational targets of cancer therapies. Enzymatic inhibition via natural bioactive compounds is gaining more traction owing to their much safer, inexpensive, and high bioavailable approach as compared to conventional chemotherapeutics. Sesquiterpene Lactones (SLs) are emerging chemopreventive compounds investigated for their distinct antioxidant activity. The enzymatic network regulators of G0/G1 are central to the continuation of cell division by bringing cell out of quiescent phase and enable elevated proliferation when activated by mitogenic signal. Inhibition measures of SLs against G0/G1 checkpoint regulator complex cyclin D/CDK4-6 and transcription factor E2F-2 was calculated using molecular docking tools, an emerging paradigm for drug designing. All SLs compounds interacted strongly with protein by inhibition potential in decreasing order as: sulfocostunolide A> sulfocostunolide B> carabrolactone B > carabrolactone A > ascleposide E > ilicol> eucalyptone. Protein-ligand complexes with highest binding free energies are: CDK6-Carabrolactone B -8.6 kcal/mol, E2F-2-sulfocostunolide B -8.1 kcal/mol, Cyclin D1- sulfocostunolide A -7.9 kcal/mol, and CDK4- Ascleposide E -7.0 kcal/mol with inhibition constants 0.4, 1.0, 1.5 and 7.0 µM, respectively. To further validate their druglikeness, these lead compounds were subjected to ADMET toxicity analysis and Pfizer's rule of five. Further *in vito* and *in vivo* investigations are recommended to verify the inhibitory potential of SLs against cell cycle checkpoints regulators for effective drug discovery.

CBGP-34

SESQUITERPENE LACTONES AS POTENTIAL G2/M PHASE CELL CYCLE CHECKPOINTS INHIBITORS

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Cancer is a second leading cause of death worldwide. Cancerous growth and abnormalities occur due to the dysregulation of cell cycle. Development of drugs to target cell cycle checkpoints leading to its arrest is a new paradigm for cancer treatment. Prevailing anti-cancer drugs are toxic, expensive and suffer from drug resistance. So, idea of chemoprevention via natural products is getting more importance as these bioactive compounds are much safer, cost effective and provide potential alternative approach for treatment of cancer. In this study, interactions of G2/M checkpoints proteins (Cyclin B1/CDK1) have been evaluated with seven bioactive compounds of sesquiterpene lactones (carabrolactone A, carabrolactone B, sulfocostunolide A and sulfocostunolide B, ascleposide E, ilicol and eucalyptone) family by using molecular docking tools to explore their cell cycle arresting potential. Outcomes of the present investigations reveal that carabrolactone B-Cyclin B1 complex and sulfocostunolide B-CDK1 complex exhibit the highest binding affinities of -8.2 and -8.0 kcal/mol with calculated inhibition constant values of 13.89 and 13.55 µM, respectively. Both potential complexes have shown good molecular interactions including hydrogen bond. Drug likeness of the lead compounds was validated by ADMET analysis as well as Lipinski's rule of 5. Further in vitro and in vivo investigations are required to validate the inhibitory activity of studied sesquiterpene lactones to develop these compounds as novel potential G2/M phase inhibitors. Email Address: aqsazaman457@gmail.com Postal Address: 129-2-AII, Township Lahore, Pakistan.

CBGP-35

UTILIZATION OF PG-SGA ASSESSMENT TOOL FORTHE EVALUATION OF MALNUTRITION STATUS IN CANCER PATIENTS

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Uncontrolled and abnormal mitotic division of cells called cancer; is significantlyaffected by dietary intake. The present study was a structured questionnaire-based study coupled with lab-based biochemical evaluations i.e. LFT, RFT,

CBC, and Electrolytes. Two worksheets were designed with cancer-related parameters mandatory for collecting cancer patients' data. PG-SGA Questionnaire with a total offour sections inclusive of criteria such as food intake, weight loss, symptoms physical activities and functions was used to document the data as well as a questionnaire which was about demographic characteristics of patients considering multiple variables, which were the focus of the present study. Data from 100 cancer patients aged 18-75 years was collected. According to SGA, 27% of patients were malnourished, 45% of patients were moderately or being suspected of malnourishment and 28% of patients were severely malnourished. The total scored PG-SGA showed that 47% of patients required nutritional intervention (≥ 4 points) and 18% had nutritional deficiency risk (≥ 9 points). The scored PG-SGA was associated with objective variables of nutritional status. There was a significant relationship estimated between SGA score and BMI. SGA score of the patient directly represents the malnutrition status of the patient, the higher the score of SGA the more the patient is malnourished, and the greater the chances of death. Studies have shown time and time again that this test has excellent sensitivity and specificity, and that it can accurately predict both poor clinical results and good ones. The objective of the study is the evaluation of the nutritional status of the cancer patients for promoting quality of life and finding co-relation of PG-SGA with clinical characteristics and functional status.

CBGP-36

GENETIC DIVERSITY AND POPULATION STRUCTURE OF THE fiDDLER CRAB *AUSTRUCA ANNULIPES* (H. MILNE-EDWARDS, 1837) BASED ON MITOCHONDRIAL DNA ALONG THE COAST OF PAKISTAN

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The fiddler crab *Austruca annulipes* inhabits tidal flat areas and is widely distributed across the Pakistani coastal areas including various coasts of Karachi and Sonmiani. Based on three mitochondrial markers We studied the genetic diversity and population genetic structure of *A. annulipes* collected from three sites of Pakistan coast. The *A. annulipes* individuals were sampled from Sandspit, Korangi, Sonmiani and Sonehri beaches of Pakistan. The amplified sequences obtained from three localities were compared with gene bank data. All local samples exhibited high levels of genetic diversity when several genetic diversity parameters were used (N_A, R_S, I, H_O, H_E, F_{IS} and F_{ST}). Pairwise F_{ST} estimates distinguished three discrete *A. annulipes* populations corresponding with the Sandspit, Sonmiani and Sonehri populations. All the population have not suffered the bottleneck effect. The three populations showed clear differences in historical population expansion times and their population dynamics after expansion. Results of the study indicate that *A. annulipes* dispersal is limited geographically and that high levels of genetic diversity are maintained both within and among the populations. The existence of genetic exchange and differentiation among the subgroups is also verified using structure analysis. Therefore, based on this evidence we propose that there is no reduction in genetic diversity in the population of *A. annulipes* although mitochondrial genome sequence is strongly suggestive for the future research.

CBGP-37

DATAMINING FOR THE DEVELOPMENT OF AN *IN SILICO* TOOL FOR THE PREDICTION OF *O*-GLCNAC MODIFICATION IN MAMMALIAN PROTEINS

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In proteins, *O*-linked β-*N*-acetylglucosamine (*O*-GlcNAc) is a novel type of post-translational modification (PTM), which occurs on serine/threonine residues catalyzed by the *O*-GlcNAc transferase (OGT) enzyme. In this single moiety *O*-linked glycosylation, the hydroxyl group (-OH) of serine or threonine residues becomes attached to GlcNAc. This modification regulates many cellular and molecular processes, and aberrant regulation of *O*-GlcNAcylation may lead to cancer and other neurodegenerative diseases. However, bioinformatic resources for *O*-GlcNAcylation are lacking, and a prediction tool is much needed to understand the mechanism of OGT's recognition of its substrate. In the past, several prediction tools and databases have been developed to identify the *O*-GlcNAc-modified sites in proteins. However, their accuracy and reliability are still questionable, which is challenging for researchers. Therefore, there is a need to develop a bioinformatics source containing experimentally known *O*-GlcNAc sites that are highly preferred to develop suitable strategies to identify accurate *O*-GlcNAc sites. For this purpose, data will be collected through a literature survey and processed to remove redundancy. After processing the data, features will be extracted and selected for the classifiers to construct the computational model. Therefore, with the available experimentally verified protein *O*-G1cNAcylation sites, it is highly desired to develop automated methods to rapidly and effectively identify protein *O*-GlcNAcylation sites.

CBGP-38

DEVELOPMENT OF PHARMACOPHORE AGAINST ASPARAGINE SYNTHETASE TO INHIBIT METASTASIS OF BREAST CANCER BY COMPUTATIONAL APPROACHES

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Cancer is the most leading concern and important cause of death worldwide. Cancer is defined as uncontrolled division of cell and it is a non-communicable illness. A total number of 18 million new cases have been diagnosed in 2018 worldwide, the most frequent being lung cancer (2.09 million cases) followed by breast (2.09 million cases) and prostate cancer (1.28 million cases). Breast cancer is mainly diagnosed in females. It can develop into metastatic cancer by migrating to other organs such as bones and liver. Asparagine is a non-essential amino acid, which is formed by the ATP dependent reaction catalyzed by the asparagine synthetase enzyme (ASNS), where aspartate and glutamine are converted to asparagine and glutamate, respectively. The human ASNS enzyme consist of 561 amino acid, having a molecular weight of 65 KDa. This enzyme governs the activation of transcriptional factors that regulates the metastasis. Post translational modifications (PTMs) are the major regulators of protein biological functions. In this century where cancer has become a global challenge and metastatic breast cancer being the second leading cause of death, there is dire need to develop new potential therapeutic targets for diagnosis. For this purpose, ASNS can be used as a potential therapeutic target to inhibit cancer metastasis, as it stimulates the transcription factors that regulates progression of breast cancer. In this study different *in silico* methods were used to develop potential diagnostic inhibitors against ASNS. On the basis of pharmacokinetics' different pharmacophore models were generated by computational methods and best model was selected by docking. 3D models of human ASNS were predicted by homology modeling methods.

CBGP-39

MOLECULAR CHARACTERIZATION AND PHYLOGENETIC ANALYSIS SUGGEST POPULATION EXPANSION AND HIGH LEVEL OF GENE FLOW IN OF BRACHYURAN CRAB *PORTUNUS SEGNIS*

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The Mitochondrial DNA marker used in studies of species identification, genetic diversity, molecular evolution of the species, and their connectivity determines the evolutionary process and phylogeography of the species. To aim of the present study was to address the genetic diversity and population structure and connectivity of the *Portunus segnis* from the coastal waters of Pakistan, with particular attention to the Indo-Pacific region, and by implementing mitochondrial DNA (mtDNA) Cytochrome C Oxidase Subunit I (COI). Among the sequences generated in the current study, observed a total of 9 haplotypes out of 29. Haplotype diversity was showed at 0.57, whereas the nucleotide diversity was 0.00026. Highly significant diversity was expressed in *P. segnis* ($P<=0.01$, $P<= 0.000$), whereas nucleotide diversity ($pi\pi$) shown a significant difference as ($P<= 0.000$). Neutrality test Tajima's D was estimated (Tajima's D: -2.1156) and $P > 0$, whereas Fu's Fs -2.87. Intraspecific distance range in between (0.000 - 0.009), the genetic diversity and neutrality test indices revealed population expansion of *P. segnis* supported by the Median Joining Network and expressed as the star-like topology and formation of one central haplotype with maximum frequency distribution to various locations. The phylogenetic tree shows the association of haplotypes from a different population to the identical clade. Haplotype arrangement in the phylogenetic tree and mixing Network according to geographic affinity suggests incomplete lineage shorting and recent population expansion.

CBGP-40

GENOTOXIC RISK ASSESSMENT ANALYSIS OF GRAPHENE NANO PARTICLES IN ALBINO MICE

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Graphene based nanomaterial have gained tremendous interest from last two decades due to its vast applications in food technology, Aeronautics and Medical Sciences. In Medical sciences it is used in all three sectors including diagnosis, treatment and prevention of different diseases in various capacities including molecular imaging, cancer diagnosis and treatment, drug delivery and cellular imaging. Due to its elevated use in human health services, it is mandatory to conduct toxicity studies specifically functional toxicity and genotoxicity. By keeping in mind, the toxic potential of graphene, a study was conducted to evaluate its genetic effects on the peripheral blood of albino mice. For this purpose, 64 randomly selected male albino mice were divided into 4 groups (having the same individuals in each group). A control group (without dose) and three treatment groups (112mg/Kg, 224mg/kg, 336mg/kg), the dose was administrated orally for three consecutive days. After treatment blood was drawn and subjected to comet assay. Data were recorded in CASP software and analyzed by using one-way ANOVA in SPSS. Maximum damage was observed at the highest dose of graphene. It can be concluded that short-term oral exposure to graphene is capable of causing genotoxicity.

3. HUMAN AND ANIMAL DISEASES

CBGP-41

MOSQUITO-BORNE DISEASES AND CLIMATE CHANGE: PAKISTAN PERSPECTIVE

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Many lethal and notorious infectious diseases in humans and animals are disseminated by several species of infectious mosquitoes. Malaria, dengue, chikungunya and zika are some important human infections vectored by mosquitoes. Climate change plays a significant role in spreading of such diseases. Mosquitoes are cold-blooded insects so warmer habitats are suited more for their proliferation consequently increase in infections they spread. Pakistan is among the most climate change-hit countries in the world, which faces continuous climate-led disasters since last many decades. The worst situation was observed in 2022 when the country faced the most unfortunate floods of its history. Due to heavy and continuous rains, and floods, dengue fever hit Rawalpindi, Lahore, Faisalabad, Multan, Karachi, Peshawar and other cities. Nationwide 25932 cases of dengue and 62 deaths have been reported. Sindh and Baluchistan were most flood affected provinces in 2022. In Sindh, 69123 malaria confirmed cases were reported in August 2022 as compared to about 19826 in August 2021. Whereas, in Baluchistan, the cases were 41368 in August 2022 as compared to 22032 in August 2021. About 78% of all cases reported in the country, were from only these two provinces in that year. In September 2022, additional 210 715 cases were reported from 62 high-burden districts as compared to 178 657 in the same districts in August 2022. It is an alarming situation and should be dealt with the scientific based integrative approach for management of vector-borne diseases.

4. MICROBIOLOGY

CBGP-42

FIRST REPORT ON VANCOMYCIN-RESISTANT *STAPHYLOCOCCUS AUREUS* ISOLATED FROM EQUINE RESPIRATORY INFECTIONS IN PAKISTAN

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Vancomycin-resistant *Staphylococcus aureus* (VRSA) is an evolving and worldwide prevailing issue in human and veterinary medicine. The current study aimed to investigate the nasal colonization of *S. aureus* and VRSA in donkeys (n = 63), mules (n = 42), and horses (n = 98) suffering from respiratory infections. Vancomycin-resistance was confirmed in *S. aureus* isolates based on phenotypic and molecular methods, followed by the phylogenetic analysis of confirmed local isolates. Furthermore, the association of various animal and management-based risk factors with *S. aureus*-associated respiratory infections was also evaluated. The nasal samples subjected to standard microbial techniques and the presence of *nuc* gene on PCR showed that *S. aureus* was prevalent in 33.33%, 42.86%, and 48.98% nasal samples in donkeys, mules, and horses respectively with an overall prevalence of 42.86%. The confirmed isolates were subjected to Kirby-Bauer disc diffusion test and 26.44% isolates showed resistance to vancomycin. The vancomycin-resistance was evaluated at molecular level by targeting the *vanB* gene and results showed an overall 13.79% prevalence of vancomycin-resistant isolates. The prevalence was higher in donkeys followed by horses and mules. The phylogenetic analysis revealed a high similarity (99%) of study isolates with each other and with already reported sequences of *vanB* gene. Risk factor analysis revealed that raising purpose (p=0.011), work intensity (p<0.001), stocking density (p=0.006), presence of other livestock animals in surroundings (p=0.043), and common drinking water source (p=0.023) were significantly associated with the *S. aureus*-associated respiratory infection in equines. Antimicrobial susceptibility testing of local VRSA isolates showed high resistance to cefoxitin and amoxicillin, followed by fusidic acid, and amikacin while the highest sensitivity was found against levofloxacin and linezolid. Furthermore, all the tested isolates showed resistance to three or more than three antibiotics and were considered multiple drug-resistant isolates. The current study is the first molecular evidence of VRSA isolated from equine respiratory issues in Pakistan. The study will help to address the emerging issue of vancomycin-resistance in equines and possible measures to tackle this issue.

CBGP-43

NEW KINGDOM: AKARYOTAE (ENDOCYTA), NEW DOMAIN: AKARYA (VIRUSIA) AND NEW PRIMARY CATEGORY (EMPIRE): AKRAYOTES IN BIOLOGICAL SCIENCES

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Prions, Viroids and Viruses are the organisms, which are not included in any reported Kingdom, Domain and Primary Category (Empire) in Biological Sciences by any one uptill now (December 2022). The Prion simply consists of protein only and has been found infectious to animals and Humans, whereas the Viroid simply consists of Ribo Nucleic Acid (RNA) or Deoxy Ribo Nucleic Acid (DRNA or Simply DNA), which is only infectious to plants. The both Prions and

Viroids are smaller in size as compared to Viruses. The virus simply consists of nucleic acid (RNA / DNA) surrounded by protein coat, the capsid. The prions, viroids and viruses neigther grow in size, and nor respire but they reproduce through RNA / DNA replication inside the living host only. The prions, viroids and viruses multiply within the host cell only, by using the RNA/ DNA, enzymes and raw materials of the host cell. The prions, viroids and viruses remain inactive, when they are present outside the living cell. It may be realized by the study of Prions (only protein) and Viroids (only nucleic acid, RNA / DNA) that they have conjugated / combined / united / assembled with each other, resulting in the shape / form / evolution of Viruses. It means that Prion+Viroids=Viruses, having both RNA / DNA with protein coat, the capsid. Thus viruses attack not only the plants but also the animals and humans as well, due to their evolution from prions and viroids. Therefore, not only the study of prions, viroids and viruses was needed but also the classification of these was important. Due to which in the present research work, the new Kingdom, the new Domain and the new Primary Category (Empire) was reported for Prions, Viroids and Viruses, not reported yet, Dec 2022, by any Scientist in Biological Sciences. The literature search method was used and for this different books, scientific journals, scientific reports, and published research papers, concern to prions, viroids and viruses were taken into consideration. The prions, viroids and viruses were not classified into any Primary Category (Empire), Domain (Super Kingdom), and Kingdom, by any Scientist uptill now (December 2022). Such as Linnaeus (1735), Haechel (1866), Chatton (1937), Copeland (1938, 1956), Whittaker (1969), Margulis and Schwartz (1982), Woese (1990) and Alblas (2016). Tariq (2018) reported the name of Kingdom; Akaryaotae (Endocyta) which contains and includes the Prions, Viroids and Viruses in Biological Sciences for the 1st time in the world. He also reported for the 1st time in the world, the 3rd Primary Category (Empire) of organism in the Biological Sciences, the Akaryotes beside the two previously reported (Prokaryotes and Eukaryotes) by Katscher (2004). The Two Primary Categories (Prokaryotes and Eukaryotes) were also reported by Koonin (2010). Tariq (2018) also reported five to seven Kingdom Systems of Organisms in Biological Sciences for the 1st time in the world including the Prions, Viroids and Viruses in the New Kingdom, Akaryotae also called as Endocyta means functioning only inside the living cell of the host. In General, the Kingdom Akaryotae (Endocyta) may also be called simply as the Kingdom: Virus. The New Kingdom for Prions, Viroids and Viruses has been reported as Kingdom Akaryotae. (Endocyta). The new 3rd Empire / Primary Category for Prions, Viroids and Viruses has been reported as Empire Akaryotes, beside two previously reported Empire Prokaryotes and Eukaryotes. The structures, characters and infectious diseases via Prions, Viroids and Viruses have been reported, in this research work. Thus, Three Evolutionary Scheme, a new Domain and a new Kingdom has been reported through this paper.

CBGP-44

BIOTOXICITY ASSESSMENT OF CLONED CRY 11 PROTEIN GENE FROM BACILLUS THURINGIENSIS 9NF

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The current investigation describes the isolation and characterization of toxic Bt. local isolates harboring 99% homology with Bti. prototoxin Bacillus thuringiensis (AXJ97553.1 and novel OUB27301.1) which contains full length cry11 gene (1.9kb). Initially, it was cloned in pTZ57R/T and then sub-cloned in pET30a (+) for expression. The optimized conditions for good expression were found 1mM IPTG, 3.5-4 h incubation time, and 37ºC. Toxicological assays were determined against 3rd instar larvae of Aedes aegypti with expressed partially purified and crude recombinant protein using recombinant E. coli BL21, DE3 transformed with cry11 gene. It was found that partially purified Bt. protein is highly toxic against A. aegypti larvae with LC50 value of 42.883±6 µg/ml. B. thuringiensis strains producing Cry 11 toxic protein can be used as bio-pesticide to control resistance in insects. Keywords: Bacillus thuringiensis; cry11 gene; δ-endotoxin; bio-insecticide; Aedes aeygpti.

CBGP-45

EFFECT OF PROBIOTICS ON GUT MICROBIOTA AND MOLECULAR CHARACTERIZATION OF GIT ISOLATED *LACTOBACILLUS* STRAINS FROM WISTAR RATS

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Probiotics are living microorganisms that have been regarded to beneficial effect on the gut microbiota. The research was conducted to examine the effects of probiotic strains on the gut microbiota of female Wistar rats. Strains included in research were laboratory isolated strains named as *L. plantarum* MZ707748 (Pro1), *L. plantarum* MZ710117 (Pro2), *Weissella confusa* MZ735961(Pro3), *L. plantarum* MZ710117(Pro4), and one commercially available strain *L. acidophilus* La-14 (Pro5). Different random groups were designed to examine the synergistic effects of experimental strains. GIT weight and length was examined. Morphological, biochemical, and molecular characterization of gut isolated strains was performed. Statistical differences in GIT weight and length were seen. Gut isolated strains of probiotic groups were gram positive, catalase negative, showed survival in phenol and NaCl. They have great antimicrobial activity. Molecular characterization of gut isolated strains suggested that *Enterrocccus lactis* OP817625, *Enterrocccus lactis* OP808213, *Lacticaseibacillus rhamnosus* OP818495, *Enterrocccus lactis* OP808214 and *Enterrocccus faeceum* OP808217 were isolated from G1, G2, G3, G4 and G5 respectively. Probiotics were safe to use and improve the gastro intestinal tract as well as animal health.

CBGP-46

CHARACTERIZATION OF LEAD ACCUMULATING BACTERIA ISOLATED FROM INDUSTRIAL EFFLUENTS

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Heavy metals (HM) toxicity is becoming a major threat to living organisms in recent years due to the increase in population and anthropogenic activities. Their multiple industrial, domestic, agricultural, medical and technological applications have led to their wide distribution in the environment; raising concerns over their potential effects on human health and the environment. Their toxicity depends on several factors including the dose, route of exposure, and chemical species, as well as the age, gender, genetics, and nutritional status of exposed individuals. Lead (Pb) shares about 10% of total pollution produced by heavy metals. The uptake of lead by the primary producers (plants) is found to affect their metabolic functions, growth, and photosynthetic activity. The accumulation of lead in excess can cause up to a 42% reduction in the growth of the roots. The present study deals with isolation and identification of lead resistant bacteria from contaminated wastewater of tanneries effluents from the Quaid-e-Azam Industrial Estate, Kot-Lakhpat, Lahore, Punjab. From the morphological, biochemical analysis and 16S rRNA sequencing, lead resistant bacteria isolate were identified as *Bacillus cereus* (OP819883) and *Bacillus* sp. (OP821491). Maximum tolerance concentration (MTC) was shown against the lead acetate at different levels. The present study reveals that the lead resistant bacterial isolate can be used for bioremediation of lead.

CBGP-47

CHARACTERIZATION OF PLASTIC DEGRADING BACTERIA ISOLATED FROM SEWERAGE WASTEWATER

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Plastic is a fundamental polymer used in daily food packaging that pollutes our environment. In this study, we collected bacteria from sewerage wastewater and observed their potential to degrade plastic balloons made of polythene and nylon 6,6. Six samples were collected from sewerage wastewater and were incubated for 120 days in 50 ml of minimal salt media (MSM) containing 60mg plastic balloons. Strain SH2B showed 23%, while *Bacillus tropicus* demonstrated 21.6% weight loss of plastic. Meanwhile, a 25% weight reduction was observed by both strains *Pseudomonas* sp. and *Pseudomonas aeruginosa*. FTIR analysis showed that these strains degraded the polythene by breaking the bonds. The compounds like 2,6 Dihydroxybenzoic acid, 2,5 Dihydroxybenzoic acid, Salicylic acid and 2,4 Dihydroxybenzaldehyde produced because of biodegradation were observed by GC_MS analysis. In conclusion, bacteria isolated from sewerage wastewater have the potential to reduce plastic pollution from the aquatic ecosystem.

CBGP-48

ANTIBACTERIAL ACTIVITY OF BACTERIA ISOLATED FROM FACIAL ACNE OF TEENAGERS BY USING DIFFERENT FRUITS

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Acne is a very common disease and mostly affects the teenagers as compared to the other age group and has some psychological affects as it lowers the confidence level. The researchers are developing the fruit formulations because the acne causing bacteria has developed resistance against the antibiotics. The recent study is conducted to investigate the effects of fruits on bacterial acne. For this purpose the bacterial samples were taken from the teenagers and grown on agar plates and then different biochemical tests were performed and then their DNA was extracted. After the Ribotyping of these samples bacterial strains were obtained which are Staphylococcus sp, Cutibacterium acne, Staphylococcus aureus, Staphylococcus epidermis, Bacillus paramycoids, and Mammaliicoccus lentus. The fruits (sweet lime, banana, pomegranate and lemon) were purchased from the local markets of Lahore. Their peels were dried and converted into powdered form. Then 95% ethanol extracts were prepared. The antibacterial activity of these extracts was checked via disc diffusion and well diffusion method. All the fruit extracts showed zone of inhibitions which means that these extracts are active against the acne causing bacteria. Then anti-acne cream was prepared using these fruit extracts. These results indicated that the fruit formulations were very active against the acne.

CBGP-49

EVALUATION OF ISOLATED PROBIOTICS ON THE EFFICACY OF IMMUNE SYSTEM IN MALE AND FEMALE WISTAR RATS

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Probiotics were isolated from non-dairy products. Microscopic, biochemical, and molecular tests were carried out for the characterization of strains. To evaluate the effects of isolated probiotics on the immune system of the gut, male and female (15+15) Wistar rats were randomly distributed into 5 groups: 0-day, negative control, positive control (commercially available *Lactobacillus acidophilus*-14), PRO-1, and PRO-2 (laboratory isolated probiotics with accession numbers; *Lactobacillus plantarum* MZ707748 and *Lactobacillus plantarum* MZ729681, respectively). During immune system investigations, the amounts of IgA and IgG in male and female groups were remarkably different, while the values of Alanine-transaminase (ALT) and Aspartate-aminotransferase (AST) in both genders were average and there were no visible differences. Male probiotic treated groups had decreased levels of interleukin-6, bilirubin, and creatinine. However, female probiotics treated groups had little rise in bilirubin and creatinine values. Cellular blood count levels of Hematocrit (HCT) and white blood cells (WBC) in male groups showed considerable differences, while there were no differences in female groups. Levels of Red blood cells (RBC) and), mean corpuscular hemoglobin concentration (MCHC) showed distinct changes in female groups, while these values were insignificant changes among male groups. There were considerable differences among control and groups given probiotics. Histopathological results showed no damage to the liver and thymus. Fecal examination of rats was used to examine the viability and survival of *Lactobacilli*. It was observed on the basis of blood tests that the immune system was boosted and improved in probiotic treated groups as compared to control groups.

CBGP-50

ANTI-ACNE PROPERTIES OF DIFFERENT HERBS AGAINST THE BACTERIA ISOLATED FROM TEENAGERS FACIAL ACNES

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Acne is a skin condition that is linked with pilosebaceous unit and cause symptoms like pimples, pustules and papules. In present study 6 samples were collected from acne patients of age 15 to 19 years old. Bacterial isolates were identified by biochemical tests i.e. catalase, glucose fermentation and gram staining. For molecular characterization of the strains DNA extraction, polymerase chain reaction and 16Sr RNA gene sequencing was performed and the six strains were identified as strain*s* S1 (*Staphylococcus* sp*.)*, S2 (*Cutibacterium acnes*), S3 (*Staphylococcus aureus*), S4 (*Staphylococcus epidermis*), S5 (*Bacillus paramycoides*) and S6 (*Mammaliicoccus lentus*). Herbal species neem (*Azadirachta indica*), tulsi (*Osimum sanctum)*, licorice root (*Glycyrriza glabra*), turmeric (*Curcuma longa)* and amaltas (*Cassia fistula*) that are acknowledged as medicinal plants were collected, dried and grounded to prepare their 95% ethanolic extracts. Anti-acne herbal cream was also formulated using these herbal extracts and a few chemicals. The antimicrobial activity for well and disc diffusion assay showed that neem extract was most efficient and 100% of acne isolates showed visible inhibitory zones and licorice extract showed least efficient results based on the ANOVA test

results. Our results showed that all the 5 herbal extracts are potent against acne causing bacteria on agar plates and anti-acne cream is also potent against these 6 strains. Hence, the present study could lead to future utilization of neem, turmeric, amaltas, tulsi and licorice against the pathogens of skin.

CBGP-51

EFFECTS OF PROBIOTICS ON HEMATOLOGICAL PARAMETERS IN FEMALE WISTAR RATS

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Different probiotics formations have different efficacies depending upon whether they consist only one or multiple strains of probiotics. In this research, probiotics impact on immune system of female rats was examined. Strains included were Lactobacillus plantarum MZ707748 (Pro 1), L. plantarum MZ710117 (Pro 2), Weisella confusa MZ727611 (Pro 3), and L. plantarum MZ735961 (Pro 4). One strain of probiotic, L. acidophilus-14 (Pro 5) was purchased commercially. Different groups were designed as G1 including pro 1 and 2, G2 comprising pro 3 and 4, G3 consisting of pro 2, 3 and 5, G4 including pro 1, 2, 3, 4 and 5, G5/PC consisting only pro 5 and NC & 0 day were untreated. Complete count of blood, serum chemistry, fecal analysis and histopathological examination of thymus and liver was done. Statistical differences were seen in the parameters of complete blood count. No difference was observed in AST, ALT, bilirubin, albumin, IL-6 and IgA except TP, creatinine and globulin. Fecal strains of probiotic groups were catalase negative, antibiotic resistant, anti-pathogenic agents, and were able to survive in phenol and NaCl. Relative thymus and liver weight were also not significantly different. Histological examinations suggested no damage in the morphology of either organ. Enterococcus lactis OP800267, E. sp. OP800231, Lactobacillus plantarum OP800244, E. lactis OP800284 and Bacillus sp. OP800286 were isolated from G1, G2, G3, G4 and G5 respectively. It was concluded that all probiotic strains were safe to use and had beneficial effects on the hematology of female Wistar rats.

CBGP-52

CYANOBACTERIAL DIVERSITY IN MICROBIAL CONSORTIUM AT SEDIMENT SURFACE OF MANGROVE HABITAT ALONG KARACHI COAST

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Cyanobacteria are highly diversified prokaryotic organisms. Marine cyanobacteria have been proven to contribute significantly in biogeochemical processes. Owing to importance of these cyanobacteria, present study was undertaken and assesses their diversity in relation to physico-chemical conditions at two sites i-e Sandspit and Korangi along Karachi coast, polluted with domestic and industrial effluents. Samples were collected from sediment surfaces underneath the canopy of mangroves. Detailed microscopic examination revealed that a rich and diverse assemblage of cyanobacteria inhabited microbial consortium belongs to five major groups, mainly cyanobacteria followed by diatoms, dinoflagellates and green microalgae. Among cyanobacteria, filamentous species were dominant as compared to unicellular types. These types were mainly composed of genera namely *Aphanocapsa, Chrococcus, Merismopedia* and *Microcystis,* whereas in filamentous types, genus *Oscillatoria* was most diverse including *Oscillatoria princeps, O. limosa, O. sancta.* However, *Leptolyngbya, Phormidium, Planktothrix*, *Pseudanabeana* and *Spirulina* were the genera also proliferated at both study sites. Among physico-chemical parameters, salinity and temperature were remains within

the range of 38 -39 PSU and 26-27°C at both sites. Slight variations in dissolved oxygen (0.15 to 0.16 mg L^{-1}, 0.20 to 0.21 mg L^{-1}) were recorded at Sandspit and Korangi respectively. Moreover, pH was ranged between 6.7-6.79 at Sandspit as oppose to 7.23-7.28 at Korangi site. Variation in nutrients ion concentrations were also noticed where, NO_3^- (1.32-1.47 µg L^{-1} and 1.98-2.55 µg L^{-1}), NO_2^- (0.44-0.48 µg L^{-1} and 0.21-0.23 µg L^{-1}), NH_4^+ (8.24-12.85 µg L^{-1} and 4.49-4.72 µg L^{-1}) and $PO4^-$ (0.58-0.63 µg L^{-1} and 0.72-0.90 µg L^{-1}) were recorded from Sandspit and Korangi respectively. Furthermore, it can be comprehended that cyanobacteria are capable to bioremidate pollutants. Hence, there is a need to explore their potential in a wide range of applications such as bioremediation, bioenergy and natural products.

CBGP-53

EFFECTS OF DIETARY SUPPLEMENTATION OF *BACILLUS LICHENIFORMIS* ON GROWTH, SURVIVAL, HEMATOLOGICAL AND IMMUNE PARAMETERS OF MOZAMBIQUE TILAPIA *(OREOCHROMIS MOSSAMBICUS)*

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The present experiment was conducted to evaluate the effect of dietary supplementation of *Bacillus licheniformis* on the growth, hematological and immune parameters of Mozambique tilapia (*Oreochromis mossambicus)* fingerlings. An 8-week feeding trial was carried out at the Animal house of GCU Lahore. The fingerlings were fed at the rate of 3% of their live wet weight on their prescribed diets once daily for two months. Different water quality parameters were monitored throughout the feeding trial. Four diets of various concentrations (10^5, 10^7, and 10^9 CFU g^{-1}) were prepared. All these treatments were applied in triplicates. At the end of the trial, the growth, hematological and immune parameters of fish were evaluated. Results indicated that growth rate, weight gain, specific growth rate, and feed conversion ratio (FCR) were significantly ($P<0.5$) higher in fish fed with the probiotic-containing diet, with the highest growth observed with a diet containing 10^5 CFU/g of probiotics. Leucocyte, erythrocyte count and glucose content were also high in experimental groups compared to control groups. Total protein content and Peroxidase activity were significantly higher ($P<0.5$) in fish fed with the highest concentration (10^5 CFU/g) of probiotics as compared to control and other dietary groups. Hence, *Bacillus licheniformis* is reported as a potential probiotic and can be used for better growth and survival rate of fish in aquaculture practices.

CBGP-54

IDENTIFICATION AND SCREENING OF HYDROCARBON DEGRADING BACTERIA ISOLATED FROM MANGROVE SEDIMENT

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Oil has a devastating effect in the marine and terrestrial ecosystems. In this regard mangroves under such areas of high anthropogenic influence are also threatened by the hazard of oil spills which ultimately affect the communities inhabiting in this ecosystem and may altered the biodiversity. Many microbial communities helps mangrove ecosystem by degrading hydrocarbon accumulated in the sediment. Therefore, the main objective of the present study was to isolate

and identify hydrocarbon degrading bacteria from the mangrove sediment. Hydrocarbon degrading bacteria were isolated from mangrove area at Sandspit and Manora by selective enrichment technique. Isolates were primarily screened for their degradation potential by using phenanthrene and anthracene as single source of carbon and energy. A total of seven distinct species were collected via spray plate technique showing their degrading potency by forming clear zones on hydrocarbon coated agar plates. Isolated hydrocarbon degrading bacteria were identified on the basis of biochemical and morphological characters and further confirmed by employing automated test systems. The species were found to belong to genera: Staphylococcs sp, *Pseudomonas aeruginosa*, *Pseudomonas pituda*, *Proteus* sp, *Shigella* sp and *Acinetobacter* sp. The biodegrading ability of each isolate was further determined by measuring Optical Density (OD) in mineral salt medium supplemented with different percentages of selected hydrocarbon on spectrophotometer. The strains with highest OD were confirmed as efficient hydrocarbon degraders. *Staphylococcus* sp., *Pseudomonas aeruginosa* and *Acinetobacter* sp. exhibited excellent growth profile when supplemented with 1% phenanthrene. Finding of present study suggest that these bacteria will play a substantial role in the removal of hydrocarbons form polluted habitats of mangrove ecosystem. A detailed study is required to identify more beneficial strains for healthy environment.

CBGP-55

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 (three trains. Taiz Gham, Green Line and Jaffer Express) grown on levine EMB agar plates in February of 2020 (8-2-20, 10-2-20 and 13-2-20) Morphology of each colony was observed, colony designation was also done on nutrient agar, again morphology was observed. The final designation of pure culture of L-EMB agar G. vials as G+ive bacteria namely as Escherichia coli, Klebsiella pnueumonia and Bacillus cereus (colourless) and Salmonella Typhimurim G+ive. The final designation of pure culture on (L-EMB agar G. vials) named as 1A1a, 1Aa2, 1Aa3. 1B2b, 1B3b, 1C1c, 1C2c, 1C3c, 2A1a, 2A2a, 2A3a, 2A4a, 2B1b, 2B2b, 2B3b, 2C1c, 2C2c, 2C3c, 3A1a, 3B1b, 3B2b, 3C1c, 3C2c, Growth on slant is +ive. Antibiotic resistance / sensitivity test was done (above 07) named as IA1a, 2C3c, 2A3a, 2C2c, 3A1a, 2C1c, 3B1b, and zone of inhibition were measured.

CBGP-56

EVALUATION OF ANTIMICROBIAL ACTIVITY OF PROBIOTICS AGAINST PATHOGENIC BACTERIA

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The aim of this study was to characterize probiotic strains isolated from different sites of Lahore using cucumber, milk, pickle, honey, rice, potato, garlic and gizzard. Samples were spreaded on MRS medium. After biochemical characterization, nine strains were selected and further identified by ribotyping (16sRNA). These strains were then assayed for their antimicrobial activity using well diffusion method. It was found that all strains were able to tolerate pH 3 for 3h, 0.3% bile salts for 4h. Three isolates were identified as *Weissella confusa, Weissella cibaria, Enterococcus faecium*, *Pediococcus acidilactici, Bacillus cereus* and two strains of *Lactbacillus plantarum*. *Lactobacillus plantarum* showed good antimicrobial activity against the five tested pathogenic bacteria (*Echerichia coli*, *Staphylococcus aureus*,

Pseudomonas aeruginosa, Bacillus subtilis, *Bacillus licheniformis)*. The present study was conducted to use the probiotics for food supplement and human health benefits.

CBGP-57

HISTOLOGICAL STUDY OF MIDGUT OF *APIS MELLIFERA* FED WITH *BACILLUS CLAUSII* (BC-2BIO) AND *LACTOBACILLUS BREVIS* (MF179529) SUPPLEMENTED DIETS

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Apis mellifera is an important pollinator having prominent impact on crops economic- ecological balance. Beekeeping provides us more valuable products like honey, pollen, propolis, bees wax and royal jelly. Ongoing era demands more scientific and environment friendly strategies to improve beekeeping sector internationally. After the ban on antibiotics usage in Europe for bees, probiotics are being used worldwide. A study related to the use of probiotics and organic acids was conducted from 5-10-2020 to 20-10-2020. 10^8 colony forming units/ml of sugar syrup of two probiotics: *Lactobacillus brevis* (MF179529) and *Bacillus clausii* (BC-2Bio) were administered with and without addition of 2.99% lactic acid, 2.91% acetic acid and 1.96% acetic acid. The administration of probiotics with acidifying agents resulted in enhancement of gastric cells discharge, huge number of peritrophic membranes, and slight vacuolization of cytoplasm. Mean midgut lumen diameters (μm^2) were 356.67±27.28, 300.00±50.00, 300.00±86.60, 390.00±37.86, 243.33±80.90, 243.33±80.90 and 386.67±8.82 compared to control's 240.00±30.55 . The study confirms the beneficial and non detrimental effects of probiotics and organic acids.

CBGP-58

PREVALENCE AND ANTIBIOTIC SUSCEPTIBILITY TESTING OF THERMOPHILIC *CAMPYLOBACTER JEJUNI* FROM COMMERCIAL BROILER FARMS IN AND AROUND LAHORE

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Campylobacter jejuni (C. jejuni) is one of the most important poultry commensal causing food-borne zoonosis in human. The present study was conducted to determine the prevalence and the antibiotic resistance profile of multiple drugs resistant (MDR) strains of thermophilic *C. jejuni* from broiler chickens. A total of 375 cloacal swab samples were collected by systematic sampling method of commercial broiler farms in and around Lahore and examined for the presence of thermophilic *C. jejuni*. Their prevalence was found to be 53% (200/375). Confirmation was done by biochemical and molecular (Polymerase chain reaction) testing methods. Phylogenetic tree analysis was also performed for genetic identification of the species. *in vitro* antibiotic disc diffusion method of those selected isolates was performed against 20 most common human therapeutic antibiotics. The isolates were found to be highly resistant against most of the available antibiotics leaving behind very less choice of selection for treatment. The results are as follows:

ciprofloxacin (91%), clindamycin (87%), moxifloxacin (84%), telithromycin (82%), erythromycin (82%), clarithromycin (76%), nalidixic acid (76%), azithromycin (69%), ampicillin (62%), co-amoxiclav (56%), chloramphenicol (51%), tetracycline (50%), tygecycline (45%), norfloxacin (27%), gentamicin (25%), levofloxacin (24%), ofloxacin (20%), imipenum (4%), meropenum (2%) and ceftazidime (1%). Carbapenums (imipenum and meropenum) and cephalosporin (ceftazidime) was found to be highly effective against these MDR thermophilic *C. jejuni* isolates. Its efficacy for the treatment of campylobacteriosis should be further evaluated in clinical trials.

CBGP-59

BIOFILM MEDIATED BIOREMEDIATION OF PESTICIDES CONTAMINATED SITES

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Overuse of pesticides in agricultural soil and industrial wastewater containing dyes contaminate the environment severely and are toxic to animals and humans as well, so their removal from the environment is essential. The present study was focused on the bioremediation of pesticides (cypermethrin (CYP) and imidacloprid (IMI)) and dyes (malachite green (MG) and congo red (CR)) using biofilm of bacteria isolated from pesticides polluted agriculture soil and effluents from the textile industry. From pesticides polluted soil, four bacteria, namely, *Bacillus thuringiensis* (OP554568), *Enterobacter hormaechei* (OP723332), *Bacillus* sp. (OP586601), *Bacillus cereus* (OP586602) and from dyes polluted soil, three bacteria *i.e*., *L. sphaericus* (OP589134), *Bacillus* sp. (OP589135) and *Bacillus* sp. (OP589136), were identified based on 16S rDNA analysis. Biofilm of individual and mixed cultures of indigenous bacterial isolates was developed and tested for their ability to degrade pesticides (CYP and IMI) and dyes (MG and CR). UV-visible and FTIR spectroscopy was used for the confirmation of CYP, IMI, MG and CR degradation. From all, the mixed culture of *B. thuringiensis* + *Bacillus* sp. (5A) (g7) showed the highest degradation (46.2%) against CYP (100µL) and the mixed culture of *B. thuringiensis* + *E. hormaechei* + *Bacillus* sp. (5A) + *B. cereus* (g11) highly degraded (70.0%) IMI (100µL) within 10 days of incubation at 37 °C. Mixed culture of *Bacillus* sp. (CF3) + *Bacillus* sp. (DF4) (g6) showed the highest degradation (86.76%) against MG (100µL) and mixed culture of *L. sphaericus* + *Bacillus* sp**.** (CF3) highly degraded (30.78%) CR (100µL). UV–Vis spectral analysis revealed the major peak at 224 nm of CYP, 263nm of IMI, 581nm of MG and 436nm of CR, which completely disappeared after biofilm treatment. FTIR analysis showed several major peaks which are completely or partly disappeared and the appearance of many new peaks after biofilm treatment. In conclusion, it is recommended that biofilm of these bacteria could be suitable agents for the bioremediation of pesticides and dyes. Pesticides degrading strains can be applied as biofertilizers in crops that are contaminated with CYP and IMI. These biofilm-forming strains should be further studied to understand the molecular machinery that regulates their degradation ability against pesticides and dyes. This study expresses an ecofriendly approach for the bioremediation of harmful contaminants from the environment, like pesticides and dyes. These biofilm-forming strains should be further studied to understand the molecular machinery that regulates their degradation ability against pesticides and dyes.

CBGP-60

BIOFILM MEDIATED BIOREMEDIATION OF HEAVY METALS POLLUTED ENVIRONMENT AND DECOLORIZATION OF PULP-PAPER MILL EFFLUENTS

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The present study aims to isolate and identify bacteria from heavy metals and pulp-paper mill contaminated sites, Kasur & Lahore, Punjab, Pakistan as well as to assess the bioremediation potential metals and pulp-paper mill effluent. In

total, 11 bacterial strains were found to be strong biofilm formers using congo red assay. 16S rRNA gene sequencing confirmed the strains belonging to *Bacillus cereus*, *B. clausii, B. flexus* (Accession No. OP554572-OP554574), *Leptospira* sp. (OP740799), *L. interrogans* (OP740799-OP740800), *B. cereus*, *B. licheniformis*, *Klebsiella pneumoniae*, *Pseudomonas putida*, *B. subtilis* and *Pannonibacter phragmitetus* (OP001792-OP001797). Atomic absorption spectroscopy of heavy metals before and after treatment confirmed that biofilm of *Leptospira* sp.(SN2) showed significantly high bioremediation of metal against (1460 ± 0.67 μgmL^{-1}) ($P \leq 0.05$) zinc (Zn). Similarly, biofilm of P. *putida* significantly decolorized (65.1%) ($P \leq 0.05$) the pulp-paper effluent. FTIR analysis of treated heavy metals showed the shifting of major peaks (1637 & 1629 to 1647, 1633 & 1635 to 1643 and 1638 to 1633) corresponding to specific amide groups due to C=O stretch. Similarly, disappearance of peaks (877, 1043 & 2976) in FTIR spectra of pulp-paper effluent was due to stretching of CH_3 groups, vibration of aliphatic and aromatic -OH suggested the removal of dyes from pulp-paper effluent. The study suggested that these biofilm forming isolates have potential to bioremediate heavy metals and decolorize pulp-paper effluent. Further studies are the need of hour to explore and further characterize the microbial flora of tanneries located in the region. Biofilm from this microbial flora can be used to maximize the bioremediation process of heavy metals and decolorization of pulp-paper effluent. Thus, it can be a great initiative to reduce heavy metal contamination and coloration from our water bodies, resulting in lower brain and cardiac disorders and cancer rate.

CBGP-61

OCHROBACTRUM INTERMEDIUM: ENVIRONMENTAL POLLUTANTS ERADICATOR

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The multiple metal resistant Gram-negative *Ochrobactrum intermedium* strain 1-525k was isolated from tannery effluents, demonstrating optimal propagation at 37°C and pH 8. The minimum inhibitory concentration (MIC) test showed that *O. intermedium* 1-525k can tolerate up to 30 mM Cr^{6+}, and also exhibit the ability to resist other toxic metal ions including Pb^{2+} (11 mM), As^{3+} (3 mM), Zn^{2+} (17 mM), Cd^{2+} (5 mM), Cu^{2+} (3 mM), and Ni^{2+} (2 mM) with the resistance order as $Cr^{6+} > Zn^{2+} > Pb^{2+} > Cd^{2+} > As^{3+}/Cu^{2+} > Ni^{2+}$. *O. intermedium* 1-525k showed maximum biosorption efficiency (q) of 48 mM Cr^{6+}/g after 6 days. Chromate stress elicited pronounced production of antioxidant enzymes such as catalase (CAT) 191%, glutathione transferase (GST) 289%, superoxide dismutase (SOD) 168%, peroxidase (POX) 275%, and ascorbate peroxidase (APOX) (200%). Within *O. intermedium* 1-525k, the influence of Cr^{6+} stress (2 mM) did stimulate rise in levels of GSH (589%) and non-protein thiols (112%) was measured as compared to the control (without any Cr^{6+} stress) which markedly nullifies Cr^{6+} generated oxidative stress. The pilot scale experiments utilizing original tannery effluent showed that *O. intermedium* 1-525k could remove 99% Cr^{6+} in 6 days. The bacterium was also able to degrade azo dyes and plastic thus, it could be a potential candidate to reclaim the metal-dyes contaminated sites.

CBGP-62

BIOREMEDIATION OF TEXTILE DYES BY LACCASE ENZYME FROM LOCALLY ISOLATED BACTERIA

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Human health and natural aquatic habitats have been affected by water pollution caused by colossal textile effluent untreated discharge into aquatic bodies. Textile dyes are heterologous biological compounds that are difficult to degrade. In the present study, bacterial laccase is used for the biodegradation of Reactive Black-5, Reactive Yellow-145,

Direct Red-80 and Disperse Blue-284 textile dyes. Maximum laccase production by laccase-positive strains was observed after 96-120 hours of incubation at 37° C. The laccases were purified by passing the bacterial culture supernatant through the MCWO concentrator which was further purified by flowing through the sepharose-66 chromatography column. The Reactive Yellow-145 biodegraded to 95%, 93.44%, 85.6%, and 74.16% with laccases isolated from GY3, AY4, N4, and EF bacteria, respectively. The bioremediation of Reactive Black-5 occurred up to 87.7%, 89.14%, 91.36%, and 95.9% by EF, N4, AY4, and GY3. The bioremediation of Direct Red-80 occurred up to 96.05%, 96%, 94.26%, and 81. 33% by EF, GY3, AY4 and N4, respectively. The bioremediation of Disperse Blue-284 was observed up to 95.2%, 91.17%, 90.8%, and 84.61% by N4, GY3, AY4, and EF, respectively. In all experiments, 5000ppm of dye concentration was used in a reaction mixture having 1:1 ratio laccase at 37°C for 24 hours. The UV-visible spectroscopy and FTIR analysis have been applied to confirmed dye degradation by the laccase enzyme.

CBGP-63

STUDY OF MICROBIAL COMMUNITY IN INDUSTRIAL WASTEWATER AND ISOLATION OF CADMIUM RESISTANT BACTERIA

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Cadmium (Cd) is one of the highly reactive heavy metals. This metal, when present in high concentration, exerts toxic and harmful effects to plants, animals as well as aquatic life. Cd(II) poisoning is closely linked with the release of this hazardous metal from various industries and agriculture sectors. It is hypothesized that highly Cd(II) resistant bacteria are present in metal-laden effluents of industrial areas. The present study deals with the isolation, identification, and characterization of the highly Cd(II) resistant bacteria from industrial effluents collected from Lahore city and its nearby areas. For this purpose, concentrations of cadmium along with other toxic heavy metals (lead, chromium, copper) present in each sample was detected. Metagenomic DNA of these samples were isolated to identify the microbiome through 16S rRNA amplicon next generation sequencing. The abundance of total microbial community was also determined through Real time PCR. These samples were utilized for the targeted isolation of Cd(II) resistant bacteria using specific media (LB, nutrient and M9 supplemented with glucose, succinate or pyruvate) having Cd(II) salt as required. The selected bacterial isolates were identified through ribotyping and characterized by performing different biochemical tests in order to assess the mechanisms of their bioremediation potentials. Optimum growth conditions of selected bacterial isolates were determined with respect to temperature and pH. The bacterial isolates showed multiple heavy metal (Cr, Pb and Cu) tolerance ability and had the highest minimum inhibitory concentration of 30mM of Cd. The identified cadmium resistant bacterial isolates possibly possess the bioremediation potential to treat Cd(II) contaminated industrial effluents.

CBGP-64

ASSESSMENT OF MICROBIOME IN INDUSTRIAL WASTEWATER AND ISOLATION OF CHROMIUM-RESISTANT BACTERIA

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Chromium, a toxic heavy metal, is closely linked with an increase in health-related risks such as respiratory diseases, lung and skin cancer. Cr (VI) compounds are abundantly used in many chemical and engineering industries, located in

various industrial areas in and nearby Lahore from where a significant proportion of the metal is discharged in wastewater. It is hypothesized that bacteria highly resistant to Cr (VI) are present in Cr-laden effluents of these areas. In current study, the wastewater samples from industrial areas in and nearby Lahore were investigated for the determination of microbiome through next generation sequencing followed by isolation and characterization of chromium-resistant bacteria. The bacterial isolates could tolerate Cr (VI) upto 40mM and showed cross resistance to various heavy metals (Cd, Pd, Cu). Highly resistant bacterial isolates were identified through ribotyping. For this, 16S rRNA gene of each selected isolate was amplified and subjected to BT sequencing. Various biochemical tests were conducted to assess the mechanism of resistance. This whole study would enable us to explore best possible bacterial strains that have potential for bioremediation of Cr (VI) containing industrial wastewater.

CBGP-65

DETERMINATION OF ANTIBACTERIAL ACTIVITY OF ETHYL ACETATE EXTRACT OF *PIPER BETEL* AGAINST *PSEUDOMONAS AERUGINOSA, CITROBACTER,* AND *KLEBSIELLA PNEUMONIAE*

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Antibiotic misuse and overuse have led to the emergence of drug-resistant bacteria and the related infections are difficult to treat. This led to prolonged hospitalizations and increased rates of morbidity and mortality. Thus, there is a need to explore and develop novel compounds that can be used as antibiotics. *Piper betel*, a vine native to Southeast Asia, has been used as a tonic herbal medicine to treat a variety of infections. In this study, ethyl acetate extract of *P. betel* leaves was prepared and examined for the bioactive compounds and antibacterial activity against *Pseudomonas aeruginosa, Citrobacter,* and *Klebsiella pneumoniae*. GC-MS analysis revealed hydroxychavicol, benzaldehyde and phytol to be the major components of the understudy extract. Ethyl acetate extract of *P. betel* leaves presented antibacterial activities against all tested bacterial strains using a well diffusion assay. *K. pneumoniae* was determined to be the most susceptible bacteria (ZOI: 21.27±0.75mm). The MIC results could not be obtained by measuring OD at 600nm as coloured nature of the extract contributed to the absorbance. The MBC of the extract was determined by the drop plate method. It was found to be 10mg/ml against all the under-study strains. Further investigation would be required to elucidate the utilization of this *P. betel* based compounds as alternative sources of antimicrobial drugs.

5. MOLECULAR BIOLOGY

CBGP-66

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*. The minimum inhibitory concentration (MIC) of lead, zinc and cadmium was proved to be in the order of Pb=Zn>Cd against *K. pneumoniae.* The metal uptake and storage ability of this strain was assessed through atomic absorption spectroscopy. *zntR* gene was amplified and cloned in pTZ57R. ZntR protein was expressed in pET expression system and purified through Fast Protein Liquid Chromatography (FPLC). Transcriptional analysis of znt regulon using different concentrations of metal helped to reach significant results. The molecular dynamics simulation and protein-metal ion docking studies of the K. pneumoniae ZntR protein are being reported for the first time.

CBGP-67

LATHYROL: A NOVEL NATURAL STAT3 DNA BINDING DOMAIN INHIBITOR

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Signal transducer and activator of transcription 3 (STAT3) is a transcription factor that mediates cellular responses to a variety of cytokines and growth factors. STAT3 regulates the expression of genes involved in controlling the various vital biological responses, including the immune response, inflammation, hematopoiesis, and oncogenesis by regulating cell growth, survival, and differentiation. Constitutive activation of STAT3 plays important roles in multiple aspects of cancer progression including invasion, migration, self-renewal, angiogenesis, survival and tumor cell immune evasion. STAT3 is known to be activated in many malignant tumors. Its activation is associated with advanced cancer stages and anticancer drug resistance. Therefore, targeting STAT3 seems to be an attractive target for treatment of advanced metastatic tumors. Although several STAT3 inhibitors have been reported to inhibit the STAT3 signaling pathway during the past two decades by targeting the SH2 domain and a few have moved into clinical trials. However, there is no FDA-approved STAT3 inhibitor yet. Herein, we identified a novel natural STAT3 inhibitor, lathyrol (a diterpenoid) by targeting the DNA-binding domain of STAT3 using *in silico* studies. Lathyrol shows hydrogen bonds with various amino acid residues including Ser381, Lys383, Glu415 and Gln416 in DNA-binding domain of the STAT3 with the binding energy of -7.5 kcal\mol. Lathyrol can prevent the STAT3 binding with DNA and further transcription of the downstream STAT3 regulated genes. Zero violation to Lipinski drug likeliness rule is associated with lathyrol. The molecular weight of lathyrol is 334.45 g\mol with a log P value of 1.99 showing good oral and intestinal absorption which is further validated by ADMET analysis. Thus, lathyrol can be developed into a potent novel STAT3 inhibitor for use in oncological clinic.

CBGP-68

CURVULARIA LUNATA, A SEVER PATHOGEN OF FRESHWSTER FISHES

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Curvularia species were found to be natural pathogens of freshwater fishes from Punjab. *Curvularia* infection was identified from silver carp reared in earthern ponds of Punjab, Pakistan. Silver carp when bought in fish diseases and health management lab of Punjab University. Fishes were found with necrotic spots and inflammation. Closer observation of infected fish body scanning under stereomicroscope revealed fungal mycelium mart on head, around eyes on tail and near anus. Fungal colonies were isolated from different body parts of infected fish. The mycelium when isolated from colony and transfer on 1% malt extract agar formed spores looking like a spores of *Curvularia*. Molecular characterization based upon DNA and ITS study revealed it to be *Curvularia lunata*. To check the pathogencity, experimental injection of *C. lunata* into silver carp fingerling showed the development of fungal mycelium on the fish skin and gills. Challenge infection showed that *C. lunata* is pathogenic to silver carp and showed 70% mortality. Histopathological observations of stained sections of various organs of moribund fishes revealed pathological changes of different severity in organs including gills, liver, heart, kidney, intestine and muscle. Pathological changes observed such as atrophy, hypertrophy, hyperplasia, necrosis, inflammation, steatosis, fibrosis, metaplasia. Gills were the most affected organ of the fish. Fungal hyphae were also observed in the muscle of post-injected fish. This is the first report of *C. lunata* from silver carp reared in earthern ponds. It may appears as an emerging pathogen, thus posing a significant risk on health of freshwater fishes.

CBGP-69

ALANTOLACTONE AS AN ANTIMALARIAL DRUG: A MOLECULAR DOCKING STUDY

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Malaria remains the leading cause of mortality throughout the world. It is caused by an apicomplexan belonging to genus Plasmodium transmitted by Anopheles mosquito. Owing to the development of resistance and decreased sensitivity to the frequently used conventional antimalarial drugs, malaria is still a major challenge for the health sector. So, there is a dire need for development of new antimalarial drugs with improved antimalarial efficiency. Herbal medicine has been used by humans since earliest times due to its high efficacy, low side effects and high availability. Alantolactone is a sesquiterpene lactone extracted from roots of plants of Asteraceae family and has been widely and successfully used in humans against various disorders due to its antitumor, anti-microbial and anti-inflammatory effects. In current study, we analyzed the antimalarial effect of alantolactone via in silico molecular docking method. Our investigation revealed that alantolactone strongly interacts with various proteins of Plasmodium including lactate dehydrogenase, falcipain-2, calcium-dependent protein kinase, cGMP-dependent protein kinase and protein kinase 7 that were crucial for its transmission and infection cycle. The binding energies obtained from the binding of alantolactone with the above-mentioned molecules were - 8.6kcal/mol, -10.8kcal/mol, -7.9kcal/mol, -9.4kcal/mol and -7.5kcal/mol respectively. Alantolactone interacted with the binding pockets of all the studied proteins through their residues including ARG109, PRO141, ALA194, ALA194, MET325, GLU321, ARG123, ARG25, VAL30, CYS114, PHE75, VAL186, ARG185, CYS150, LYS153, ILE326, LYS172, LYS172, ALA328, LYS381, LEU702, LYS704 and LYS704. In addition to molecular docking results of toxicity prediction and ADME analysis for drug-likeness also suggested that

alantolactone is safe to use as an antimalarial drug for humans. To further prove the antimalarial effect of alantolactone, in vivo and in vitro investigations are suggested which may then lead to the use of alantolactone as a potential antimalarial drug with high efficacy against malaria.

CBGP-70

ALANTOLACTONE DERIVATIVES AS POTENTIAL INHIBITOR OF FURIN A POTENT SARS-COV-2 HUMAN TARGET PROTEIN

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Novel strain of severe acute respiratory syndrome (SARS-CoV-2) had adversely effected human health with high mortality rate throughout the world. The SARS-CoV-2 is a severe respiratory disease caused by the expression of positive single stranded RNA enveloped virus. The rapidly spreading coronavirus infection had raised an alarming situation. Researchers are in perpetuate search for effective therapeutic drugs. Most of the natural products are proposed to have significant clinical outcomes but their mode of action is not clear. Molecular docking is an immediate drug designing tool for this purpose. In recent discoveries it has been shown that host membrane contains a furin-like cleavage site which contribute highly to the pethogenicity of the SARS-coV-2 due to high expression in the respiratory tract. This study aims to repurposed Alantolactone derivatives as potential inhibitor of SARS-CoV-2 target protein i.e., furin. The studied compounds showed high binding affinities -7.5 to -8.0. The amino acid residues SER312, SER311, GLN488, ILE312, ASN310, ARG490, ASP30 showed hydrogen bonding with the studied ligand while ALA532, TRP531, PRO266, PRO260, TYR313, ILE312 amino acid residues showed hydrophobic interactions. Further in-vitro and in-vivo studies are required to validate the results.

CBGP-71

NATURAL BIOACTIVE MOLECULES AS POTENTIAL INHIBITOR OF THIOREDOXIN REDUCTASE1; A MOLECULAR DOCKING STUDY

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Human thioredoxin reductase (hTrxR) is a homodimeric flavoprotein crucially involved in the regulation of cellular redox reactions, growth, and differentiation. Redox-sensitive signaling factors also regulate multiple cellular processes including proliferation, cell cycle, and pro-survival signaling cascades, suggesting their potential as molecular targets for anticancer drug development. Here in this study, we found three naturally derrived compounds; Lathyrol, Brevilin A and Alantolactone as thioredoxin reductase1 inhibitors. We performed molecular docking and visualization by using different tools like Autodock mgl tool, autodock vina, pymol, and discovery studio visualizer. Results of molecular docking showed that lathyrol showed conventional Hydrogen Bonds with ASP231, LYS234 and LYS486 residues of TrxR1(2ZZC). The binding energy value obtained from the interaction of Lathyrol with 2ZZC was -8.5kcal/mol. Our second docked compound Brevilin A formed conventional Hydrogen Bonds with GLN72, ARG416 and ASN444 residues of 2ZZC. The binding energy value obtained from the interaction of Brevilin A with 2ZZC was -8.8kcal/mol. While our third docked compound Alantolactone formed conventional hydrogen bond with TRP411 and alkyl bonds with LEU75 and ALA79 residues of 2ZZC. The binding energy value obtained from the interaction of Alantolactone with 2ZZC was -7.5kcal/mol. All these findings were further validated by another docking tool PyRx. Our

Molecular Docking study results have suggested that all these biomolecules are potential inhibitors of TrxR1 but Lathyrol and Brevilin A are predicted to be the best inhibitor of TrxR1 as they form strong bonding (hydrogen bonding) with amino acid residues of TrxR1 and have lower value of binding energy. Further *in vivo* and *in vitro* studies should be done to validate these findings and develop these bioactive biomolecules into novel anticancer drugs.

CBGP-72

EFFECT OF PESTICIDE POLLUTION ON DNA DAMAGE IN BLOOD ERYTHROCYTES OF TILAPIA, *OREOCHROMIS NILOTICUS* DURING CHRONIC EXPOSURE

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Runoff from various fields and industries contain highly toxic pesticides and their residues that persist in aquatic environment thereby posing a serious threat to aquatic fauna and flora. Laboratory experiments were conducted to evaluate the DNA damage in peripheral blood erythrocytes of Tilapia, *Oreochromis niloticus* through employing comet assay. Fingerlings of *Oreochromis niloticus* (tilapia) were exposed to three sub-lethal concentrations of pesticide mixture (chlorpyrifos+endosulfan+bifenthrin) i.e. $1/3^{rd}$, $1/4^{th}$ and $1/5^{th}$ of LC_{50} along with negative and positive control for the duration of 60-days. DNA damage was examined by using three parameters viz. %age of damaged nuclei, genetic damage index (GDI) and cumulative tail length of comets (CTL). After 60-days of exposure period, comet slides were prepared and examined under Epi-Fluorescence microscope for damage assessment. Pesticide mixture gave significantly ($p<0.05$) variable DNA damage in fish erythrocytes at various exposure concentrations. Dose dependent DNA damage in terms of %age of damaged nuclei and GDI were observed, with highest damage at $1/3^{rd}$ of LC_{50} as compared to control groups. Incidence of CTL was also observed higher due to $1/3^{rd}$ of LC_{50} exposure, as evident from their mean value 876.10±0.38µm while it was significantly lower (3.40±0.03µm) due to negative control. Significantly variable time dependent DNA damage results were observed under comet assay. This study also confirmed that the single cell gel electrophoresis or comet assay is a useful tool for assessing the DNA damage in fish and might be appropriate as a part of environmental monitoring programs and toxicology studies.

CBGP-73

PREVIOUSLY REPORTED MUTATIONS IN *TYR* AND *OCA2* GENES ARE RESPONSIBLE FOR OCA IN TWO CONSANGUINEOUS FAMILIES

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Oculocutaneous albinism (OCA), an autosomal recessively inherited nonsyndromic form of albinism, illustrated by either complete absence or deficiency of melanin in the skin, hair and iris. Pathogenic variants in eight genes have been reported to be involved in causing OCA. In all published population studies, however, the detection rate of alleles causing OCA varies. This condition varies in severity and often resulting white skin, vision defects and light hair colors. In present study two families afflicted with autosomal recessive oculocutaneous albinism were recruited from Azad Jammu and Kashmir. Both families were subjected to Tetra primer analysis Family A showed 1255 c.1255G>A (p.Gly

419Arg) in exon 4 of *TYR* gene and family B showed 486 c.1456 G > T (P. Asp 486 Tyr) mutation in Exon 14 of *OCA2* gene. Both variants identified with Tetra primers were confirmed by Sanger Sequencing.

CBGP-74

PHYLOGENETIC ANALYSIS OF DOVE AND PIGEON SPECIES (AVES: COLUMBIDAE), OF PAKISTAN BASED ON COI GENE SEQUENCE OF MITOCHONDRIAL DNA

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Doves and Pigeons belong to living family "Columbidae" order Columbiformes with a wide range of taxonomic diversity and geographic distribution. Samples of seven species of family Columbidae one sample per species were collected from different districts of Pakistan via random sampling during the study. DNA extraction was carried using chloroform/phenol protocol with some modifications. The amplification of COI region of mitochondrial DNA was carried by a pair of universal primers (BirdF1/BirdR1). BLAST tool at National Center for Biotechnology Information (NCBI) was used for identification of sequence of targeted gene region. Sequence alignment was performed through CLUSTALW before phylogenetic analysis and tree construction by MEGA6 to predict the effective ancestry of different Columbidae species. Different available trees were reconstructed i.e. Maximum Likelihood tree, Neighborhood joining tree, Maximum parsimony tree and UPGMA tree to compare them along with finding relationship among different species of family Columbidae. The results of current study on COI gene barcoding and phylogenetic analysis of family Columbidae showed that *Columba livia livia* and *Columba eversmanni*, are closely resembled as well as *Spilopelia senegalensis* and *Streptopelia decaocta*. While *Streptopelia tranquebarica* and *Spilopelia chinensis* have great affinity due to small clade difference and *Treron phoenicoptera* is distinctly related to other species due to large clade difference. This study will contribute in further studies on family Columbidae and phylo geographic studies of birds.

CBGP-75

MOLECULAR SYSTEMATIC (DNA Bar coding) OF CAELIFERA (ORTHOPTERA) OF PUNJAB PAKISTAN

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Caelifera sub-order of Orthoptera in Pakistan has diversity among its genera and species, still there was no remarkable concentration puts towards species of this Sub-order Caelifera of Punjab, Pakistan. Caelifera sub-order of Punjab, Pakistan required great need for forcing on its systematic molecular and DNA barcoding analysis to minimize the crop damage and agricultural losses should be encountered. Out of collected species systematic data of 5 species namely *Truxalis eximia eximia, Acrida willemsei, Schistocerca gregaria, Sphodromerus undulatus undulatus* and *Oedaleus decorus* were analyzed and their DNA and Amino Acid sequence was recorded. The phylogenetic tree of these 5 species were developed as per record of iBOL (International Barcode of Life). DNA barcoding and amino acid sequences provides us the basic similarities among the related genera and also helps in constrictions of phylogenetic

origin. DNA bar coding and Amino acid sequence also enrich the knowledge about similar species and their phylogenetic relation to related species.

CBGP-76

GENETIC CHARACTERIZATION OF *THEILERIA* ISOLATES BY MOLECULAR APPROACHES FROM DISTRICT SIALKOT, PAKISTAN

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Theileriosis is one of the common tick born disease which is caused by intra erythrocytic parasite from genus *Theileria*. This is economically important as it is responsible for morbidity and mortality to livestock sector in developing countries like Pakistan. The current study was undertaken in District Sialkot, Pakistan for molecular and phylogenetic anaylsis of *Theileria* spp. isolated from blood samples of Bovines. A total of 30 (Cow=10 and Buffalo=20) blood samples were collected from District Sialkot. Out of 30 collected blood samples, 13 (43%) were identified as positive for Theileriosis by "Field stained" microscopy. DNA was extracted from positive blood samples using standard phenol chloroform extraction method. For genetic analysis, 18S rRNA gene was used as a marker for PCR amplification. The amplicon size was 430bp for the specific primer used of 18S rRNA amplification. PCR products showing good bands were selected for DNA sequencing. All sequences of current study were run on gene Blast and compared with already available *Theileria* spp. sequences in gene bank for genetic variations. Phylogenetic tree was also constructed by using neighbor joining method. Genetic variations in sequences was observed in aligned sequences of current study which indicated presence of haplotypes of *T. annulata* in district Sialkot. The phylogenetic analysis revealed our isolate had up to 99% similarity with sequences of *T. annulata* reported from India, Italy, Egypt, Iran, Iraq, Uganda and China. These results recommended that *T. annulata* is predominant in Bovines of District Sialkot, Pakistan. This is the first report of its kind from District Sialkot, Pakistan and also paved the way for further molecular and phylogenetic analysis in the region for the formulation of more efficacious management and control strategies.

CBGP-77

PROTECTIVE EFFECTS OF RHAMNETIN ON METHOTREXATE-INDUCED HEPATOTOXICITY IN RATS

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Methotrexate (Mtx) is an immuno-suppressive and anti-neoplastic agent broadly used to treat varied autoimmune and malignant diseases. Mtx is an immuno-suppressant and chemotherapeutic agent, which is known to prompt liver damage. Rhamnetin (Rhm) belonging to the class of flavonoids, as a secondary metabolite existing in several fruits and plants, it exhibits varied pharmacological properties such as anti-inflammatory, antioxidant, antibacterial, antiviral, and anticancer activity. The current experiment was planned to ascertain the hepatoprotective effect of Rhm on Mtx-induced liver damage. To conduct this experiment, 24 male albino Sprague-Dawley rats were selected. They were divided into 4 equal groups, viz. control, Mtx (20 mg/kg), Mtx+Rhm (20 mg/kg + 30mg/kg) and Rhm (30 mg/kg) each comprising 6 rats. The experiment was conducted for 30 days. The effect of Mtx and Rhm on the liver was evaluated by anti-oxidant enzymes (CAT, SOD, GPx, GSR, GST, GSH), inflammatory markers (IL-IB, NF-kB, TNF-α, Cox-2), and oxidative stress markers (ROS, TBARS). Biochemical indicators of Mtx-induced hepatotoxicity included alkaline phosphatase (ALP), aspartate

aminotransferase (AST), and alanine aminotransferase (ALT). The activity of hepatic antioxidant enzymes such as glutathione-S-transferase (GST), Glutathione Peroxidase (GPx), superoxide dismutase (SOD), Glutathione (GSH), GSR and catalase (CAT) as well as the levels of thiobarbituric acid reactive substances (TBARS), a lipid peroxidation marker, were utilized to evaluate oxidative stress-mediated lipid peroxidation in liver sections. According to our findings, Mtx administration significantly elevated ALT, AST, and ALP serum levels. The levels of CAT, GPx, SOD, GSH, GSR and GST in the liver were likewise significantly elevated after Mtx administration. Liver histology, as well as, ALT, AST and ALP showed that Rhamnetin (Rhm) treatment dramatically reduced Mtx-induced hepatotoxicity. Rhm also significantly reduced elevated levels of GST, GPx, SOD, GSH, GSR and catalase (CAT) activities in the liver analogous to the Mtx-treated group. According to these findings, oxidative stress-mediated lipid peroxidation was reduced by Rhm exhibiting hepatoprotective effect against Mtx-induced hepatotoxicity. As a result, Rhm treatment could be an effective way to combat Mtx-induced hepatotoxicity. The data from this experiment was examined statistically using Mean SEM.

CBGP-78

THERAPEUTIC EFFECTS OF VITEXIN ON CIPLATIN-INDUCED LUNG DAMAGE IN MALE ALBINO RATS

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Cisplatin (CP) is a platinum-derivative chemotherapeutic drug used to cure various organ malignancies, particularly testis, ovaries, urinary bladder, head, neck, brain and especially lungs. However, it is demonstrated to induce a series of major harmful impacts, particularly pulmonary toxicity. Vitexin is a flavonoid produced from plants that has anti-inflammatory and antioxidant properties. This research was conducted to examine protective role of vitexin on CP-induced lung damage. Twenty-four male albino rats were divided into four groups. Group 1 treated as a control, whereas group 2 treated with CP (10 mg/kg) on day 1, group 3 co-administered with vitexin (50 mg/kg) and CP (10 mg/kg), group 4 received vitexin (50 mg/kg) for one week. At the end of the experiment, rats were sacrificed and lung specimen analyzed. The findings indicated that when rats were exposed to CP, the activity of antioxidant enzymes, i.e. glutathione (GSH), glutathione peroxidase (GPx), catalase (CAT), glutathione reductase (GSR), superoxide dismutase (SOD), and glutathione S-transferase (GST) decreased. After treatment with vitexin, an elevation in the antioxidant enzymes activity was observed. In addition, CP caused inflammation of the lung in rats. In contrast, vitexin reduced the inflammation by lowering the inflammatory cytokines level (TNF-α, NF-κB, IL-16, IL-1β and COX-2) and acted as an anti-inflammatory drug. The consequences demonstrated that vitexin reduced CP caused oxidative stress by reducing the levels of reactive oxygen species (ROS) in lung tissues of the rat. The results were evaluated statistically applying one-way ANOVA and Tukey's test for the comparison of different groups. Our findings indicated that vitexin might act as a natural therapeutic agent against the adverse impacts of lung damage induced by CP.

CBGP-79

PROTECTIVE EFFECTS OF RHAMNAZIN ON BISPHENOL-AN INDUCED HEART DAMAGE IN RATS

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BPA is a chemical that is produced in large quantities and extensively utilized. Different studies on rats exhibited the lethal effects of BPA on the cardiac tissues of the heart. Rhamnazin is a naturally occurring, flavonoid compound that

shows defensive actions in metabolic disorders. It has several medicinal, anti-inflammatory, and antioxidant benefits. The purpose of this study was to determine the curative effect of rhamnazin on BPA-induced heart damage in rats. At the University of Agriculture, Faisalabad's animal house, twenty-four male albino Sprague-Dawley rats were raised for 56 days. The first group was used as a control. The second group of rats was given 50 mg/kg/day of BPA. The third group received a combination of 10 mg/kg/day of rhamnazin and 50 mg/kg/day of BPA. Only 10 mg/kg/day of rhamnazin was given to the fourth group. At the end of the experiment the rats were slaughtered, and blood was collected in EDTA tubes. The findings of our trial revealed that BPA exposure significantly decreased the activity of antioxidant enzymes, i.e., glutathione (GSH), catalase (CAT), glutathione S-transferase (GST), glutathione peroxidase (GPx), glutathione reductase (GSR) and superoxide dismutase (SOD). When rats were treated with rhamnazin, the activity of these enzymes increased, which exhibits the antagonistic effect of rhamnazin against BPA. When BPA was administered, the levels of the inflammatory markers (NF-kB, TNF-α, IL-1β and IL-6) were higher than in the control group, according to the assessment of these markers. While rhamnazin lowers these levels which shows the therapeutic activity of rhamnazin against BPA.BPA dosage raised blood marker levels in contrast to the control group, while rhamnazin reversed this effect. Our findings indicated that rhamnazin might act as a natural therapeutic agent against the adverse impacts of heart damage induced by BPA.

CBGP-80

ASSESMENT OF CADMIUM LEVEL IN BLOOD OF BREAST CANCER PATIENTS

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Heavy metals are known carcinogens and toxicants. Industrial waste, tanneries, and other sources of heavy metal exposure are increasing. Heavy metals build up in breast tissue and affect DNA synthesis and tumor cell survival. Cadmium (Cd) is a carcinogenic heavy metal that can activate estrogen receptor alpha, causing breast cancer to grow and advance. Cadmium levels in breast cancer (BC) patients and their relationship to cancer development is unreported in Gujranwala. The purpose of this research is to find out presence of cadmium level in blood of patients with breast cancer in the Gujranwala division as well as healthy person. Age, location, previous medical history, stages of breast cancer, metastasis, stage of tumor, grades of breast cancer and lymph nodes took into consideration. Blood samples were digested with strong nitric acid and hydrogen per oxide at hotplate for1-2 hours. The standard solution prepared via wet digestion. The content of cadmium in blood measured by inductively coupled plasma-optical emission spectrometry (ICP-OES). This research was carried out in 67 female breast cancer patients admitted in Gujranwala institute of Nuclear Medicine (GINUM) and 26 healthy persons. SPSS 16.0 software was used for statistical analysis. There is significant association was showed between stages of tumor and number of lymph nodes as their p value 0.028. There is significant difference was found between blood cadmium level in breast cancer patients and healthy persons as their significant value 0.597 and negative correlation was found -0.109. Parameters of breast cancer patients such as metastasis, stages of cancer, grades of breast cancer and chemotherapy cycles showed not association with blood cadmium level as their statistical value were 0.814, 0.126, 0.372, 0.725. This research will give effective methods for understanding and treating breast cancer. In addition, this research will aware people in order to control and prevention from breast cancer.

CBGP-81

DETERMINATION OF LEAD LEVEL IN BLOOD OF BREAST CANCER PATIENTS

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Heavy metals are toxic to humans and their exposure has grown as a result of increased industrialization and anthropogenic factors. Multiple distinct pathways are used to introduce heavy metals into the human body including potable water, breathing air, eating food and cutaneous exposure. As toxic metals build up in the body various organs and tissues are negatively influenced by hazardous metal absorption. Heavy metal toxicity causes changes in gene expression and the growth of the human breast cancer. Recent findings indicate that metallic compounds are estrogen receptor disruptor and increase breast cancer risk. Lead is nonessential toxic metal. Lead exposures in human is carcinogen. Lead exposure may increase the chance to damage DNA and it inhibits the DNA repair by interacting the protein which is involved in DNA repair damage. Lead mimics the activity of estrogen and activates the estrogen receptor and causes breast cancer. The objective of this research was to determine the lead level in breast cancer patients as well as in healthy females in Gujranwala division. Study was done on 67 female breast cancer patients hospitalized to the Gujranwala Institute of Nuclear Medicine (GINUM).Blood lead level was measures using inductively coupled plasma spectroscopy.Statistical analysis performed using spss (v.16.0). The concentration of lead was high in breast cancer as well as in controll groups.There was strong correlation between healthy and cases group observed.There was strong correlation with metastasis and stages of cancers and significant value was 0.001. Parameters such as stages of tumors, metastasis, grades of cancer,showed significant relationship as their signoficant values were 0.00,0.002 and 0.00.

CBGP-82

EXPRESSION OF PRO-INFLAMMATORY CYTOKINES (IL-6 & IL-18) EXACERBATE THE RISK OF DIABETIC NEPHROPATHY IN THE PAKISTANI POPULATION

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Diabetic nephropathy (DN) is a micro-chronic diabetic consequence induced by metabolic and hemodynamic abnormalities. Free radicals react with other critical cellular components, causing progression of aberrant renal function. This case control study was aimed to determine the role of IL-6 and IL-18 diabetic nephropathy in Pakistani population. The study's subjects (n=180 from Lahore, Gujranwala, and Karachi) were divided into control, diabetes mellitus, and diabetic nephropathy groups. The serum concentration of IL-6 & IL-18 were determined by enzyme-linked immunosorbent assay (ELISA). The expression analysis of IL-6 & IL-18 was performed by Real Time PCR. The significant increase in serum levels of IL-6 were observed among the control, DM and DN groups (15.3 ± 24.1 pg/ml , 34.7 ± 24.0 pg/ml, 52.6 ± 33.2 pg/ml) whereas no significant difference was observed in serum levels of IL-18. The expression analysis of IL-6 were increased by more than forty three fold in DN group (*n*-fold =~ 43.6) as compared to

DM & control whereas the expression profile of IL-18 decreased in DN group (*n*-fold =~ 0.89). In DN group the correlation analysis revealed direct association of GFR with serum IL-6(*r*=0.1114) & inverse relationship with serum IL-18(*r*=-0.097). In multiple regression analysis using GFR as the dependent variable, BMI and expression of IL-18 were determinants in DM subjects, but only uric acid in DN subjects. The present study implicates that increased expression of IL-6 and decreased of IL-18 was associated with development of DN in Pakistani population.

6. PHYSIOLOGY

CBGP-83

THE PREVALENT COMPLICATIONS ASSOCIATED WITH HEMODIALYSIS

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Hemodialysis is a treatment to filter wastes and water from people whose kidneys are failing. But along with the procedure there are certain complications. The present study investigated the complications and side effects associated with dialysis. Study was carried out at Nawaz Sharif kidney hospital Swat. Data was collected through structured questionnaires from 200 hemodialysis patients. The observed complications were nausea (100%), vomiting (83.7%), headache (82%), pruritus (56%), and muscle cramp (88%). Low blood pressure level (89%) of the total and low level of physical activeness was around 86.7%. It is concluded that dialysis is a treatment of a lethal disease but due to its associated complications it becomes an uneasy treatment for patients. It is important to consider all these complications and work for the improvement of the procedure of dialysis.

CBGP-84

THE TESTOSTERONE ROLE IN ADOLESCENT MALES FROM HOSPITAL OF HYDERABAD AND JAMSHORO

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Testosterone is a principal sex hormone needed for the normal physiological processes during all life stages. In males, testosterone is essential for the development and maintenance of secondary sexual traits. Testosterone also influences bone mass, muscle strength, mood, and intellectual capacity. Testosterone imbalances lead to reproductive dysfunction during multiple life stages in human males. Low testosterone levels are related to reduce semen quality in men, increased genital malformations, and changes in the time of onset or progression of puberty. In the recent study of adolescent males, a clear positive relationship between testosterone level and energy relationship and muscle tone in adolescent males. The partakers were 120 adolescent males 15-17 years old with median age of 16. Level of testosterone obtained during present study ranging from 270ng/dl to 720ng/dl with mean testosterone level during adolescent males is 495ng/dl. Adolescent males with normal testosterone show 70% well muscle tone while 30% show weak muscle tone. 27% males with normal testosterone feel tired while 73% don't show tiredness. 56 % Adolescent males with normal testosterone follows biorhythms & having normal energy and well muscle tone while 44% males with low testosterone don't follows biorhythms and having low energy and weak muscle tone.

CBGP-85

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

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The main aim of the present study was to find out estrogen level with respect to menstrual cycle and effects on mental health among unmarried and married females. The proposed study was descriptive in nature. The target population of the study was comprised on 50 females. During present study mental health were observed through questionnaire and blood investigation of estrogen level. 56% female showed headache, 54% showed depressive mood, 46% showed mood change, 44% showed sleep problem, 40% showed mental confusion, 38% showed irrational anger, 36% showed tension, 30% showed lack of motivation and 20% showed increased fatigue. Results clearly indicated that estrogen levels have strong impact on mood swings in girls.

CBGP-86

TOXIC EFFECT OF CAFFEINE ON THE CARDIAC MUSCLE TISSUE OF ALBINO RATS

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Use of caffeine and other energy increasing compounds have become very popular amongst younger generation over the last few decades. In United States of America caffeine is considered to be one of the most important stimulants which may result in metabolic disorders, cardiovascular diseases, Parkinson disease etc. Three treatments were tested to observe histological changes, 3 mg/0.5 ml; 9 mg/3 ml and 125 mg/3 ml of caffeine on the cardiac muscles of albino rats. Untreated albino rats were kept as control. The rats were anesthetized chloroform 3 cc. An incision was made in the abdomen and incised up to neck. Gross sections of heart muscular tissues was observed, and the tissues were taken and cut in longitudinal and transverse pieces and selected for tissue processing, block making, sectioning, mounting, staining, microscopic observation and photography. The healthy cardiac muscles of albino rats showed normal and centrally arranged nucleus, the cardiac muscle fibres were arranged properly and connective tissue appeared normal. Several histopathological alterations were observed in cardiac tissue of treated albino rats. The cardiac muscle tissue of albino rats treated with 3 mg/0.5 ml of caffeine showed formation of spaces due to shrinkage of muscle fibres. The nucleus became more obvious due to the shrinkage of muscle fibres. In rats treated with 9 mg/3 ml of caffeine showed the hyaline degeneration of the atrial wall. At the same time there were spaces seen in between the muscles indicating atrophy. In rats treated with 125 mg/3 ml of caffeine heart tissue showed atrophy and condensation of tissue muscles fibres surrounding vascular area. The atrial wall showed hyaline degeneration. Damaged heart tissue observed in the present study was due to different doses of caffeine administrated to the albino rats.

CBGP-87

TOXIC EFFECT OF CAFFEINE ON BLOOD CULTURE AND GIT FLORA OF ALBINO RATS

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Male albino rats were employed in this study as animal model and three different doses of caffeine citrate (Lahore Pharma) was used for comparison. The three different dosages were selected to be administered to the rats. The dosages were calculated so as to match the dosages given to the human beings according to their body weights. The doses were 0.5 ml; 1.5 ml; 3 ml. Untreated rats were kept as control. The immediate aim of the present study was microbiological evaluation of the treated animals to ascertain the role of drugs. The study was designed to check whether the drugs make animals immune-compromised or susceptible to infection or not. A regular blood culture was done to check bacteremia. Blood culture of treated and untreated animals were tested. Microbiological analysis of the blood of the treated animals did not reveal presence of any bacteria i.e. no bacteremia was detected. The mechanisms of the animals nor did it make them susceptible to the infection. Almost same normal flora of the rats in GIT was found. However, there was slight difference in the count of the normal flora in highest dose. The finding indicates that the drugs did not alter the GIT microflora namely *E. coli, Lactobacilli, Bacillus subtilis* and *Staphylococcus aureus.*

CBGP-88

PREVALENCE OF SUB-CLINICAL MASTITIS IN FIVE PURE BREEDS (SAHIWAL, RED SINDHI, ACHAI, CHOLISTANI AND HOLSTEIN FRIESIAN) OF CATTLE IN PAKISTAN

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Mastitis is the inflammation of one or more quarter(s) of udder of dairy cattle which causes pathological changes in the udder of lactating cattle and leads to disturbances in the quality and quantity of milk. Main types of mastitis are clinical mastitis (with swollen udder or flakes in milk, sometimes systemic fever, and loss of appetite) and subclinical mastitis (SCM) (with no visual signs), both affect the production of milk however SCM is considered more prevalent than clinical type. Globally, the prevalence rate of SCM in dairy cattle ranges from 17% to 93%. The present study was designed to find out the prevalence of SCM in five pure breeds of cattle in Pakistan. Milk samples were collected from a total of 700 Pakistani pure dairy cattle (including 300 Holstein Friesian, 108 Achai, 104 Red Sindhi, 100 Sahiwal and 88 Cholistani breed). Direct microscopic somatic cell count (DMSCC) method was used to find out SCM. The DMSCC results showed an overall prevalence of 44% (308) of SCM. The indigenous Achai breed revealed lowest (32.40%) SCM, followed by Holstein Friesian (38.67%), Cholistani (40.91%) and Red Sindhi (42.31%), while highest prevalence of SCM was recorded in Sahiwal breed (77%). The result of SCM indicates that high yielding cows are more susceptible to mastitis. It is concluded from the results of the current study that sub-clinical mastitis is high prevalent disease in cattle of Pakistan and causes heavy economic loss to the dairy industry. It is suggested to aware farmers about the SCM, and the losses caused due to SCM.

CBGP-89

EFFECT OF ALOE VERA GEL IN EXCISIONAL WOUND HEALING BY USING RAT MODEL

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A wound is a breakdown in the protective function of the skin or loss of continuity of epithelium, with or without loss of underlying connective tissues, muscles, nerves, bones following injury to the skin, surgery, a blow, cut, chemicals, heat, cold, friction, shear force, pressure or diseases such as leg ulcers or carcinomas. A study was undertaken to determine the healing properties of Aloe vera gel on epidermal wounds in rats. Six adult rats were divided into three groups randomly of three each group representing the treatment without treatment and control respectively. A pair of wounds measuring 2cm x 2cm each was created on the back of each rats lateral to the spinal cord. The wounds were treated with homogenized Aloe vera gel while the wounds in second group were treated with normal saline. Representing the inflammatory, proliferative and maturation phases of wound healing respectively. Blood samples were collected on days 21 for hematology analysis. Animals treated with Aloe vera gel had significantly ($p<0.05$) faster rates of healing with shorter days of skin fall off than the control and untreated group. As showed significant ($P<0.05$) changes in the packed cell volume, mean corpuscular volume, lymphocyte and neutrophil counts. The study concluded that Aloe Vera was effective in treating epidermal wounds in rat over the control. An improvement occurred in hematological profile of the experimental animals and these findings will go a long way in expanding the horizon of clinical application of this plant in solving wound healing problems in both humans and other animal species.

CBGP-90

EVALUATION OF *SOLANUM NIGRUM* EXTRACTS FOR ANTIDIABETIC ACTIVITY AGAINST ALLOXAN INDUCED DIABETIC MICE

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Diabetes mellitus (DM) is a universal endocrine disorder. Hypoglycemic from natural and synthetic sources are available to care for diabetes. The aim of this study was to induce experimental diabetes mellitus using alloxan monohydrate in common adult Swiss albino mice and to confirm the antidiabetic activity of changes in body weight, food and water consumption, urine volume and glucose level between common and diabetic mice to investigate. Solanum nigrum has been shown to be helpful in treating diabetes. The result of methanol and aqueous extract from Solanum nigrum leaves was examined under common conditions of glucose loading and alloxan monohydrate-induced diabetic mice. The polyherbal composition shows significant hypoglycemic activity.

CBGP-91

IMPACT OF AQUATIC ENVIRONMENTAL POLLUTANTS ON ANTIOXIDANT ENZYME, LIPIDS, PROTEINS AND DNA OF FISH, *LABEO ROHITA*

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Industrial effluents and agricultural runoff contain a lot of pollutants (metals, microplastics, detergents, dyes etc) that ultimately entered into rivers and cause detrimental effects on the fresh water fish population and other aquatic inhabitants. So, present study was planned to investigate the metal load in riverine water and fish collected from Bloki Headworks. Moreover, toxic effects of these metals on antioxidants enzymes, protein and DNA of fish were also studied. Results revealed that the concentration of cadmium (Cd), Cobalt (Co), Manganese (Mn) and Copper (Cu) was significantly higher (Cr> Cu> Co> Mn) in water and fish samples. Antioxidant enzyme activity was measured in liver, kidney and muscles of fish. Among these enzymes, SOD was higher in kidney than liver and muscles while CAT was high in liver as compared to kidney and muscles. The activity of GST was higher in control fish as compared to riverine fish. Results regarding carbonyle protein and lipid peroxidation showed higher damage in fish kidney than liver and muscles. Moreover, exposed fish exhibited higher level of carbonyle proteins, lipid peroxidation and micronuclei frequency as compared to control fish.

CBGP-92

EFFECT OF MICROPLASTIC INGESTION ON GROWTH PERFORMANCE, BODY TEMPERATURE, DIGESTIVE ENZYME, HORMONAL LEVELS, HEMATOLOGY AND SERUM BIOCHEMISTRY OF *GALLUS GALLUS DOMESTICUS*

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Microplastics are a source of serious environmental pollutants having size smaller than 5 mm when absorbed by organisms via food chain is unclear how they behave and affect animals. The purpose of this study was to estimate the impact of microplastics on growth performance, body temperature, digestive enzyme, hormonal levels, hematology and serum biochemistry of domestic chickens. Thirty-two samples of Gallus gallus domesticus were divided into control and 3 treatment/experimental groups and kept in separate cages at animal house, Bahauddin Zakariya University, Multan. Three experimental groups were given treated feed consisting of microplastic @ 20%, 30% and 40%. The experimental trial was run for a period of sixteen weeks. At weekly basis body temperature and body weight of the birds were measured. The birds were autopsied at the end of the trial, and blood were collected from the brachial vein in EDTA anticoagulant vials for serology, hematology, hormones analyses, gut was removed for digestive enzyme analysis. In growth and body temperature data, bird body weight was lower in G3 as compared to other groups. For hematology, TRBC count and MCV among all treated groups do not show significant changes while TWBC count in three treated groups was significant with PCV % significant in fourth group. The CK-NAC, ALAT, and urea remain unaffected while T3 and T4 showed significant differences in all groups when compared with control. The FSH showed non-significant relation in group 1 while significant results were obtained with group 2 and 3. The TSH showed a non-significant relation when compared with control in group 1 and 2 while significant results were seen in group 3. A significant increase in the level of amylase and total protease enzymes was noted while the lipase enzyme activity remained unaffected. No prominent fluctuations were observed in the level of lipase activity in both experimental and control group. Overall, experimental groups showed higher hormonal level

and enzymatic production while lower weight gain than control group which may indicate that impurities in food can ultimately reduce chicken's net energy acquisition from ingested food and reduce their energy reserves.

CBGP-93

ASSOCIATION OF ABO BLOOD GROUP WITH AGE OF MENARCHE

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Menstruation cycle has a vital role in female reproduction system. The first menstruation cycle or menstrual bleeding is known as "menarche". Menarche is associated with multiple factors which have a strong effect on the age at menarche. Different factors like nutrition, geographical location, physical activities, genetic factors and health status have an influence on the age at menarche. The purpose of this study was to find out the association of ABO blood group system with the age of menarche. A total of 50 students were included in this study. Blood was collected and tested to find out the types of blood group. The age of menarche was asked from each student and verified from their mothers. The association of ABO blood group system was then determined with the age of menarche. Using statistical analysis, the mean age of menarche of females having blood group B was found to be 13.86 ± 0.71. Similarly, the mean age of menarche of females with blood group A, AB and O was found to be 13.2 ± 1.30, 13.62 ± 0.916 and 13.30 ± 0.94, respectively. Taken together our data showed that age of menarche is not associated with any specific blood group type. Finally, our study has one limitation. The sample size of current study was too small, and all the participants were from the same area. Further study is needed to validate the findings of current study using large sample size from diverse area of population.

CBGP-94

STUDY OF ASSOCIATION OF TESTOSTERONE WITH PROSTATE CANCER IN GUJRAT, PUNJAB, PAKISTAN

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The aim of the current study is to find out the association between the levels of testosterone in prostate cancer patients by the observation of a tumor marker Prostate-specific antigen (PSA). Prevalence was recorded in Gujrat, Punjab, Pakistan. Blood samples of normal and prostate cancer males were collected from Gujrat, Punjab, Pakistan. Information including age, marital status, smoking, Prostate-specific antigen (PSA), testosterone, and any previous record was obtained with the patient's consent. Exclusion and inclusion criteria were well defined. The samples of control and patients were examined through ELISA protocol to check the testosterone and Prostate-specific antigen (PSA). Testosterone significantly affects the prostate-specific antigen (PSA) with ($P<0.05$). The mean hormonal levels of patients were marked lower than normal person's samples. The present study indicates that testosterone levels are

negatively affected by prostate-specific antigens (PSA). According to our findings, the prevalence of Prostate cancer recorded in Gujrat, Punjab, Pakistan is 2%. Our study may prove feasible for the detection of prostate cancer in aged males. Testosterone replacement therapy may prove to be effective in retrieving the complications induced by prostate cancer.

CBGP-95

EFFECT OF MANGIFERIN AGAINST DOXORUBICIN-INDUCED LUNG DAMAGE IN RATS

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Doxorubicin (DOX) is one of the most extensively prescribed, potent anti-cancer drug, however, its clinical administration is restricted due to its serious organotoxic potential especially pulmotoxicity. Mangiferin (MGF) is a xanthone that exhibits therapeutic potential with anti-tumor, antidiabetic, anti-inflammatory, and antioxidant properties. This study is an attempt to investigate the possible therapeutic potential, and protective effect of mangiferin (MGF) $C_{19}H_{18}O_{11}$ against DOX-induced pulmonary damage in rats, using biochemical approaches. The experiment was conducted for one month at the Biocontrol Laboratory at the University of Agriculture in Faisalabad. Twenty four male albino rats were maintained in cages and divided into four random groups (six rats each). The study groups were tagged viz. control group, DOX, DOX+MGF and MGF. 1st group served as the control group. 2nd group was given DOX (5 mg/kg). 3rd group was treated with DOX (5mg/kg) and MGF (25 mg/kg) simultaneously. 25 mg/kg MGF was administered to 4th group. During 30 days experimental duration the physical as well as physiological conditions of experimental sample was analyzed regularly. The findings indicated that when rats were exposed to doxorubicin, the activity of antioxidant enzymes, i.e. glutathione (GSH), glutathione peroxidase (GPx), catalase (CAT), glutathione reductase (GSR), superoxide dismutase (SOD), and glutathione S-transferase (GST) decreased. After treatment with mangiferin, an elevation in the antioxidant enzymes activity was observed. In addition, doxorubicin caused inflammation of the lungs in rats. In contrast, mangiferin reduced the inflammation by lowering the level of the inflammatory cytokine (TNF-α, NFκB, IL-6, IL-1β, and COX-2) and acted as an anti-inflammatory drug. The consequences demonstrated that mangiferin reduced doxorubicin caused oxidative stress by reducing the levels of Thiobarbituric acid reactive substances (TBARS) and reactive oxygen species (ROS) in lung tissues of the rat. Thus co-treatment with mangiferin remarkably reversed all the aforementioned pulmonary damages. Our finding indicated that MGF might act as a natural therapeutic agent against the adverse impacts of pulmonary damage induced by DOX.

CBGP-96

ISORHAMNETIN INHIBITS INFLAMMATION AND OXIDATIVE TISSUE DAMAGE IN CISPLATIN-INDUCED PULMONARY TOXICITY IN RATS

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Cisplatin (CP) is a chemotherapeutic agent belongs to an antineoplastic family, used to cure various types of cancers. When CP was used to treat cancer its overdosage caused toxic effects on multiple organs including the lungs. A variety of plants products present in nature are a possible source of anticancer agents. Isorhamnetin (ISO) is a naturally occurring flavonoid present in the form of glycosides in citrus fruits. It exhibits anti-inflammatory and antioxidant properties. The recent research was planned to check the influence of ISO on CP-induced pulmonary damages. For this

purpose, an experiment was conducted in which twenty-four male albino Sprague-Dawley rats were used by separated into 4 sets and each set was contained 6 animals. The duration of the experiment was 30 days. 1st set was considered as the control set with no treatment. The 2nd set of animals was treated with CP (10mg/kg) once during the experiment. The 3rd set was co-treated on the first day with ISO (25mg/kg) and CP dose (10mg/kg). The 4th set was treated with ISO (25mg/kg) orally on daily basis. The findings of the research showed that when rats were exposed to CP; its administration induced a significant ($p < 0.05$) reduction in the activity of the antioxidant enzymes, including glutathione (GSH), superoxide dismutase (SOD), glutathione reductase (GSR), catalase (CAT), glutathione S-transferase (GST), level of lipid peroxidation (TBARS) and glutathione peroxidase (GPx). After treatment with ISO, an elevation in the antioxidant enzymes activity was seen. Moreover, CP caused inflammation and oxidative tissue damage to lungs in rats. In contrast to CP, ISO acted as an anti-inflammatory drug that reduced inflammation by lowering the level of the inflammatory cytokines (NFκB, IL-16, TNF-α, COX-2, and IL-1β). However, ISO treatment significantly ($p < 0.05$) reduced the oxidative stress caused by CP, by lowering the levels of reactive oxygen species (ROS) in the lung tissues of rats. Findings of the current research indicated that ISO might act as a natural therapeutic agent against the adverse impacts of pulmonary damage induced by CP.

CBGP-97

PREVALENCE, CAUSES AND RISK FACTOR ASSESSMENT OF CATARACT AMONG GENERAL POPULATION OF DIVISION MUZAFFARABAD, AZAD JAMMU AND KASHMIR

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This study was aimed to determine the prevalence, causes and risk factors of cataract among general population of Division Muzaffarabad, Azad Jammu and Kashmir. This was a population based descriptive cross-sectional study conducted among participants attending Al-Shifa Trust Eye Hospital Muzaffarabad, Abbas Institute of Medical Sciences Muzaffarabad, Combined Military hospital Muzaffarabad, Private eye clinics and eye camps in different areas of Division Muzaffarabad for eye care services from December 2021 to May 2022. In this study quantitative data collecting methods were used. A total of 1080 participants suffering from cataract, were enrolled in the study. Participants were divided in 5 stratum of age ranges <30, 31-40, 41-50, 50-60 and >60 years. Presenting visual acuity of participants were measured by using Snellen's chart. All the participants in this study underwent a comprehensive external and internal eye examination to detect cataract by using slit lamp and ophthalmoscope. Participants of >60 age group were more effected. The prevalence of cortical cataract, nuclear cataract and posterior sub capsular cataract was 23.6%, 57.1% and 19.3% respectively. There was found statistically significant association between age (Chi=22.575, df=8, p value <0.01), gender (Chi-square=0.83, df=8, <0.05). Height (Chi-square=233.51, df=2, p value=<0.001), marital status Chi-square=1782.785, df=3, p value=<0.001), Occupation (Chi-square=152.244, df=3, p value, <0.001), Family income (Chi-square=714.12, df=3, p value<0.001), Qualification (Chi-square=588.361, df=4, p value=<0.001), Districts (Chi square=24.72, df=4, p value=<0.001), current residence (Chi-square=13.27, df=2, p value=<0.01), Affected eyes (Chi-square = 346.800, df= 1, p- value = <0.001), frequently mobile usage time (Chi-square=13.394, df=6, p value=<0,05), causes and risk factors (Chi-square=141.47, df=10, p value=<0.001) and presenting visual acuity of patients (Chi-square=274.58, df=8, p value=<0,001). The main causes and risk factors of cataract was diabetes (31.1%), UV light, (25.4%) overuse of screen (13.0%), smoking (12.8%), hypertension (8.8%) and trauma accounts (8.8%). Cortical cataract mostly effects aged peoples above than 50 and 60. Females are more effected by cortical cataract. Cortical cataract was more prevalent in rural areas in District Muzaffarabad as compared to District Jhelum Valley and Neelum. Diabetes was a major risk factor for development of cortical cataract. Nuclear cataract was more prevalent in age groups >60, 51-60 and <30. Prevalence of nuclear cataract was greater in females then males. Nuclear cataract was more prevalent in rural areas of District Muzaffarabad followed by district Neelum and Jhelum Valley. UV light was major risk factor for nuclear cataract progression with a disease duration of 2-5 year. Posterior sub capsular cataract was more

common in participants of age >60 and 51-60. Males were more effected by posterior subcapsular cataract. It was more prevalent in rural areas of District Muzaffarabad followed by District Neelum and Jhelum. UV exposure was major cause and risk factor associated with this type.

CBGP-98

MENARCHE AND MENOPAUSAL TROUBLES HYSTERIA AND POST-MENOPAUSAL SYNDROME ARE NOTHING BUT PSYCHO- SOMATIC TRAUMA/SHOCKS

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Our day-to-day observable feminine troubles, at the time of start of menses, Menarche, and its termination, post-Menopause in women folk, we see a lot of troubles. At the time of menstrual cycle start, her Unconscious refuses to accept this Change and falls into a SHOCK/TRAUMA. Although the response is entirely different in each and every girl, at the time of its start, in its extreme form, her control over body-muscular system deteriorates and with the passage of time this situation goes from bad to worse. Here the term Hysteria (hystera, womb: wondering of uterus causes mental disturbances) was evolved. As such type of seizures were also observed in male patients, then a lot of terms were applied; non-epileptic seizure, psychological trauma, Neuropathological disorder, non-organic trauma, so and so forth. Recent data reveals that such types of issue is reducing with the changing social norms of uncurbed environs. The second situation a lady faces which is increasing with the modernisation of the society in which persistent young women are increasing. Here, as she loses her ability of fertility, in start of the Menopause, her unconscious fear of becoming infertile in her further life drags her up to another shock or trauma. Now a diverse array of health hazards are seen: some explainable and others unexplainable, e.g. burning sensation from the rear part of neck and skull, hypertension, vertigo, non-stop menstrual flow, tachycardia, insomnia, touchy psychology and so on. In her first situation she is at the mercy of her family elders. Some people believe that she is in the possession of some superanatural forces and they repair to the exortionists. Some others consult the physicians who recommend tranquilizer like *Chlorpromazine* and turn them addicts. Anyhow the patients of first category may overcome the problem sooner or later, but her second issue is more disastrous, awesome and somewhat away from the relevancy. In the Menarche case the world focused critically, on the other hand post- and peri-menopausal syndrome is not focused subtly. These patients visit physicians like cardiologists, neurologists, gynecologists or psychiatrists. All these physicians seldom understand the basic cause of the disease. Thus the patient remains untreated as regards the basic cause of the disease. Moreover, this treatment needs long term duration, because its basic factor is obscured from these physicians. Secondly, the Allopathic system of medicine has no fruitful treatment of the situation. The Homeopathic system of medicine has proper and prompt treatment of such type of psychological trauma and the result is seen within few minutes. I may quote only two examples of Homeopathic treatment of severe cases of the Psycho-somatic trauma: a woman of round about 50, came in my clinic, she has have not slept for last three days, I diagnosed her as the patient of Postmenopausal syndrome, she was sitting on patient-stool, I gave her 2 drops of *Lachesis* 30, within a minute or two she put her head on the table and was sleeping on the spot at patient stool. Another lady of same age, her pulse rate was 173, I got anxious, and at the spot I gave her cardiac tonic, *Crataegus oxyacantha* Q 20 drops and her pulse dropped 113 within few minutes. Later on she was given *Lachesis* 30. Then their proper treatment was started. In the repertory of Homeopathic medicines, the number of medicines is very large and some what confusing. We have organized a set formula of these psychosomatic issues:

1. Formula for Hysteria

	Inscription	**Subscription**	**Instruction**
(i)	Asa foetida	30	20 drops 3 time a day
(ii)	Ignatia amara	6x	20 drops 3 time Verateru m album
(iii)	Createagus oxyea	Q	20 drops 3 time

In severe cases sometime Lachesis 30 was given instead of Asa foetida. In the case of post and perimenopausal syndrome (i) Lachesis is given in the start because in this case the severity of the issue is at the extreme as compared to menarche. Remaining two groups of medicines are same. This situation clearly indicates that same medicines are required in both entirely different forms of problems. Both these easily manageable feminine issues Neither are diseases Nor syndromes but are mere bad outcome of collective interaction of her innate hormonal changes with her (past and present) social behavior, thinking and environment, thus can be called as shock or trauma.

CBGP-99

EVALUATION OF MENSTRUAL DISORDER IN ADOLESCENCE FEMALE BELONGING URBAN AND RURAL POPULATION OF HYDERABAD DISTRICT

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Disorder of menstrual cycle has become very common in both married and unmarried female. A large ratio of females suffering from menstruation related health issues. Female has become infertile due to this problem. Menstrual disorder is abnormal condition occurs in menstrual cycle. These disorder cause anxiety and also source of depression for patient and also affect the majority of adolescent's female and impacting quality of diet , life style and surrounding environment .In this study through cross sectional questionnaire collected data majority of females patient with menstrual disorder regarding the sign and symptoms such as PCOS, fibroid tumor ,depression, endometriosis, infertility, miscarriages, irregular periods, hair loss, hot flashes, weight gain, breast pain, insomnia, lower abdominal and back pain. This research work conducted in the different hospitals of Hyderabad district from 15 December 2021 to 31 may 2022 by filling a questionnaire which was adopted with discussion of this project supervisor and concerned hospitals surgeon and female gynecologist according to who method to collect the data conducted systematic overview to find out the main causes of menstrual disorders, which show adolescence female suffering from these menstrual disorders, namely Amenorrhea(absence of menses), Dysmenorrhea(painful menstrual bleeding), Menorrhagia(heavy or prolong menstrual bleeding) , oligomenorrhea(frequent periods), polymenorrhea (infrequent periods) and abnormal uterine bleeding AUB. Mostly reported cases where dysmenorrhea patients among unmarried females due to hormonal imbalance, stress, weight loss or due to exercise, and amenorrhea among married female due to various fluctuations during their periods or in absence of periods and also due to the deficiency of diet. 32% of females had premenstrual syndrome PMS, 5.4% had PCOS, 58% of females (girls) missed school, office, and institutes because of AUB (abnormal uterine bleeding) and period pain, and 4.6% had premenstrual dysphoric disorder PMDD.

CBGP-100

ADVERSE REPRODUCTIVE OUTCOMES AND MATERNAL OCCUPATION

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In the world the rate of infertility and adverse reproductive outcomes increased day by day. We are discussing the factors responsible for temporary or permanent infertility and causes of adversities in reproductive outcomes. To

determine the effect of stress and hormonal disturbance in employed or un-employed non conceiving women of Karachi population. In 2018-2020 research was conducted on 70 women in which 35 was employed and 35 was unemployed. We designed two questionnaire one is general in which collect all data about age, weight, marriage age, non-conceiving time, education, physical activity, employment status and hormonal history and also attach hormonal reports along with this. Second Questionnaire was about stress it had stress measuring question to measure stress of employed and unemployed women. The association between age, weight, education, stress and hormonal disturbance was calculate by SPSS results from logistic regression. On IBM SPSS version 23. Statistically logistic regression model used for (Binary logistic regression analysis) by adjustment of dependent variables (stress, prolactin, thyroid) and independent variables such as age, weight, education, physical activity in employed and unemployed women and interpret it with the help of probability. We used chi square to find the association between hormonal disturbance and stress. Increase in weight, physical activity, and age increase the chances of stress in employed women. In unemployed women low education level and less physical activity decrease the chances of stress. There are chances of disturbance of prolactin hormone with an increase in physical activity of individuals in employed women. Increase in physical activity, age sometimes weight gain may increase the chances of disturbance of prolactin level in unemployed women. Gain in weight concerning increase in age is a threat of hypothyroidism in employed and unemployed women. There is no association shown between stress and hormones both have their effect on the reproductive abilities of women. Above results shows that stress of over work load indirectly effects the reproductive function of women. Thyroid dysfunction is common in both working and non-working women. Obesity disturbs thyroid functions. Prolactin disturbance found in physical active women increase the chances of infertility.

CBGP-101

INVESTIGATING THE FACTORS OF HYPERTENSION: HYPERTENSIVE AND NON-HYPERTENSIVE FAMILY HISTORY

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The purpose of this Study was to estimate the hypertension prevalence and explain its relation with hypertensive and non-hypertensive family history and study burden as school work load in 14 to 20 years school going girls. The area chosen for the study were Karachi (Liaquatabad town) and KPK (Swat). Middle, secondary and higher secondary schools were visited along with questionnaire. Which was first explained to the students, and then they fill it confidently. B.P., height and weight were measured in a comfortable environment. This is a comparative study including hypertensive and non-hypertensive family history. Multiple logistic regression model, odds ratio and hosmer-lameshow were taken to measure the association. Hosmer Lame-show test represent Chi-Square test and Pseudo $R^{2.}$ According to the Logistic Regression model, for each significant value the value of P is 0.01 (1%) greater. That's why the null Hypothesis cannot be rejected for each of the case. The odds ratio, standard error and estimated coefficient of the logistic binary model for the different significant variable indicate that if hypertension in positive then the value of logit in favor of hypertension changes -0.101 to +0.146 in accordance of Karachi data while for KPK data the logit value changes from -0.210 to +0.177. While odds ratio of age, family history, work load, headache, irritability and irregular heart beat increased by +0.124, -0.058, -0.253, -0.145, -0.101 and 0.192 respectively in favor of Karachi data while in case of KPK data odds ratio increased by +0.060, -0.180, -0.061, -0.152, -0.210 and -0.190. Odds ratio of laptop and junk food in case of Karachi is decreased by +0.146 and +0.066 while in case of KPK it decreased by+0.158 and -0.152. Significant increase of hypertension is reports in this study with increased concentration of age, family history, work load, headache, irritability and irregular heartbeat.

CBGP-102

PREVALENCE OF ANEMIA IN SCHOOL GOING CHILDREN OF TEHSIL MATTA DISTRICT SWAT, KHYBER PAKHTUNKHWA, PAKISTAN

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The current study was conducted to find out the prevalence of anemia in school going children of tehsil Matta, district Swat. Anemia is a disease in which an individual has low level RBCs. Anemia can cause death of an individual if it is not treated on time. Anemia is more common in females as compared to males. The prevalence of anemia changes with living place, climates of an area etc. In the current study, data were collected from 500 children of different schools of tehsil Matta in a period of 08 months. Sahli's method was used to find out hemoglobin level. To collect data, a close type of questionnaire was designed which include many factors like Age, Sex, Residency, malaria history, diarrhea history, daily diet history, and economic status. The overall prevalence of anemia recorded was 62%. Anemia is more prevalent in female (82.68%) as compared to male (44.24%). Prevalence rate of anemia is high in urban living children (71.34%) as compared to that of rural (48.0%). Malaria also acts as a risk factor and (72.70%) malarial children were anemic. Poverty also act as a risk factor for anemia as (72.41%) poor children were anemic. Anemia is more prevalent in vegetables avoiding children (74.30%) as compared to vegetable eating children (39.55%). Those children which are using junk food like local chips etc. at high rate are more anemic (74.16%). Use of iron rich food like fruits, vegetables, eggs, milk etc. can reduce the risk of anemia. To prevent anemia, children should reduce or stop the use of junk food.

CBGP-103

USE OF EXTREMELY HIGH DILUTIONS OF ACETYLCHOLINE ON RABBIT JEJUNUM: A STUDY ON "POTENTIZATION"

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Potentization is the process in which a substance is diluted with distils water or alcohol and then put into mechanical shaker for vigorous shaken for a process called succession. It was assumed by homeopathic concept that this will produce vital energy in the diluted solutions. In this study we compared the responses of serial dilution and succession dilutions on isolated jejunum muscle of Rabbit. Organ bath assembly and Oscillograph chart recorder were used to record the force and frequency of contraction of jejunum. Our results showed that succession dilution of acetylcholine from ACh 10^{-3} to ACh 10^{-24} showed more long lasting and stabilize effect when compare to simple dilutions. However, our experiments do not produced a significant difference on force and rate of contraction in most of the dilutions when compare to its simple ones. The results are discussed in terms of intrinsic influence of intestine that release neuromodulators and produce a strong influence on tissue rather than the dilutions consistent the macro or micro molecule of drug.

CBGP-104

TOXIC EFFECTS OF ANTIHYPERTENSIVE DRUG PROPRANOLOL HYDROCHLORIDE ON HORMONAL INDICES

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Propranolol hydrochloride is a synthetic, non-selective beta-adrenergic receptor blocking agent, appears to be an effective treatment for Hypertension and myocardial infraction. At dosages greater than required for beta blockade, propranolol also affects the cardiac output and hormonal parameters. Twenty healthy mature male New Zealand rabbits (*Oryctolagus cuniculus*) were orally intoxicated with Propranolol through 1cc syringe. Group A was considered as the control group and served with food and water only while group B was the experimental group intoxicated with Propranolol at the dose of 05 mg/kg body weight regularly for 30 days. TOSOH AIA system Hormonal analyzer (Made in Japan) was used for analysis of the hormonal indices. Propranolol caused adverse effects like Weakness, restlessness and diarrhea in the treated rabbits. Also an increase of 55.85%, 4.45671% and 48.6239% in the level of TSH, Estrogen and Progesterone respectively was found. While a decrease of -28.8557% in the level of T3, -5.87276% in T4 and -22.3762% in Testosterone level. The study shows that Propranolol has adverse effects on the thyroid as well as on sex hormones of treated rabbits.

CBGP-105

AMINO ACIDS CAPPED METALLIC NANOPARTICLES FOR THEIR IMPROVED BIOMIMETIC AND CATALYTIC ACTIVITY

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Recently, silver nanoparticles (AgNPs) have increased many folds in the industrial, biomedical, and other sectors. Due to its reported biocidal properties, the environment becomes vulnerable to its toxic effects. Mitigating its toxicity might be a good approach in the current scenario. The current study has been designed to perform surface functionalization of the AgNPs using biomolecules, such as amino acids. For this purpose, silver nanoconjugates (AgNCs) were developed using amino acids, such as L- glycine, L- tyrosine, L- tryptophan, N-acetyl cysteine, L- lysine, and L- arginine and tested for their biomimetic and catalytic activity. Characterization of these AgNCs was performed using UV-Vis spectroscopy and Fourier transform infrared spectroscopy (FTIR). In-vitro studies were done to assess their antioxidant potential by performing tests, such as 2,2- diphenyl-1picrylhydrazyl (DPPH), H_2O_2 scavenging assay, and Ferric reducing power (FRP) assay. We found a significant increase (p<0.05) in the concentration of pure amino acids, such as L-Tryptophan, NAC, L- Tyrosine, and L- Glycine as well as conjugated amino acids, such as Lys-AgNCs and Tyr-AgNCs resulted in the significant increase (p<0.05) of DPPH values. In case of H_2O_2 scavenging assay, L-Tyrosine, and NAC showed non-significantly higher (p>0.05) activity while L- glycine showed the least activity in all pure amino acids. In conjugated amino acids, NAC-AgNPs and Gly-AgNPs showed significantly higher (p<0.05) while Lys-AgNCs showed the least activity. In the ferric reducing power (FRP) assay pure amino acids, L-Tryptophan, and L-Tyrosine showed significantly higher (p<0.05) absorbance than the other amino acids. In Conjugated amino acids Lys-AgNPs, Arg-AgNPs, Tryp-AgNPs, Tyr-AgNPs, and Gly-AgNPs showed significantly higher (p<0.05) absorbance than C-AgNPs and NAC-AgNPs at 700nm. In-vitro biomimetic analysis was done to assess their antioxidant enzymes by

performing tests, such as superoxide dismutase (SOD)- like activity, Catalase (CAT)- like activity, and Glutathione-S-transferase (GST)-like activity. Arg-AgNPs showed a significantly increased (p<0.05) level of SOD-like activity, C-AgNPs and AgNCs showed a significantly decreased (p<0.05) level of CAT-like activity, and Arg-AgNPs showed a significantly higher (p<0.05) level of GST-like activity. The catalytic activity of pure and capped AgNPs was studied against Methylene blue and Congo red. Tyr-AgNCs showed methylene blue dye degradation and NAC-AgNCs showed congo-red dye degradation. It is concluded that surface functionalization enhanced the stability of chemically-synthesized NMs, mainly facilitated by functional groups present in the amino acids. Biomolecules-based synthesis and surface functionalization of NMs might yield eco-friendly and less toxic NMs for future applications.

CBGP-106

EVALUATION OF NANOGEL COMPRISING AMINO ACIDS CAPPED SILVER NANOPARTICLES FOR ACCELERATED 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 where fibroblasts, microvascular cells, keratinocytes, and immune cells play a major role. Many types of antimicrobial and moisturized wound dressings are being developed with a variety of features to heal the wound. This study has been designed to prepare the silver nanoparticles (AgNPs) based hydrogels in combination with the L-Tyrosine and L-Tryptophan amino acids to accelerate the tissue regeneration process. The conjugation of amino acids with the AgNPs 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 tissue regeneration potential of AgNPs individually and in combination with the L-Tyrosine and L-Tryptophan amino acids was evaluated by estimating the wound contraction percentage, serum proteins analysis, biochemical tests, and histological examination. The AgNPs hydrogel in combination with the L-Tryptophan amino acid showed a good healing potential in which wounds were healed in 12 days (Percent wound contraction Mean ± SE: 83.26 ± 0.66) than that of wounds treated with the pure C-AgNPs hydrogel, L-Tyrosine AgNPs hydrogel, and Polyfax (Positive control) respectively (Percent wound contraction Mean ± SE: 67.20 ± 0.51, 67.52 ± 0.93, and 51.46 ± 0.70). The level of serum proteins significantly increased (P<0.001) in different treatment groups as compared to control groups. Catalase, and GST level significantly decreased, while SOD level significantly increased in L-Tryptophan AgNPs hydrogel as compared to control groups as well as to other treatment groups. Histological examination also showed that wounds covered with L-Tryptophan AgNPs hydrogel have better wound healing capacity than Polyfax and other treatment groups. These findings support our hypothesis that amino acid-capped silver nanoparticles based hydrogels can be a strong contender for an efficient wound care and management.

CBGP-107

IN VIVO ANTIOXIDANT POTENTIAL OF BIOGENIC SILVER NANOPARTICLES SYNTHESIZED FROM *PSIDIUM GUAJAVA* L.

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The use of nanoparticles has increased in recent decades whereas the toxicity of metallic nanoparticles remained an important issue of debate. Hence, there is a need to develop safer and eco-friendly nanoparticles while keeping their

efficacy intact. The current study was designed to develop silver nanoparticles (AgNPs) by using *Psidium guajava* L. pulp extract and evaluate their antioxidant potential. For chemically and green synthesized silver nanoparticles (C-AgNPs and G-AgNPs), the Surface plasmon resonance (SPR) spectra displayed peaks at 393 nm and 405 nm, respectively. Scanning electron microscopy (SEM) displayed an average size of 30-35nm for G-AgNPs. In FTIR spectra –OH bond stretching was observed in G-AgNPs and some bonds contracted and a few others completely diminished. The G-AgNPs showed a higher level of radical scavenging activity (RSA) (25.85%), hydrogen peroxide scavenging activity (34.34%), and ferric-reducing power (0.28). When we compared the control group (G1) to various treatment groups (G2-G6), the levels of catalase (CAT), superoxide dismutase (SOD), and glutathione-s-transferase (GST) indicated a highly significant difference ($p < 0.05$). The level of blood urea, uric acid, blood urea nitrogen (BUN), serum glutamic pyruvic transaminase (SGPT), serum glutamic-oxaloacetic transaminase (SGOT), Alk. phosphatase, total bilirubin, and serum electrolytes were also evaluated. The clinically critical biochemical results also strengthened our hypothesis that G-AgNPs are less toxic than C-AgNPs. Additionally, the histopathology of liver, kidney and intestinal tissues indicated that green synthesized silver nanoparticles are relatively safer.

CBGP-108

EVALUATION OF AMINO ACID CAPPED SILVER NANOPARTICLES FOR ANTIBACTERIAL ACTIVITY

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Antibiotic resistance is one of the major obstacles that medical science faces today. To tackle this issue, recent exploitation and manipulation of nanoparticles have drawn our attention to developing novel approaches using nanoparticles. We synthesized silver nanoparticles (AgNPs) and capped them with amino acids, such as tyrosine, tryptophan, arginine, and glycine. The particles were characterized using UV-vis spectrometry and Fourier transform infrared spectroscopy (FTIR). The antimicrobial activity of these AgNPs and their conjugates were tested against four strains of bacteria, two gram-positive, viz: *B. subtilis* and *S. aureus,* and two gram-negative, viz: *E. coil* and *P. aeruginosa* using the disc diffusion method and well diffusion methods. It was found that amino acid-capped AgNPs showed enhanced antibacterial activity. Zones of inhibition of amino acid-capped silver nanoparticles of tyrosine (8mm and 8.2mm) of tryptophan (9mm and 8 mm), arginine (6.5mm and 6.3mm), and glycine (6mm and 6.7mm) against *B. subtilis* and *S. aureus* respectively. It is concluded that conjugated AgNPs of tyrosine and tryptophan showed enhanced antibacterial potential as compared to arginine and glycine.

CBGP-109

ANTIOXIDANT ACTIVITY OF SILVER NANOPRISMS AND THEIR CONJUGATES IN ALBINO MICE

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Silver nanoparticles of various shapes are used for biomedical applications but induce toxicity and oxidative when administered in a biological system. The current study has been designed to synthesize silver nanoparticles of

novel triangular shape via a chemical reduction method and different amino acids as their capping agents. Both uncapped and capped nanoprisms exhibited three prominent peaks at 330 nm, 420 nm, and 660 nm. FTIR results showed the reduction and development of new peaks in FTIR spectra of AgNPrs conjugated with different amino acids. In-vitro antioxidant activity was evaluated by performing DPPH (2, 2-dipheny1-1-picrylhydrazil) activity, Ferric reducing power assay, and H_2O_2 scavenging activity. Six groups of albino mice were treated with cadmium, silver nanoprisms, and their conjugates with a dose of 20mg/kg for 28 days. After 28 days, they were dissected, and blood and organs were collected for further analysis. Uncapped AgNPrs were found to induce toxicity; elevated levels SOD were registered, whereas CAT and GST decreased by the exposure of subject particles. Among all the conjugates, L-cystine and L-tyrosine-capped nanoprisms exhibited good antioxidant activity, and L-glycine-capped nanoprisms showed very less antioxidant activity. Histopathological studies also exhibited damage in the case of the animals treated with uncapped AgNPrs and L-glycine-capped AgNPrs. In contrast, those treated with L-cystine and L-tyrosine exhibited normal texture of the tissues. From this study, it is concluded that the toxicity of nanomaterials can be reduced after conjugating various biological molecules and they can be used for various biomedical applications.

CBGP-110

PREVALENCE OF PERIPHERAL DIABETIC NEUROPATHY (DPN) TYPE 1 DIABETES MELLITUS (T1DM) I N PATIENTS OF HYDERABAD AND JAMSHORO, SINDH

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Public health is being threatened on a big range by Diabetes mellitus (DM). It has observed thatmore than 382 million people are suffering from DM in 2013. DM, a communal metabolic disorder with an expanding incidence globally, is related with chronic complications of peripheral nervous system (PNS) and the central nervous system (CNS). Somatic and autonomic peripheral nerves are affected both by a long-term micro-vascular complication diabetic neuropathy (DN). According to American Diabetes Association (ADA) / American Academy of Neurology (AAN), (1988,) DN is a clinically apparent or sub-clinical ailment of the peripheral neuron as an effect of DM without other pathogenic reasons. Main complication of T1DM is DN due to hyperglycemia leads to chemically changes that found in the nerves. Diabetic peripheral neuropathy (DPN) shows a main role in illness and death in patients with type 1 diabetes mellitus (T1DM). DPN generally starts in the nerves of feet as they are the longest nerves and nurtured with longest blood vessels of the physique. This ailment is called DPN. Distal symmetric neuropathy (DSN) is the commonest type of DPN. DM be able to decreases the blood supply to the feet and slowly harms the nerves which brings sensation. Thestudy purpose was focused upon the estimation of the incidence of DPN among T1DM patientsunder the different age groups in the selected study areas, of two major hospitals namely Civil Hospital Hyderabad and Liaquat University of Medical Health Sciences (LUMHS) Hospital, Jamshoro of outdoor patients (OPD) for the period from February to August 2018. It is furnished by the result found that 105 patients of DN were observed in this study. From the perusal of DN patients, it has been observed that the among 105 DN patients 60 (57%) patients were DPN. Most of the patient's duration of T1DM were 16-20 years.50% patients age group was 20-25 & 50% was 26-30 years. Out of 60 DPN patients 75% have positive family history and25% patients have negative family history. Out of 60 DPN had 25% good glycemic control and 75% patients had poor glycemic control. Out of 60 DPN patients 80%were hypertensive (BP>145/95mmHG) and 20% were Normotensive (BP <145/90mmHG). Out of 40 male DPN patients 30%were smokers.

CBGP-111

BACTERICIDAL ACTIVITY OF SHAPE-DEPENDENT SILVER NANOPARTICLES AND THEIR CONJUGATES USING CLARITHROMYCIN

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Serious economic and environmental damage results from antibiotic-resistant bacterial strains causing a threat to public health. In the current study tailored nanoparticles (NPs) capable of enhanced bactericidal potential are synthesized in various sizes and shapes. The chemical reduction method opted for the synthesis of silver nanoparticles (AgNPs) and silver nanoprisms (AgNPrs), which were later conjugated with clarithromycin. UV-Vis spectroscopic peak was recorded at 415nm for silver nanoparticles and 645 nm for silver nanoprisms. The surface composition and optical properties of the nanoparticles were assessed by Fourier-transformed infrared spectroscopy (FTIR) and photoluminescence spectroscopy (PL). The bactericidal efficacy of these newly synthesized silver nanomaterials in the free and conjugated state with clarithromycin was evaluated against *Pseudomonas aeruginosa* (gran-negative) and *Bacillus subtilis* (gram-positive) bacterial strains. Silver nanoparticles, conjugated silver nanoparticles, silver nanoprisms, and their conjugate's antibacterial activity were recorded, 8-10 mm, 11-15 mm, 12-13 mm, and 16-18 mm (Zone of inhibition) respectively for disk diffusion assay. The results of the well diffusion method for bactericidal potential silver nanoparticles, conjugated silver nanoparticles, silver nanoprisms, and conjugated silver nanoprisms are 9-12 mm, 11-13 mm, 114 3 mm, and 15-18 mm respectively. Enhanced antibacterial activity was depicted by clarithromycin-conjugated silver nanoprisms (AgNPrs) as compared to silver nanoprisms (AgNPrs) in a free state.

CBGP-112

STUDY OF HIGH-RISK FACTOR OF SECONDARY INFERTILITY IN WOMEN IN DISTRICT OF HYDERABAD SINDH PAKISTAN

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The purpose of the study was to investigate the actual reasons of secondary infertility in females secondary infertility is a world health issue which affecting approximately 5 to 8% of couples. Secondary infertility is growing now days. Secondary infertility is the inability to conceive for one year after having conceived at least once before. FSH and LH are major reproductive hormone that play a vital role in the normal reproductive cycle and in maintaining reproductive health among women. Disturbance in these two hormones is one of the risk factors for secondary infertility. A disturbing level of TSH is also a risk factor for secondary infertility age plays an important risk factor for secondary infertility. Survey-based research is carried out in the civil hospital in Hyderabad. During study period to collect 35 sample the required data from the patient. The major symptom found among most of the female was an abnormal menstrual cycle, skin dryness, weight loss, stress (50%), miscarriage (50%), and hair loss (60%), Most patients have a low literacy rate (90%), The main cause of secondary infertility from these results is the disturbing level of FSH, LH, and TSH as the normal levels of these hormones are necessary for maintaining reproductive health.

CBGP-113

VARIATIONS IN THE NORMAL HAEMATOLOGICAL PARAMETERS OF EUROPEAN RABBITS (*ORYCTOLAGUS CUNICULUS*)

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The study is aimed to compared the variations in hematological (Complete blood count, Differential leucocyte count) parameters of the European rabbit (*Oryctolagus cuniculus*) present in Pakistan with that of the other countries. For this purpose, thirty mature male rabbits that are clinically normal and not infected with any disease were selected from six different areas of the Punjab, Pakistan. The blood samples were collected from all these thirty rabbits and analyzed for the hematological parameters in the laboratory. The results of the current study are compared with normal hematological values available in literature for the rabbits of same age, breed and gender as are used in this study. The comparison shows variations in the values of Hb, 8.63-8.73, 10.7-11.18, 8.57-8.79, 9.1-12.0, RBC, 4.47-4.55, 4.85-5.23, 7.13-7.33, 4.21-5.32 and WBC, 6.3-6.41, 2.051-3.191, 6.57-6.79, 2.6-3.1 for Egypt, Iraq, Nigeria, and Pakistan respectively. These values revealed the geographical variations in the normal range of the hematological parameters in the *Oryctolagus cuniculus*.

CBGP-114

AN INVESTIGATION OF STREPTOCCOCAL CAMEL MASTITIS IN PUNJAB, PAKISTAN AND MOGADISHU, SOMALIA

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Mastitis is the inflammation of mammary gland that is detectable in case of clinical and subclinical mastitis. This study looked at prevalence of clinical and sub-clinical mastitis in Cholistan (Punjab, Pakistan) and Dharkenley (Mogadishu, Somalia) for streptococcus species isolation. A total of 200 samples (100 from each area) were collected randomly from camels of Cholistan and Dharkenely. Data collected to evaluate different risk factors. Clinical mastitis diagnosis was based upon clinical signs while California mastitis Test (CMT) was performed to diagnose the subclinical cases of mastitis. Teats were rinsed with water, dried properly with clean towel and disinfection performed by using cotton swab dipped in 70% ethanol. Fore strips of milk were discarded and sample positive for mastitis were collected from each teat separately into sterile falcon tubes. The spread-out approach was used to culture each milk sample on blood agar. Multiple streaking method was used to purify individual colonies with specific agar. *Streptococcus agalactiae*, *Streptococcus dysgalactiae*, and *Streptococcus uberis* are the *Streptococcus* species that were checked for sensitivity to antimicrobial agents by disc diffusion test. All of the data was evaluated statistically using SPSS version 20.0 and chi-square. In this study from Dharkenley and Cholistan the overall prevalence of clinical mastitis was 10.5%

and 3.4% respectively, and the prevalence of subclinical mastitis was 26% and 42.8% respectively. *Streptococcus agalactiae* was highly prevalent as compared to other *Streptococcus* species.

CBGP-115

ASSOCIATION OF ARSENIC WITH TYPE 2 DIABETES MELLITUS

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Many studies on water quality of district Kasur and Lahore have developed an association with exposure in drinking water and arsenic born diseases. Heavy metals produce damaging effects on human body, arsenic is one of them. We collect water samples from different sources from both districts. Concentration of arsenic ranges from 0.00µgm/L to 116 µgm/L in Kasur and 0.88µgm/L to 70 µgm/L in Lahore. The aim of the study is to determine association of arsenic in drinking water with prevalence of type 2 diabetes mellitus. By comparing urinary concentration of arsenic, it was found that male contain significantly high exposure as compared to women. High concentration of urinary arsenic also have significant association with age above 60 year, smoking, education, occupation eating habits, and residence near industries also show association.

CBGP-116

HAEMATOLOGICAL AND BIOCHEMICAL STUDIES OF OVARIAN CANCER PATIENTS IN GUJRANWALA DIVISION

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Ovarian cancer is cancer of the ovaries, the egg releasing and hormone producing organ of the female. The second-highest average yearly rise in mortality and a 30-percent overall five-year survival rate are both associated with ovarian cancer. Previous data reported that haematological and biochemical profile may be affected by chemotherapy treatment. A retrospective cohort study was conducted from January 2018 to December 2020 to compare the changes in haematological and biochemical profile before- and after-chemotherapy treatments of cancer patients visited at the Oncology unit of GINUM. Blood samples from healthy women and those who had ovarian cancer were collected for ovarian cancer research. Descriptive statistics was observed by SPSS tool. Paired sample t-test was used to find out the significant difference between various parameters of ovarian cancer patients pre and post chemotherapy. All of the patients were female, and their haematological profiles showed a substantial decline from pre- to post-chemotherapy, with the exception of Mean Corpuscular Volume (MCV) and Mean Corpuscular Hemoglobin Concentration (MCHC). The biochemical profiles revealed that none of them dropped considerably after chemotherapy compared to before treatment due to the supplements (paclitaxel, cisplatin, carboplatin) were given to the patients. Age of ≥50 is most susceptible to ovarian cancer. This study supports an association between Age at menarche and ovarian cancer risk the menarche age is ≥12 is most susceptible. The study will be helpful for oncologist to treat ovarian cancer patients with anemic condition.

CBGP-117

HEMATOLOGICAL ANALYSIS IN COVID-19 PATIENTS IN GUJRANWALA DIVISION

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Severe acute respiratory syndrome coronavirus (SARS-CoV-2), a novel influenza virus, has spreading globally, leading the World Health Organization to declare a pandemic. This study was aimed to ascertain the changes in hematological and biochemical parameters in Covid-19 patients. This retrospective analysis has performed on 254 covid-19 patients including 162 males and 92 females admitted in Imran Idrees Teaching hospital Sialkot who tested positive for SARS-CoV-2 by analyzing diagnostic laboratory investigations such as complete blood count, liver function test, renal function test, C-reactive protein, lactate dehydrogenase and serum ferritin test reports, by comparative and statistical analysis of Covid-19 positive patients. This study also involved the comparison of patients with respect to age and gender. For data analysis SPSS software was used. Quantile- quantile plot, descriptive statistics, one sample t-test were used as statistical methods. This study concluded that males are more suspected to COVID-19 than females. Pre-existing conditions and Elderly person (65 and above) are at high risk. The results have showed that lymphocytes and erythrocytes in Covid-19 positive patients were decreased to different degrees, and the blood was in a state of hyper coagulation, which was more obvious in severe and critically ill patients. The increased levels of serum creatinine, CRP, D-dimer and serum ferritin ($P<0.05$) were positively correlated with disease and can be considered as a reliable prognostic marker, to assess the severity and prognosis of Covid-19 cases. This study is helpful for pathologists to make more accurate diagnostic predictions, to control and cure the disease.

CBGP-118

FIPRONIL-INDUCED EFFECT ON MUSCLE GLYCOGEN, ON OXIDATIVE STRESS AND AMELIORATION BY VITAMIN C IN SILVER CARP

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A broad-spectrum phenylpyrazole insecticide fipronil (FP), which is widely used around the world to control insects and also as a veterinary medication targets the GABA-aminobutyric acid (GABA) receptor and has a favorable selective toxicity for insects. Yet there is increasing evidence that FP causes a variety of toxic effects on animals and humans, like hepatotoxic, neurotoxic, reproductive, nephrotoxic, and cytotoxic effects. It has been hypothesized over the past ten years that oxidative stress contributes to the numerous toxicities brought on by FP. To test the toxicity of the insecticide depending on duration and concentration, fish were subjected to a low dose of fipronil in the current investigation. Silver carp (Hypopthalmichthys molitrix) groups were exposed to low dose of FP 3.325 mg/40 L of water. The primary objectives of this research were to examine the relationship between fish muscle glycogen concentration and oxidative stress as potential mechanisms of FP-induced toxicity and metabolism. Relative and comparable toxicities in liver, gills, and muscles were assessed at antioxidant levels, and muscle glycogen content was calculated. The results indicated that reactive oxygen species (ROS) formation and oxidative stress as a result of FP treatment are associated with various forms of toxicity in comparison to control groups and the level of damage was pronounced. To investigate the remedial potential of Vitamin C in FP-induced toxicity, Vitamin C was given in water for 4 days and later in feed for 20 days after 96 h FP exposure. This proved to be very beneficial for fish as their behavior and also as regards morphological and physical deformities and oxidative stress which reduced to a larger extent, while muscle glycogen

content was also restored to normal. Moreover, vitamin C in FP and vitamin C pre-mix form also demonstrated reduced toxic effects of FP.

CBGP-119

COMPUTER VISION SYNDROME AMONG STUDENTS OF PUBLIC SECTOR UNIVERSITIES OF LAHORE DURING THE COVID-19 PANDEMIC ERA

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During the last part of 2019, the coronavirus disease 19 (COVID 19) which emerged in the city of Wuhan, China, was declared by WHO as global public health emergency. Consequently, the lockdown policy was implemented all over the world that lead to the new concept of online work, shopping and study. In addition to the questionnaire, routine dry eye clinical tests and conjunctival impression cytology impression cytology specimen retrieval was performed on the subjects. The study was conducted during the second and third phases of COVID, at the time when lockdown was lifted and face to face educational activities were partially restored. Out of the 426 subjects, females had a preponderance of 61.7% compared with males38.3%. The majority (87.8%) of them were in the age group of 18-25 years. The common symptom presented by the subjects was eyes tiredness (97.4%) and nearly all (99.5%) used visual device terminals (VDTs) not only for educational activity but also used it during their leisure time, which affected daily life routine (80.5%) of the subjects. About 72% had itchy eyes (68%), redness and foreign body sensations were reported equally by 66.44% of the students. The present study proved that there was significant effect of the use of VDTs among the university students during COVID pandemic on the various parameters used to assess the eye health and diagnosis of the computer vision syndrome and associated problems by the ophthalmologist.

CBGP-120

EFFECT OF BODY POSITIONS ON ELECTROCARDIOGRAPHIC RECORDINGS OF RHESUS MONKEY *(MACACA MULATA)*

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Electrocardiogram (ECG) is an invaluable tool used to detect the electric activity and rhythms of the heart during each cardiac cycle through measurement of potential changes through electrodes placed on the body surface. Conditions like arrhythmia, myocardial infarction, coronary heart disease, atrial fibrillation, premature ventricular contractions etc. can be easily detected by doing ECG of the patient. In non-human primates, ECG is used to evaluate standard electrocardiographic data of different species that is useful in cardiotoxicological study and preclinical drug safety testing for novel drugs. *As* rhesus monkeys *(Macaca mulatta*) serve as most suitable model for investigations on heart diseases because of the close similarity with humans in many physiological aspects, high quality ECG tracings are therefore necessary for accuracy of results. Body positions may have profound effect on ECG, accordingly, the position

that suits best for ECG tracings in non-human primates may well can be applied to human subjects. The present study was designed to determine the effect of four different positions (dorsal, ventral, sitting, standing) on ECG parameters. For this purpose, we obtained limb lead electrocardiogram of ketamine sedated rhesus macaques in all the four positions. Rhythms, RR Interval, heart rate, PR Interval, QRS duration, QT Interval, P wave duration and amplitude, T and R waves amplitude were calculated from rhythm lead II manually using interpretational methods. For QT interval correction, Bazett, Fridericia, Framingham and Hodge formulas were calculated both manually and by using QT correction calculator. These evaluations of ECG parameters suggested significance change ($P<0.05$) in electrocardiographic characterization of rhesus monkeys while in different body positions.

CBGP-121

DETERMINATION OF OXIDATIVE PROFILE IN PATIENTS WITH ISTCHEMIC AND HEMORRHAGIC STROKE

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Stroke is the disorder of blood vessels. It is of two types ischemic and hemorrhagic. Ischemic stroke occurs when a clotted blood gets trapped in vessels of brain thus blocks vascular supply. Based on literature review Ischemic stroke is present in 80-88% of the world stroke population. The other type is hemorrhagic contributing to 15-20% of the stroke population, causing rupture of blood vessel and blood leakage into surrounding brain tissue. Hypertension, diabetes and ischemic heart disease are major risk factor of stroke. Stroke irrespective of the type, involves a complex pathophysiology, results in generation of Reactive oxygen species, NOX and many other antioxidants. The antioxidants ultimately result in inflammation and cell death. The purpose of this study was to determine oxidative profile of ischemic and hemorrhagic stroke patients and to compare their blood serum biomarker, blood plasma biomarkers and oxidative biomarkers. Blood proteins levels RBC, WBC, platelet count, lymphocytes, neutrophils, and others plasma proteins, as well as blood serum biomarkers such as urea, bilirubin, LDH, Na, K, Ca, were measured from the patients admitted in hospital after stroke onset. Blood sample was collected and oxidative profile of different antioxidants circulating in the blood of stroke patients was measured as compared with their aged-matched controls by using spectrometry. Out of total hundred samples 50 were stroke patients while 30 were diagnosed with ischemic and 20 were of hemorrhagic type. Hypertension was found in 70%, and diabetes was in 50% of the patients. There is increase in level of WBCs, Alkaline phosphate, Ca, Neutrophil count, and many other proteins in ischemic as well as hemorrhagic stroke patients as compared to controls subjects. Oxidative parameters ROS, SOD, POD, TBARS show a significant increase ($p<0.001$) in ischemic as well as hemorrhagic stroke patients. Ischemic stroke patients showed a markedly greater difference in oxidative parameters as compared to controls. The oxidative parameters showed increased activity but there remains a complex physiology of their massive production, mechanisms involving ROS regulation. To minimize ROS production which is generated during stroke is the major therapeutic strategy.

CBGP-122

PROTECTIVE EFFECT OF KISSPEPTIN-10 AND N-ACETYL CYSTEINE AGAINST SODIUM ARSENITE TOXICITY IN LIVER AND KIDNEY OF ADULT MICE

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Arsenic toxicity is widespread, and effects are very well known. Several; remedial measures have been tested to counter arsenic toxicity. NAC, also known as n-acetyl-L-cysteine, is a potent antioxidant that has been used to treat a

variety of diseases and toxicities. A hypothalamic peptide namely, kisspeptin has also been suggested to have role in enhancing the defense system. The current study evaluated the effects of intraperitoneally administered kisspeptin-10 (50 nmol/day once a week administration) and N-acetyl cysteine (75 mg/kg b.w. for five alternate days) on the liver and kidney tissues of adult male mice exposed to low (4 ppm) and high (10 ppm) doses of sodium arsenite in drinking water for 35 days. Mice were divided into: tap water control, sodium arsenite alone (4 ppm and 10 ppm), kisspeptin-10 alone, N acetyl cysteine alone, and combined (sodium arsenite + kisspeptin-10; sodium arsenite + N acetyl cysteine; sodium arsenite + kisspeptin-10+ N acetyl cysteine) treatment groups at both 4ppm and 10ppm.In aspects related to oxidative stress markers and antioxidant enzymes, the results revealed that there was a significant increase in ROS and TBARS levels in the liver and kidney exposed to sodium arsenite (groups 4 and 5) in comparison to the control group. In the sodium arsenite-treated group, CAT, SOD, POD, and GSH levels were significantly decreased. Total protein content increased significantly in the above- mentioned organs. The biochemical parameters ALT, AST, ALP, creatinine, triglycerides, and cholesterol were all analyzed. Arsenic-treated groups showed significantly increased levels of AST, ALP, ALT, and creatinine in kidney and liver tissue. The normal histological structure of the kidney and liver was altered in arsenic-treated groups. Kidney tissues revealed shrunken glomeruli, increased Bowman's space, diminished glomerulus diameter, leukocyte infiltrations, and vacuole formation. Increased sinusoidal space, irregular hepatocyte distribution, and nuclear cell infiltrations were observed in the liver. The arsenic-treated group also showed a non-significant decrease in organ mass index. Results revealed that Kisspeptin and N-acetyl cysteine supplementation were equally effective in preventing sodium arsenite-induced kidney and liver damage. Histologically, Kisspeptin and N-acetyl cysteine combined with sodium arsenite exposure prevented massive tissue damage, which was seen in sodium arsenite alone treated mice. Surprisingly, when kisspeptin and N-acetyl cysteine were combined with 4 and 10 ppm sodium arsenite exposures, the above- mentioned parameters significantly improved more than kisspeptin-10 alone supplementation. This evaluates the synergistic effects of kisspeptin-10 and N-acetyl cysteine on oxidative stress markers, antioxidant enzymes, biochemical effects, as well as histoprotective effects against arsenic-induced toxicity in the liver and kidney of adult male mice.

CBGP-123

ANTIFERTILITY, ANTIOXIDANTS AND HEMO-IMMUNOLOGICAL EFFECTS OF JANTAR (*SESBANIA SESBAN*) POWDER ON *OREOCHROMIS MOSSAMBICUS*

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Tilapia is the second most culturable fish after carps. However, wild tilapia (*Oreochromis mossambicus*) poses a significant danger to the freshwater system especially in aquaculture due to its rapid breeding. About 75% of the published research indicates the detrimental effect of tilapia's introduction in aquaculture. Similarly, hormonal administered mono-sex tilapia is also not satisfying the consumer's demand due to its potential hazardous effects. Therefore, this study is executed to explore the antifertility and growth-promoting effects of the medicinal plant *Sesbania sesban* in *O. mossambicus*. A 90-day feeding trial in a replicate of three was conducted in an indoor facility under semi-control conditions. Uniform size, active fry of *O. mossambicus*, average body weight 1.7± 0.4g were equally distributed in 21 glass aquaria (13 fry/aquarium) having well-aerated water. The aquaria were randomly divided into 7 groups, one group (C) was fed 40% crude protein basal diet while others, each of three groups (S1, S2, S3 and R1, R2, R3) were fed a basal diet fortified with graded level i.e., 12.5, 25 and 50g per kg diet of S. *sesban* seed and root powdered. Initially, fish were provided feed at the rate of 7% body weight, three times a day. Afterward, based on the body weight, feeding frequency and ratio was changed. Results indicated a dose-dependent significant effect of both seed and root of *S. sesban* on the growth performance of *O. mossambicus*. However, all pairwise comparisons among groups indicated the most significant effects of *S. sesban* seed compared to roots. The S3 group showed the highest weight gain and SGR and the lowest FCR. In addition to these S *sesban* supplemented di*et al*so showed significant (P>0.05) dose-dependent positive

effects on blood indices i.e., S3 group showed the highest RBCs and WBCs count, haemoglobin level, HCT%, MCV, MCH, MCHC; and status of antioxidant enzymes SOD, POD, CAT, and the lowest LPO level. However, metabolic enzymes, AST, ALT, and LDH did not show any significant difference among the treated groups and control group. Both seed and root of *S. sesban* showed dose-dependent negative effects on the GSI of both male and female fish. In male, both roots and seeds at higher doses showed statistically similar effects, i.e., 92% decrease in GSI as compared to the control group. However, in females, the roots of *S. sesban* showed the most significant effect on the GSI, in contrast to plant seeds. The GSI of the R3 group was 94.6% decreased as compared to control, while the S3 group showed 89.8% reduction in GSI. Serum testosterone level also showed a dose-dependent decrease in response to both roots and seeds of *the S. sesban* plant. However, at higher dosage levels, in contrast to roots, seeds of plants most significantly reduced the testosterone level. Based on results, *the S. sesban* plant could be recommended for improving the growth, health status, and controlling the reproduction of *O. mossambicus.*

CBGP-124

IMMUNOMODULATORY EFFECTS OF THYMOQUINONE ON HUMAN T LYMPHOCYTES

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Thymoquinone (TQ), an active component of Nigella sativa oil possesses anti-cancerous, anti-inflammatory, and anti-apoptotic properties and have potential to cure a variety of diseases comprising auto-immune disorders. In the present study, TQ was investigated for its immunomodulatory effect in vitro. Human T lymphocytes were stimulated with phytohemagglutinin. Different doses of TQ (1.5 µM, 3 µM, 6 µM, and 12 µM) were used for 4, 8, 24, and 48 hours. Enzyme-linked immunosorbent assay was used to measure the levels of inflammatory cytokines (IL-6 and IL-8) at 8 and 24 hours while the levels of anti-inflammatory cytokines (IL-10) at 4 and 48 hours. For all times. TQ showed a dose-independent decrease of pro-inflammatory cytokines. The lower dose of TQ exhibited a more effective decrease in levels of pro-inflammatory cytokines, while in the case of IL-8, middle doses were more effective when stimulated with PHA. Levels of IL-10 were increased non-significantly by TQ at 4 hours and 48 hours. These findings suggest that TQ exhibits immunomodulatory potential along with its other therapeutic properties that can be used to modulate the immune response.

CBGP-125

A STUDY ON DEMOGRAPHIC AND PULMONARY FUNCTION PARAMETERS OF COPD IN LOCAL PAKISTANI POPULATION

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Chronic obstructive pulmonary disease (COPD) is a disorder of the airways characterized by inflammation and airflow limitation. It is a major cause of morbidity and mortality globally and its prevalence is increasing. Shortness of breath, cough and/or mucus production are common signs and symptoms of COPD. COPD is produced due to interaction between gene and environment. It is a complex disease caused by environmental factors such as tobacco smoking and air pollution from burning biomass in poor areas. Certain risk factors have been selected and studied previously in

different countries around the globe to determine their relation with COPD susceptibility. The target of the present study was to examine the role of risk factors such as age and smoking in the etiology of COPD and to determine the difference between pulmonary function parameters between COPD patients and healthy individuals in the population of Punjab, Pakistan. Healthy individuals were considered as controls (n = 150) and were chosen from the general population of Multan, Pakistan whereas cases (n = 150) were selected from the diagnosed COPD patients of Al-Khaliq Hospital, Multan. Only those patients were included in this study that showed airflow obstruction in their spirometry tests. The criterion for airflow obstruction was taken as a ratio of FEV1/FVC of < 70% after administration of 200 µg of inhaled salbutamol using a spacer device. The COPD was staged based on FEV1 as a percentage of predicted. Statistical analysis was carried out by using the SPSS software (version 20.0). The clinical information of the study subjects including age, smoking history, pack-year detail of the smokers and ex-smokers, BMI and pulmonary function parameters were calculated as mean ± standard deviation. Statistically significant differences were observed in the clinical features between COPD patients and controls. Increase in age combined with smoking and pack-years of smoking were the most important risk factors for COPD where the cases had been exposed to more pack-years of smoking as compared to the controls. Furthermore, significant differences were observed in the values of different pulmonary function parameters between COPD patients and healthy individuals.

CBGP-126

ASSOCIATION OF THYROID FUNCTION AND COMPLETE BLOOD COUNT PARAMETERS WITH HYPOTHYROIDISM AND HYPERTHYROIDISM

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This study was designed to determine the role of thyroid function and complete blood count (CBC) parameters in patients with thyroid disorders, including hyperthyroidism and hypothyroidism. This study was conducted jointly at Department of Zoology of The Women University Multan and Multan Institute of Nuclear Medicine and Radiology (MINAR), Nishtar Hospital Multan. A total of 268 study participants included 150 patients and 118 controls (both males and females). Patients were further divided into two groups with 98 patients in hyperthyroid group and 52 patients in hypothyroid group. The study participants were tested for thyroid hormone levels (triiodothyronine (T3), thyroxine (T4) and thyroid stimulating hormone (TSH) by radioimmunoassay (RIA) and radioimmunometric assay (RIMA). CBC parameters were analysed by automated blood analyzer. In the control group (n=118) with mean age 33±12.31 years (ranged between 1-62 years), T3 showed positive correlation with T4 ($p< 0.0001$, $r=0.446$), PLT ($p< 0.009$, $r=0.241$) and PCT ($p= 0.042$, $r=0.188$), but negative correlation with MCHC ($p< 0.003$, $r=-0.270$). T4 has positive correlation with T3 ($p< 0.0001$ $r=0.446$), PLT ($p< 0.005$, $r=0.258$), LY ($p< 0.011$, $r=0.233$), MO ($p< 0.030$, $r=0.199$) and GR ($p< 0.005$, $r=0.256$), but negative correlation with MPV ($p= 0.022$, $r=-0.211$). Whereas TSH had no correlation with T3, T4 and CBC parameters. In mean age was 38±14.17 years (ranged between 4-64 years), T3 had positive correlation with T4 ($p<0.0001$, $r= 0.840$) and negative correlation with WBC ($p<0.031$, $r= -0.218$). T4 had positive correlation with T3 ($p<0.0001$, $r= 0.840$) while negative correlation with HGB ($p<0.035$, $r= -0.213$) and MCH ($p<0.034$, $r= -0.215$). TSH also had no significant correlation with T3, T4 and CBC parameters. In hypothyroid group (n=52), with mean age 34±12.68 years (ranged between 6-65 years), T3 has positive correlation with T4 ($p< 0.0001$, $r= 0.570$) and negative correlation with TSH ($p< 0.0001$, $r= -0.477$). T4 has positive correlation with T3 ($p< 0.0001$, $r=0.570$) and negative correlation with TSH ($p< 0.0001$, $r=-0.561$). TSH showed negative correlation with T3 ($P< 0.0001$, $r=-0.477$), T4 ($P< 0.0001$, $r=-0.561$), RBC ($p< 0.002$, $r=-0.412$), HGB ($p< 0.008$, $r=-0.364$) and positive correlation with MCV ($p< 0.042$, $r=0.283$). This study demonstrated the association of some CBC parameters with T3, T4 and TSH in hyperthyroid and hypothyroid conditions. Therefore, monitoring of these parameters can be important for the treatment of these disturbances.

CBGP-127 Cancer Biology

A DESCRIPTIVE EPIDEMIOLOGICAL STUDY OF HEAD AND NECK CANCER IN NISHTAR HOSPITAL MULTAN

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The purpose of this study was to find out the prevalence and clinicopathological features of Head and Neck Cancer (HNC) patients visiting Nishtar Hospital Multan, Pakistan. Though extensive research has been done all over the world regarding different features of HNC but to best of our knowledge in Southern Punjab little or no data is available. Biopsy proven Head and Neck Cancer patients were recruited from Nishtar Hospital Multan. Data was collected and analyzed for clinicopathological features. The frequency of HNC was more in male patients 79(65.3%) as compared to female patients 42(34.7%). Mean age of patients was 54.77±15.96 and 44.69±14.75 for males and females respectively. Majority of patients came from Dera Ghazi Khan Division 52(43.80%). The habit of smoking was identified in 62(51.2%) patients and 59(48.8%) patients were nonsmokers. Among demographic factors, there were statistically significant differences in age, smoking and education factor ($p>0.05$) in male and female groups. Regarding clinical features of HNC, the percentage of stage III cancer (54.5%) and moderately differentiated tumour 100 (82.6%) was the highest. Among TNM classification, T3-4 and N0 were more frequent with frequency of 86 (71.0%) and 61(50.4%) respectively. Among male and female patients' groups, a significant difference was found according to the all HNSCC subsites ($p>0.05$). The Larynx 50 (41.3%) was the most common affected site. Squamous cell carcinoma (96.6%) ratio was more in this study. The frequency of Head and Neck cancer is more in male patients. Age, smoking and education are found to be important factors for HNC regarding gender. Use of naswar, gutka, betel leaves and nuts (Paan, chalia) and alcohol has no major role in causing HNC.

7. TOXICOLOGY

CBGP-128

EFFECTS OF TITANIUM DIOXIDE NANOPARTICLES EXPOSURE ON VITAL ORGAN OF *Ctenopharyngodon Idella*

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The aim of current study was to analyze the histopathological changes in the organs of *Ctenopharyngodon Idella.* Titanium dioxide nanoparticles (TiO2 NPs) were widely produced and released into the environment, posing a serious threat to fish and human health. Titanium dioxide nanoparticles (TiO2-NPs) have the greatest industrial application compared to other nanoparticles. Four million TiO2 nanoparticles are consumed annually as pigments in a wide range of products, including food colorings, cosmetic industry paper products, ink, and plastic products. A 60-day feeding experiment was conducted to evaluate the effect of TiO2-NPs on grass carp (*Ctenopharyngodon Idella*) histology. Titanium dioxide nanoparticles at different concentration (0.5 mg/L, 1 mg/L, 1.5 mg/L, 2 mg/L) were incorporated with fish diet during an 8-week period. Histopathology of vital organ gill, heart, liver, and intestine were examined. After treatment of titanium dioxide nanoparticle histopathological analysis organ showed in gill hyperplasia, necrosis, curvature and mucos secretion. In heart dispersion and swelling was reported. In liver cloudy swelling and hydropic degeneration was reported. In intestine there were sign of necrosis, degeneration and dysplasia in intestine.

CBGP-129

ASSESSMENT OF Al AND As CONCENTRATIONS IN BODY ORGANS OF *CHANNA MARULIUS* AND *WALLAGO ATTU*

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For sustainable conservation of carnivorous fish species that are on the verge of extinction in natural waters of Pakistan, it is necessary to determine their tolerance limits toward common aquatic xenobiotics. Therefore, present research was planned to determine acute toxicity (96 h LC_{50} and lethal concentrations) of aluminum (Al) and arsenic (As) to the two commercially important fish species viz. *Channa marulius* and *Wallago attu* and their accumulation in body organs (gills, heart, 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 two fish species for their tolerance limits to the metals. *C. marulius* was significantly more tolerant to both Al and As toxicities, followed by *W. attu*. Both 96 h LC_{50} and lethal concentration values of metals computed showed that As was significantly more toxic to both the carnivorous fish species than Al. During acute concentrations exposure, significantly higher accumulation of metals was recorded in liver of both the fish species, followed by gills, heart and skin. However, statistically significant but least amassing of both the metals was found in muscles of *C. marulius* and *W. attu*.

CBGP-130

ACUTE TOXIC EFFECTS OF CADMIUM ON CATALASE ENZYME, GILL HISTOLOGY AND GENOTOXICITY OF FISH, *OREOCHROMIS NILOTICUS*

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Fish is complete source of important vitamins, fatty acids and other minerals. It is also an essential unit of aquatic ecosystem and food chain. Rise of industrialization is main cause of pollution in aquatic media. Release of untreated waste through factories is rising threat to health of all living beings, especially fishes. Its Negative impact on environment is unmeasurable. Industries dispose of waste in water bodies without treating it. Waste contains harmful heavy metal effluents. These metals through biomagnification and biocnecentration get into food chain. Both fish and fish consumer get affected by metal. Cadmium (Cd) is one of the most important non-essential elements. It has mutagenic, carcinogenic and teterogenic properties. This study was planned to calculate the effect of Cd on acute toxicity, catalase (CAT) enzyme activity, gills histology and mutagenic changes in *O.niloticus*. In present study, LC_{50} for Cd was calculated as 56.021mg/L, was measured with probit analysis. Lethal value for Cd was 80.7336mg/L which resulted mortality of whole population. No mortality was occurred in control group. The activity of CAT enzyme was decreased in Cd treated group of fish and it followed the order: intestine<gills<muscles<brain as compared to control group of *O. niloticus*. Significant decrease in enzyme activity ($P<0.05$) was recorded in results. Gills histology revealed changes includes fusion of secondary lamella, curling filmants of secondary, aneurysm, hyperplasia in secondary lamella and epithelial lifting. Destruction in both primary and secondary lamella was also found in results. In present study Cd treated group of *O. niloticus* erythrocytes showed increase in nuclear mutagenicity. Increase number of micronuclei, notched and De-shape is found in results. Significant ($p<0.05$) number of micronuclei, notched shape and de-shpaed nuclei were formed in *O. niloticus* after treating with Cd.

CBGP-131

HISTOPATHOLOGICAL CHANGES OF ALBINO MICE (MUS MUSCULUS) LUNGS IN RESPONSE TO CYPERMETHRIN EXPOSURE

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Cypermethrin is one of the widely used pyrethroid insecticides, due to its high insecticidal activity and low toxicity to mammals. However, the indiscriminate and unregulated use of this pesticide in agriculture in Pakistan has dramatic effects on many non-target species of animals, including humans as well. Forty healthy male mice were randomly divided into four groups, Control, A, B and C using dose equivalents of 0.1-0.25 LD50. Each group included 10 animals orally administered 900, 1800 and 3600 µg of cypermethrin for 10 days. Animals of group C were dies on fourth day. Before the start and completion all animals were weighed. All animals were dissected after 10^{th} days. Lungs were removed and weighed. These organs were preserved in 10% formalin for histology. Results revealed significant changes in body weight (g) of group A (25.9±1.11) and also group B showed significant variations (20.9±1.06) as

compared to control (24.5±1.35). Lungs weight (g) were higher in group A (0.59±0.08) and lower in group B (0.36±0.03) as compared to control (0.42±0.03). Pulmo-somatic Index (%) was also noted maximum in group A (2.30±0.30) and minimum in group B (1.82±0.26) as compared to control (1.62±0.21). Lungs damage were confirmed by histopathological changes, which revealed congestion, marked pulmonary edema, and asphyxia in cypermethrin-exposed mice. Overall results revealed cypermethrin was toxic to mammals.

CBGP-132

AMELIORATIVE EFFECTS OF LUTEOLIN AGAINST BISPHENOL A INDUCED LUNG TOXICITY IN ALBINO RATS

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Bisphenol A (BPA) is an estrogenic environmental toxicant, which is evinced to cause several toxicities in different parts of the body including lungs. BPA is present in canned food, plastic materials, bottles and water storage containers. Luteolin is a plant-derived flavone that is extracted from *Reseda luteola* and performs antioxidant, anti-inflammatory, anti-cancerous and anti-hypertension actions. This research was designed to evaluate the protective effects of luteolin against BPA-induced lung damage in Albino male rats. In the University of Agriculture Faisalabad, the experiment was carried out in the Biocontrol Laboratory for 30 days. 24 rats were kept in cages and classified into 4 different groups. Each group contained six rats (n=6). Group I was called the control group. Group II received Bisphenol A (50mg/day). Animals of group III were administered with luteolin (50mg/day). Groups IV were given both Bisphenol A and luteolin (50mg/day). BPA promoted damages in rats and the results showed that antioxidant enzymes (SOD, GPx, CAT, GST, GSR and GSH) activity decreased when rats were administered with BPA. Alleviation in enzymes was occurred when treated with luteolin. Inflammation was also caused by BPA and the level of inflammation markers (IL-1β, NF-κB, IL-6, COX-2 and TNF-α) were decreased by lowering the inflammation in lung tissues by anti-inflammatory action. The administration of BPA caused considerable ($\rho<0.05$) decrease in weight of lungs of rats. In addition to the oxidative stress markers were also observed which included the level of ROS (reactive oxygen species) and MDA (malondialdehyde) that was reduced significantly, according to the findings. BPA exposure raised the inflammatory cytokines level in tissues of rats as compared to the control. Data obtained were statistically analyzed. Therefore, luteolin act as a therapeutic compound against the damages in lung tissues induced by BPA.

CBGP-133

ASSESSMENT OF THERAPEUTIC EFFECTS OF JACEOSIDIN AGAINST BISPHENOL A INDUCED RENAL DAMAGE IN RATS

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Bisphenol A (BPA) is a widely distributed environmental contaminant that is linked to nephrotoxicity. BPA is metabolized in the liver by sulfation and glucuronidation pathways and its half-life is 5.3 hours after consumption. Many flavonoids are found in Artemisia species extracts, some of which are jaceosidin, eupalitin, and eupafolin. Among them, jaceosidin was reported to have highest antioxidant properties. Current study is planned to evaluate the defensive role of jaceosidin in opposite to the bisphenol A induced kidney damage in rats. 24 male albino rats were taken and divided into four groups. Each group contain 6 animals. 1st group was assigned as the control group. 2nd group was administered

with bisphenol A (50 mg/kg/day). Third group was co-administered with BPA (50mg/kg/day) and jaceosidin (7mg/kg/day). The fourth group was administered with jaceosidin (7mg/kg/day). Antioxidant enzyme and inflammatory markers such as CAT, SOD, GPx, GSR, GST, MDA, and ROS were checked to access the activity of BPA and Jaceosidin. In BPA treated group the antioxidant enzyme activity decreased as compared to the control group, while in the jaceosidin treated group, the activities of anti-oxidant enzymes were enhanced. The level of inflammatory markers was up-regulated in BPA treated group, on the other hand, level of these inflammatory markers was down-regulated in the jaceosidin treated group. Urea and creatinine levels were increased in the BPA treated group in contrast the level of creatinine and urea decreased in the blood of jaceosidin treated group. After utilizing BPA, the creatinine clearance from the urine was decreased while treatment with jaceosidin enhanced the clearance of creatinine from the urine. Mean ±SEM and one-way analysis of variance (ANOVA) followed by Tukey's test was used to statistically analyze the significant level ($P<0.05$) of data obtained from this trial.

CBGP-134

PROTECTIVE EFFECTS OF TANGERETIN ON CISPLATIN INDUCED LUNG TOXICITIES IN MALE ALBINO RATS

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Cisplatin (CP) is an anti-cancer chemotherapeutic drug used to treat numerous malignant cancers. CP's medical efficacy is limited by severe side effects, such as lung damage. Tangeretin is a naturally occurring citrus flavonoid present in the peel of various citrus plant species, which displays anti-oxidant and provocative properties. This study was aimed to see the protective effects of tangeretin on cisplatin-induced lung toxicities in male albino rats. Tangeretin is a flavonoid found in a wide variety of plants. It has many therapeutic, antioxidant, and anti-inflammatory effects. The experiment was performed for one month in the laboratory of University of Agriculture in Faisalabad. Twenty-four rats (male) were used and kept in cages and classified in 4 groups for this purpose. The findings indicated that when rats were exposed to Cisplatin (10mg/kg), the activity of antioxidant enzymes, i.e. catalase (CAT), glutathione peroxidase (GPx), superoxide dismutase (SOD), glutathione S-transferase (GST), glutathione (GSH) and glutathione reductase (GSR) decreased. After treatment with Tangeretin (40mg/kg), an elevation in the antioxidant enzymes activity was observed. In addition, Cisplatin caused inflammation of the lungs in rats. In contrast, Tangeretin reduced the inflammation by lowering the inflammatory cytokines level (NFκB, TNF-α, IL-6, IL-1β, and COX-2) and acted as an anti-inflammatory drug. The results showed that Tangeretin decreased the oxidative pressure brought about by Cisplatin. It reduces the levels of reactive oxygen species (ROS) in lungs tissues of the rat in contrast to the control group. Cisplatin dosage raised blood marker levels, while Tangeretin dose caused in a significant reduction. The outcomes were assessed by applying one-way ANOVA and Tukey's test for the assessment of the relative multitude of gatherings genuinely. This study indicated the protective effects of tangeretin on cisplatin-induced lung toxicities in male albino rats.

CBGP-135

NEPHROPROTECTIVE EFFECTS OF RHAMNETIN ON METHOTREXATE-INDUCED RENAL TOXICITY IN MALE ALBINO RATS

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ABSTRACT

Methotrexate (MTX) is a folic acid antagonist and it is the most often used chemotherapeutic drug in cancer therapy. But it exhibits several adverse effects on different organs including kidneys, liver, lungs and brain. Rhamnetin

(Rhm) is an O-methylated flavonol, which can be extracted from cloves and it exhibits anti-inflammatory and antioxidant effects. The current study was designed to assess the potential impacts of Rhm on renal damage instigated by MTX in rats. 24 male albino rats were classified into four groups. Each group contained 6 animals. 1st group was treated as a control, while 2nd was administrated with MTX (20 mg/kg). 3rd group was co-treated with MTX + Rhm (20 mg/kg + 30 mg/kg), whereas, 4th group received Rhm (30 mg/kg). Our findings showed that MTX exposure reduced the activities of antioxidant enzymes such as glutathione (GSH), catalase (CAT), glutathione reductase (GSR), glutathione peroxidase (GPx), superoxide dismutase (SOD) and glutathione S-transferase (GST). Furthermore, MTX intoxicated group show inflammatory responses by increasing the level of inflammatory markers (interleukin-1β (IL-1β), interleukin-6 (1L-6), nuclear factor kappa-B (NF-κB), tumor necrosis factor-α (TNF-α), cyclooxygenase-2 (COX-2). MTX treatment augmented the level of oxidative stress markers such as (reactive oxygen species **(**ROS), thiobarbituric acid reactive species (TBARS). MTX treatment also increased the urea and creatinine content, while lowering the creatinine clearance. However, Rhm administration normalized the level of inflammatory markers, oxidative stress markers as well as the activities of antioxidant enzymes, which indicated its anti-inflammatory and antioxidant potential. The impact of Rhm on renal tissues was also assessed by evaluating kidney function markers such as creatinine, urea and creatinine clearance. Rhm supplementation normalized all the changes in the renal function markers. Histopathological studies also showed the alleviative effects of Rhm on MTX-induced kidney damage in rats. Our finding indicated that Rhm might be act as a natural therapeutic agent against the adverse impacts of renal damage induced by MTX.

CBGP-136

HEPATOPROTECTIVE EFFECTS OF RHAMNAZIN AGAINST BISPHENOL A INDUCED LIVER DAMAGE IN RATS

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Bisphenol A (BPA) is an emerging toxicant in the environment. Humans are continuously affected by bisphenol A due to its extensive utilization in the formulation of additive oils for lubrication, cleansing agents, dyes, surfactants, cosmetic items, resins and plastic items. BPA induces oxidative stress that leads to organ toxicities i.e., hepatic toxicity. Rhamnazin is an antioxidant drug that is used to mitigate the effect of bisphenol A in liver damage. Rhamnazin is a naturally occurring flavanoid which is extracted from variety of plants and it has anti-oxidant, anti-tumor and anti-inflammatory property. So, the current research was planned to study the remedial role of rhamnazin against bisphenol A prompted hepatic damage in rats.24 male albino rats were divided into 4 groups, Control, BPA (50 mg/kg), BPA + Rhamnazin (50 mg/kg + 10 mg/kg) and Rhamnazin (10 mg/kg). Our results revealed that the BPA intoxication significantly ($p< 0.05$) increased hepatic serum markers level i.e., alkaline phosphatase (ALP), alanine aspartate (AST) and alkaline transaminase (ALT) while, significant ($p< 0.05$) reduced the activities of Superoxide dismutase (SOD), Glutathione reductase (GSR), Catalase (CAT), Glutathione peroxidase (GPx), Glutathione (GSH) and Glutathione S-reductase (GST) in liver of rats. Additionally, BPA also significantly ($p< 0.05$)prompted the elevation of thiobarbituric acid reactive substances (TBARS), reactive oxygen species (ROS) along with inflammatory serum markers for instance, tumor necrosis factor alpha (TNF-α), nuclear factor kappa B (NF-kB), interleukin-6 (IL-6), interleukin- 1β (IL-1β) and Cyclooxygenase-2 (COX-2). BPA exposure resulted in significantly ($p< 0.05$) increased disfunctioning and histopathological injuries in the liver. Co-administration of Rhamnazin restored all the toxicological effects induced by BPA. This study showed that the rhamnazin might have the aptitude to ameliorate hepatotoxicity induced by the BPA in rats.

CBGP-137

HEAY METAL LOAD AND HISTOPATHOLOGICAL ALTERATIONS IN SELECTED ORGANS OF FISH COLLECTED FROM RAVI RIVER

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Fast industrialization as well as agricultural advancement lead towards continuous increase in water pollution due heavy metals. Due to their persistent nature and low degradability heavy metals pose a serious threat to the aquatic fauna and flora. So, there is a dire need of continuous biomonitoring in order to assess the threat of metal pollution. The present experiment was designed to evaluate the tissue specific metals accumulation and histopathological alteration in gills, liver and muscles of fish (*Cirrhinus mrigala*) collected from river Ravi. The fish species selected for this study are common inhabitant of river Ravi and act as bio indicators species. Fish was dissected and gills, muscles and liver were separated. The samples were fixed in 10% buffered formalin solution for 4 days. Fixed tissues were dehydrated and embedded in paraffin. Section cutting was done by using microtome. Slides were observed under light microscope. For metal accumulation, organ samples were processed through wet digestion method and analyzed using Atomic Absorption Spectrophotometer. Obtained data was analyzed statistically using SPSS computer program. Fish liver showed higher concentration of cadmium, manganese, copper, lead and mercury as compared to gills and muscles. Overall means showed significantly higher concentration of all metals in gills (494.25±645.57 µg/g) of *Cirrhinus mrigala* followed by that of liver (277.2±110.86 µg/g) and muscles (182.75±184.09 µg/g). Histopathological alterations are most prominent in liver, muscles and kidney of fish collected from river Ravi as compared to that of control fish.

CBGP-138

EFFECTS OF CR+Cd ON GROWTH PARAMETERS, LIVER HISTOLOGY AND SOMATIC INDEX OF *LABEO ROHITA*

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This study was designed to examine the impacts of a waterborne Cr+Cd mixture on *Labeo rohita*'s growth performance, liver histomorphometry and hepatosomatic index. Acute toxicity bioassay was used in the first part of the experiment to determine the 96-hour LC_{50} and lethal concentration value, which were calculated as 18.65 mgL^{-1} and 31.22 mgL^{-1}, respectively. In the second phase, fish were exposed to a Cr+Cd mixture with a $1/3^{rd}$ of the LC_{50} value for 8 weeks in order to evaluate the chronic impacts on the fish's growth performance, liver histomorphometry and hepatosomatic index. During the 8-week study period, the fish that were treated with the Cr+Cd mixture displayed a considerably lower level of growth metrics, including daily weight gain, daily length gain, specific growth rate, condition factor, and feed conversion ratio, as compared to the control group. After an 8-week experiment period, the fish treated with the Cr+Cd mixture had significantly wider sinusoids and smaller hepatocytes than the control group in terms of histomorphological characteristics of liver. Fish that had been exposed to the Cr+Cd mixture also showed signs of hemorrhage, irregularly formed hepatocytes (loss of their polygonal shape), enucleated, eccentrically located nuclei, vacuolation, and liver necrosis. Throughout trial

period, the hepatosomatic index in the fish treated with the Cr+Cd mixture decreased whereas it increased in the control group. Thus, it is suggested that treatment of all kinds of wastewater must be conducted before discharge into aquatic system and enforcement of relevant law and regulations also be taken into considerations.

CBGP-139

EFFECT OF SUB-LETHAL DOSES OF ARSENIC TRIOXIDE ON HAEMATOLOGICAL AND GROWTH PERFORMANCE IN QUAILS (*COUTRNIX JAPONICA*)

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Arsenic occurs naturally in water and soil and can be source of intoxication. The concentration of metals and effects of this metal on hematological parameters were examined in avian species. However, limited studies have been done to evaluate differences in the hematology of this heavy metal. This study was designed to determine the effects of heavy metal on body weight, behavioral responses and hematology changes in blood Japanese Quails (Coturnix japonica) after oral exposure of different doses of arsenic as 20 ppm, 15ppm, 10ppm and 5ppm for 45 days. A total of 50 birds of Japanese Quails were divided into 5 groups, the first group (A) as control group, other groups B, C and D were treated with doses. Behavioral alterations in all the groups were observed daily. Different parameters of behavioral alterations included the alertness of the birds, response on stimulus, foaminess in faces and crowing were observed. Grossly, the hematological changes in blood cells count were recorded. It is concluded that arsenic is a toxic heavy metal which can bring serious changes in the behavior and blood cells of non-targeted specie.

CBGP-140

BIOCHEMICAL ABNORMALITIES INDUCED BY CARAWAY OIL AGAINST THE DIFFERENT POPULATIONS OF *TROGODERMA GRANARIUM*

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The development of resistance in *Trogoderma granarium* (khapra beetle) to pesticides has become a universal phenomenon in all stored product pests. It is very important to know the mechanism of resistance in insects to launch a successful pest control strategy. The aim of the present investigation was to evaluate the toxicity of caraway oil against the 4th instar larvae of *T. granarium* populations i.e., D.G khan, Mughal pura and Lab control which were maintained at 35±2°C and 60±5 relative humidity. The LC_{20} and LC_{50} values of the 4th instar larvae of these three populations were calculated through Minitab-16 software. It was found that the 4th instar larvae of Lab control were the most resistant population. After that, these three populations of *T. granarium* proceeded to carry out a biochemical analysis. The toxicity of caraway oil was determined by the energy reserves and carbohydrate metabolizing enzymes i.e., glucose, trehalose, trehalase, amylase and invertase. After an exposure period of 24 hours, there was a decreased level observed in all parameters except trehalase in the D.G khan and Mughal pura populations. However, in Lab control, there was a decreased level of trehalase and an increased trend observed in others respectively. Results obtained from this study showed that caraway oil had adverse effects on the energy reserves and carbohydrate metabolizing enzymes of *T. granarium*.

CBGP-141

THE CONTRIBUTION OF GUT MICROBIOTA OF INSECTICIDE-RESISTANT INSECT *TROGODERMA GRANARIUM* AGAINST DELTAMETHRIN AND EMAMECTIN

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The khapra beetle (*Trogoderma granarium*) is such an invasive pest that is commonly kept in quarantine in many nations and has even been named among the 100 worst species in the world The present study aimed to isolate and evaluate the gut microbiome of *T. granarium*. The population of the khapra beetle was collected from godowns of D.G Khan, Lahore, and Layyah (Pakistan). Further, the microbiome from the gut of the 4th instar larvae which is most resistant than all life stages of the khapra beetle was isolated by the streak plate method and identified on biochemical characterization, gram staining and colony morphology. It was observed that the bacterial strains that had been isolated and purified were gram-negative and rod-shaped. These strains exhibited good growth over a broader range of pH (5-9) and temperature (30-37°C). The experimental work was performed to determine the toxicity of exposed pesticides on the gut microbiome of *T. granarium*. The strains were exposed to different concentrations of deltamethrin and emamectin insecticides on *Trogoderma* populations i.e., 100,150, 200, 250, and 300 ppm. For further confirmation, the growth curve was observed with different phases of growth on applied dose concentrations. The data obtained from the growth curve showed that the gut microbiome of the khapra beetle was resistant to the exposed insecticides.

CBGP-142

BACTERICIDAL ACTIVITY OF COPPER NANOPARTICLES AND THEIR CONJUGATES USING DIFFERENT ANTIBIOTICS

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Copper nanoparticles, owing to their inexpensive formation, numerous characteristics, and many promising implementations in medicine, optics, electronics, and in the formation of lubrications, conductive films, nanofluids, and antibacterial agents have enticed tremendous attention over the last few years. In the current study, copper nanomaterials were prepared through a chemical reduction method in which copper sulfate salt was reduced with ascorbic acid and sodium borohydride in the presence of capping agent PVP under constant stirring at 80℃. In our preparation route, vitamin C (ascorbic acid) was used to protect nanoparticles from the oxidization during formation and storage. Three antibiotics, namely doxycycline, lincomycin and erythromycin were used to conjugate the freshly prepared copper nanoparticles. Scanning electron microscopy (SEM) and UV-vis spectrometry were performed to analyze size, shape, morphology and optical properties of particles respectively future the particles characterization was done by Fourier transform infrared spectroscopy (FTIR) to revealed the coordination conjugated copper nanoparticles with respective antibiotics. The average crystal sizes particles were less than 10nm at room temperature. This research reports the antibacterial characteristics of CuNPs. After the formation and characterization of copper nanomaterials antimicrobial activity of these particles and their conjugates was checked against three strains of bacteria *B. subtilis, E. coli and P. aeruginosa* by disc diffusion method and well diffusion method. Clear zones of inhibition are observed on the plates. In well diffusion method conjugated copper nanoparticles with Lincomycin show greater antibacterial effect than other two

antibiotics like Doxycycline and Erythromycin. Among three strains of bacteria conjugated copper nanoparticles shows greater bactericidal activity against *E. coli and P. aeruginosa* (Gram negative) as compared to *B. subtilis* (Gram positive). In disc diffusion method when concentration is changed again Lincomycin conjugated copper nanoparticles shows greater anti-bacterial activity against three strains of bacteria as compared to other two conjugates and individual antibiotics and copper nanoparticles.

CBGP-143

EVALUATION OF OXIDATIVE EFFECTS OF CLARITHROMYCIN ON LIVER, KIDNEY AND GILLS OF *OREOCHROMIS NILOTICUS*

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Clarithromycin is a macrolide antibiotic used to treat bacterial infections of skin and respiratory system mainly but it can cause nausea, abdominal pain, diarrhea, dyspepsia, headache, dizziness, angiodema and rash. Antibiotic drugs produce highly reactive oxygen species which is also harmful to aquatic organisms induce oxidative stress and cause cellular disturbance which ultimately change the structure of membrane. A variation among oxidants as well as antioxidants in support of the oxidants is termed as oxidative stress. Antioxidation mechanism of the cells comprises of enzymes glutathione, peroxidase, superoxide dismutase, and catalases as well as antioxidant enzymes act as defense system against the oxidative stress. In present study the oxidative effects of clarithromycin on liver, kidney and gills of *Oreochromis niloticus* were investigated. *Oreochromis niloticus* is among the most economically important species of fish in Pakistan. Individuals of one year old *Oreochromis niloticus* were exposed to various physiological doses of clarithromycin. After exposure of clarithromycin, liver, kidney and gills of one year old fingerlings were taken out for the antioxidant enzyme assay. Antioxidant enzyme in selected organs of clarithromycin exposed fish was compared with control fish. Ultimately, clarithromycin exposure caused severe anemia, cardiovascular diseases, damaged the liver, kidney, and gills of *Oreochromis niloticus.* Enzyme assay indicates the elevated level of antioxidant enzymes such as peroxidase, superoxide dismutase and catalase due to oxidative stress. One way ANOVA with the tukey's test was done for statistical analysis.

CBGP-144

PB+CD INDUCED PEROXIDASE ACTIVITY AS MARKER OF OXIDATIVE STRESS IN LIVER, KIDNEY, GILLS AND HEART OF *OREOCHROMIS NILOTICUS*

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The present experimental work was designed to study the activity of peroxidase enzyme under Pb+Cd metal mixture stress in the liver, kidney, gills and heart tissues of *Oreochromis niloticus*. For this, fish collection was

done from fish seed hatchery and acclimatized to laboratory conditions for one week. Two separate glass aquaria were selected; one for control group and other for experimental group, fish fingerlings were shifted to these glass aquaria after acclimatization. Fish in the experimental group were exposed to chronic Pb+Cd binary metal mixture stress for two weeks. Throughout the experimental trial, various physico-chemical parameters were determined on daily basis. At the end of experimental trial fish were dissected, liver, kidney, gills and heart were extracted out, weighted and rinsed with phosphate buffer having pH 6.5. After that, the extracted organs were homogenized, filtered and centrifuged. Activity of the peroxidase obtained from the organs extract was determined with the help of spectrophotometer at 470 nm by measuring its ability to decompose H_2O_2. Mean±SD was calculated and found that all the means are significantly different. To compare variables among the control and metal mixture stressed fish ANOVA was applied. The peroxidase activity in liver, kidney, gills and heart tissues of stressed fish was found to be 277±4.73 UmL^{-1}, 196±3 UmL^{-1}, 150±5.13 UmL^{-1} and 128±5.03 UmL^{-1} as compared to 155±2.08 UmL^{-1}, 122±4.04 UmL^{-1}, 106±2.52 UmL^{-1} and 77±5.03 UmL^{-1} in the control group respectively. Over all, the peroxidase activity for experimental group was found to be higher when compared with the control group. The present study would be helpful in understanding how binary metal mixture relates to the antioxidant immune physiology of fish.

CBGP-145

HEALTH RISK ASSESSMENT OF HAZARDOUS HEAVY METAL CONTAMINATED *ORYZA SATIVA* AND *TRITICUM AESTIVUM* GROWN IN FOUR DIFFERENT IRRIGATION SYSTEMS NEAR LAHORE, PAKISTAN

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Carcinogenic and non-carcinogenic nature of heavy metals has been observed and proved in many investigations. Heavy metals may take part in the human food chain from his dietary source. Among the main dietary stuffs, *Triticum aestivum* and *Oryza sativa* are included in most parts of the world. This study was aimed to find the health risks associated with the consumption of As, Cd, and Pb contaminated *T. aestivum* and *O. sativa*. The present investigation was also designed to find the significance of the irrigation system on heavy metal bioaccumulation in these food crops. Samples of soils along with their related crops (*T. aestivum* and *O. sativa*) have been collected from four different irrigation systems, i.e., groundwater, river Ravi water, household domestic wastewater and heavy industrial loaded drain water). Samples of soil and both crops were analyzed by ICP-OES. The results indicated that *O. sativa* had a great tendency to accumulate heavy metals. It has been observed that ground water irrigated food crops have the least health risks. While, industrial effluents loaded draining irrigated crops produce the highest risk to human health, followed by domestic sewage irrigated food crops and river irrigated food crops. The consumption of *T. aestivum* and *O. sativa* by adults produced high health indexes above than the threshold (1) as 1.91, 2.64, 4.98 and 8.78 and of *O. sativa* as 4.05, 6.81, 10.14 and 12.52 in ground water (GW), river water (RW), domestic wastewater (DomWW) and drain wastewater (DrWW) irrigation systems respectively. While, ingestion of the amount of these crops by child health risks increases significantly. Furthermore, these dietary stuffs also produce significant carcinogenic effects in human adults and children. Cancer risk factors of As and Cd also showed higher values than limitations.

CBGP-146

ANALYSIS OF POLYCHLORINATED BIPHENYLS (PCBS) SPECIES IN SAMPLES OF SOIL AND IRRIGATING WATER IN DISTRICT KHANEWAL AND MULTAN, PUNJAB, PAKISTAN

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Soil and irrigating water contaminated with polychlorinated biphenyls (PCBs) have adverse effects on terrestrial food chain that ultimately poses human health risk. In order to assess the possible dangers to human health in two districts of Khanewal and Multan Punjab, Pakistan, it was intended to look into the concentrations of widely used fourteen PCB species in samples of soil and irrigation water. After extraction via n-hexane using the Soxhlet apparatus and cleanup using the multilayered glass column chromatography with modified silica, soil samples were tested and quantified for PCB species through GC/MS. Liquid-liquid extraction using n-hexane was used to extract samples of irrigation water. Before conducting a GC-MS analysis for PCB species in samples of irrigation water, the extracts were concentrated and purified using columns. In the research region of both districts, the level of mean concentration±std in dry weight of soil ranged from 23.42±15.60 to 84 .74±15.68 (ng/g). The mean concentration of PCB-77, PCB-114, PCB-118, PCB-167and PCB-169 in soil varied significantly ($p<0.05$). In Khanewal, the mean concentrations of PCB species in samples of irrigating water varied from 2.01±0.67ng/L to 26.73±11.64ng/L, whereas in Multan, they ranged from 4.04±0.50ng/g to 36.35±0.30 ng/L. The mean concentration of PCB-118 and PCB-156 in irrigating water varied significantly ($p<0.05$). Recent research will be valuable for the sustainability of both terrestrial and aquatic ecosystem.

CBGP-147

CURATIVE EFFECT OF DIOSMETIN AGAINST NONYLPHENOL INDUCED LIVER DAMAGE IN RATS

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Nonylphenol (NP) is an emerging environmental toxicant. Humans are continuously affected by nonylphenol due to its extensive utilization in the formulation of additive oils for lubrication, plastic items, cleansing agents, dyes, surfactants, cosmetic items and resins. NP induces oxidative stress that leads to organ toxicities i.e., hepatic toxicity. However, Diosmetin (DIOS) a bioflavonoid, is abundantly present in the leaves of legume, spermin and citrus fruits. DIOS possesses antioxidant, antibacterial, anti-apoptotic, anti-mutagenic and anti-inflammatory activities. So, the current research was planned to study the protective role of diosmetin against nonylphenol prompted hepatic damage in rats. 32 male albino rats were grouped into 4 groups, Control, NP (50 mg/kg), NP + DIOS (50 mg/kg + 100 mg/kg) and DIOS (100 mg/kg). Our results revealed that NP intoxication increased hepatic serum markers level i.e., alkaline phosphatase (ALP), aspartate aminotransferase (AST) and alanine aminotransferase (ALT) while, substantially reduced the activities of Superoxide dismutase (SOD), Glutathione reductase (GSR), Catalase (CAT), Glutathione peroxidase (GPx), Glutathione (GSH) and Glutathione S-reductase (GST) in liver of rats. Additionally, NP also prompted the elevation of malondialdehyde (MDA), reactive oxygen species (ROS) along with inflammatory serum markers for instance, tumor necrosis factor alpha (TNF-α), nuclear factor kappa B (NF-kB), interleukin-6 (IL-6), interleukin- 1β (IL-1β) and cyclooxygenase-2 (COX-2). NP exposure resulted in increased dysfunctioning and histopathological injuries in the liver. Co-administration of DIOS restored all the toxicological effects induced by NP. This study showed that diosmetin might have the aptitude to ameliorate hepatotoxicity induced by the NP in rats.

CBGP-148

STUDY OF ECOTOXICOLOGICAL EFFECTS OF BIOPESTICIDES ON *LUMBRICUS TERRESTRIS* AND *PHERETIMA POSTHUMA*

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Earthworms play significant role in soil fertility and organic matter decomposition. They increase soil fertility by burrowing behavior. In present study the ecotoxicological effects of biopesticides on earthworms *Lumbricus terrestris* and *Pheretima posthuma* were estimated. Present experiment investigated the effects of biopesticides on earthworm's growth, survival, cocoon production and DNA damage. Earthworms were taken from fish form of Zoology, Wildlife and Fisheries department of University of Agriculture Faisalabad and treated with biopesticides in bio monitoring lab. Leaves extract of neem and datura were taken as bio pesticide. There were total seven groups, one with control and six with different concentrations of biopesticides. Group T0 was control, Group T1 and Group T2 were treated with low dose of neem and datura (150mg/kg), Group T3 and Group T4 were treated with high doses (250mg/kg) of neem and datura, Group T5 was treated with the mixture of low doses and Group T6 was treated with the mixture of high doses of both biopesticides. After the exposure of high concentration, weight of *Pheretima posthuma* and *Lumbricus terrestris* was significantly decreased. In treated groups weight and length decreased and no cocoon produce and mortality also occur. In comparison to control group where no decrease in weight and length was observed. Comparison of control group and treated groups wrere analyzed by Tukey HSD test. There is a significant difference was observed between all treatments. But T5 and T6 show more significant difference both in weight and length. Comet Assay technique was used for checking DNA damage, for both species with different concentrations of bio pesticides. There was slight damage observed in DNA when high doses applied.

8. VIROLOGY

CBGP-149

DISTRIBUTION OF MEASLES VIRUS GENOTYPES IN VACCINATED AND NON-VACCINATED CHILDREN IN PESHAWAR PAKISTAN

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Measles is a highly contagious disease and recent outbreaks are reported from Pakistan. The frequency of measles infection in children and distribution of MeV genotypes in vaccinated and non-vaccinated were investigated during the 2018 measles outbreak in Peshawar, Pakistan. Throat swab and urine samples, as well as clinical and demographic data, were collected from children (N=156) with measles like symptoms, admitted in pediatric wards of different hospitals. The most prevalent genotypes found were D3, G2 and B3.1. The distribution of MV genotypes was statistically significant in unvaccinated children ($p<0.005$). Mixed genotypes (D3 and D7) were identified in 2.45% children administered with single or double dose and 14.7% of the samples were not typed [in Clade-D (7.4%), Clade-B (4.1%), and Clade- G (3.3%)]. Most of the children of age 1-5 years were found positive for MeV and the notable complications were severe pneumonia (5.6%) and diarrhea (26.8%). It is concluded that MeV genotype D3 was prevalent in the study population, importantly in the vaccinated children. The un-typed samples seem the circulation of new variants and need to be explored.

CBGP-150

EPIDEMIOLOGY OF VIRAL HEPATITIS B AND C IN ORPHANS OF AZAD JAMMU AND KASHMIR

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Hepatitis B and C viruses are leading health problems in Pakistan affecting more than 20 million people across the country due to low screening rate among population particularly underprivileged vulnerable groups. Current study was aimed to find out the prevalence of hepatitis B virus (HBV) and Hepatitis C virus (HCV) along with the associated risk factors among the orphan children in three districts of Azad Jammu and Kashmir. About 673 children including 299 males and 374 females from district Hattian Bala, Poonch and district Kotli were selected and screened for HBV surface antigen and HCV antibodies by using Immunochromatographic kits followed by polymerase chain reaction of seropositive sample for confirmation of active infection. Risk factors were evaluated by using a pretested questionnaire. Cumulative seroprevalence of HBV and HCV was found to be 8% while active prevalence of infection was found to be 2.5%. Seroprevalence of HBV was found to be 0.4% (3/673) while only 1 of 673 children was found to have active HBV infection. Seroprevalence of HCV was found to be 7.5% (51/673) while prevalence of active HCV infection was found to be 2.3% (16/673). Females were found to be more affected as compared to males. Hepatitis C virus was found to be more prevalent in district Poonch followed by Hattian Bala and Kotli. HCV and HBV were more common in the age group (11- 17) years than the age group (4-10) years. Sharing of personal hygiene items tooth brush/combs/shaving kits

(70.45%) were most common risk factor found in the target population. This study indicates that prevalence of viral hepatitis particularly HCV is considerably high in the studied orphans and is suggestive of a dire need of large-scale screening and awareness interventions in AJK with a special emphasis on the targeting vulnerable groups of population to contain the infection before it gets uncontrollable.

CBGP-151

MUTATIONAL ANALYSIS OF HBV RT DOMAIN IN PATIENTS NON-RESPONDERS AGAINST ENTECAVIR AND TENOFOVIR

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Hepatitis B virus (HBV) is a pathogen infecting human liver cells. It is a member of Hepadnaviridae family of viruses. HBV has a spherical particle of 22nm. It has partially double stranded, covalently closed circular DNA (cccDNA) genome. HBV infects liver cells and cause hepatitis which may be acute or chronic. The chronic infection may lead to liver cirrhosis and hepatocellular carcinoma, resulting in death. Clinically HBV therapies include interferon and nucleot(s)ide analogues (NAs). Interferon therapy have some negative side effects. Whereas NAs have the problem of viral resistance. The resistance occurs because of some mutations. Mutations occur at very high rate in HBV genome because it does not have proof reading mechanism. Tenofovir and entecavir are major NAs currently used for chronic hepatitis B therapy. Resistance mutations against other NAs have been studied extensively. This study was designed with the objective to screen out the mutations in the RT domain in patients non responders against entecavir and tenofovir. Surveys were conducted to select the non-responder patients receiving the NAs like entecavir and tenofovir. HBV DNA was extracted from blood samples of the patients and a fragment of genome including RT domain was amplified by polymerase chain reaction (PCR). The amplified PCR products were run on agarose gel electrophoresis system to identify the targeted DNA fragment by comparing with the DNA ladder and the amplification was confirmed. The amplified product was purified and sequenced by commercial sequencing services. Manual analysis of resistant mutations was also be carried out. The mutations were also be confirmed by "geno to pheno HBV" the online data base for HBV genome analysis. From 15 non responder patients only six were successfully sequenced. The mutations found in study are R18S, V27I/V, N53K, Y54D, S57Y, S109Q, R110G, N118N/S, N131D/N, Y135S, N139D, Q149K/D, I169P, V173P/L, L180I, A181V, M204V, N238T, I266L and K270R were found from the patients. The mutations V27I/V, N53K, Y54D, S57Y, S109Q, R110G, N118N/S, N131D/N, N139D, Q149K/D and K270R were considered as putative mutations because they were less frequently reported in previous studies and were found in the RT domain of viruses separated from the non-responder patients of

CBGP-152

TOXICOLOGICAL IMPACTS OF XYLENE ON THE DEVELOPMENT OF CHICKEN EMBRYO

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Xylene (dimethyl benzene) is an aromatic hydrocarbon occurring naturally in petroleum and coal tar or produced in chemical industries from petroleum. Exposure to xylene can occur via inhalation, ingestion, eye or skin contact, and it is rapidly absorbed by lungs. Xylene may impair the memory or hearing ability, and may lead to incoordination, coryza, catamenia disruption, dermatitis, pharyngitis, fatigue and conjunctivitis. Similarly, studies suggested that individuals who were exposed to xylene, benzene and toluene simultaneously are more prone to DNA damage in the peripheral

blood cells. To evaluate the toxicological impact of xylene on chicken embryo the study was carried out in the Laboratory of Zoology, Department of Zoology, The Women University Multan, Pakistan, by the approval of the ethical committee of university. To that end, 70 fertile eggs of broiler breeders were acquired from commercial hatchery and divided into seven groups (n=10) and administered xylene via in-ovo technique individually before keeping eggs in incubator. In controlled group, five eggs were not administered any dose (A), while five eggs were administered to very little dose of 0.5 µl (A*) of xylene. While other six groups contain 0.6, 1.2, 2.4, 3.0, 3.6 and 4.8 µl per egg respectively (B, C, D, E, F, G). Results showed that xylene can have a dose-dependent detrimental effect on embryonic growth and development. As, in eye development, significantly lowest size was observed in F group (3.75 mm) of xylene compared with A group (9.34 mm). Similarly, limb growth rate also retarded in F group (40.5 mm) compared with 61.44 mm and 54.77 mm in B and A group respectively. Xylene group G (4.8 µl) resulted in death of all embryos due to high level of toxicity. It can be concluded that like in human subjects, xylene have its negative impacts on chicken embryo and can cause growth retardation and mortality due to high toxicity.

CBGP-153

AN INVESTIGATION ON BUPROFEZIN INHALATION TOXICITY AND ITS EFFECTS ON MALE ALBINO MICE

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Buprofezin is a thiadiazine chitin synthesis inhibitor that kills the insect at molting by inhibiting the incorporation of *N*-acetyl-D-glucosamine (2-(acetylamino)-2-deoxy-D-glucose) into chitin. Buprofezin is sprayed that is stable under acidic, and alkaline conditions and it is also thermostable and photostable, and its residues were insistent. The study was designed to investigate the toxic effects of buprofezin on the lungs, liver, and kidneys by inhalation. Mice were exposed to buprofezin mist using a nebulizer in a whole-body exposure. Group-I control was given distilled water mist whereas treated groups II, III, and IV were given 35 mg/ml, 250 mg/ml, and 500 mg/ml doses of buprofezin respectively, for 60 min over 14 days. Statistics were applied to comparisons at a p- 0.05. Biochemical parameters such as alanine aminotransferase (ALT), aspartate aminotransferase (AST), *alkaline phosphatase* (*ALP*), creatinine, urea, triglycerides, and cholesterol were increased in the serum. Oxidative stress markers and antioxidant enzymes such as reactive oxygen species (ROS) and thiobarbituric acid reactive substance assay (TBARS) were also increased while tissue total protein, superoxide dismutase (SOD), catalase (CAT), and peroxidase (POD) and non-enzymatic reduced glutathione (GSH) were decreased in lungs, liver, and kidney tissues. Histopathology indicates morphological changes in the lungs, liver, and kidney tissues. In treated groups lungs showed pulmonary tissue injury, inflammatory lesions, and alveolar spaces decreased, and impairment of the bronchial lining cells also several histological lesions can be found in the kidney and liver tissues. The study concludes that buprofezin is a toxic insecticide that can cause severe damage to the lungs, livers, and kidneys when it is inhaled during spray in a field. Additionally, further research is still required to investigate other aspects like behaviour and neurotoxicity.

CBGP-154

EFFECT OF LONG-TERM ADMINISTRATION OF CEPHRADINE (VELOSEF) ON TISSUES OF SPRAGUE-DAWLEY RATS

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Antibiotics are commonly used chemotherapeutic agents to treat bacterial infections. The irrational use of antibiotics led to increased antimicrobial resistance worldwide. The research has revealed that increased and irrational use of

antibiotics is associated with an increased risk of incident and fatal breast cancer. No experimental evidence however exists in favor. Velosef (cephradine) is a commonly prescribed antibiotic since it is considered relatively safe. Although the carcinogenic potential of other antibiotic groups is known. However long-term studies in animals have not been performed for above said to evaluate its carcinogenic potential. Thus, the present study aimed to evaluate any carcinogenic potential of cephradine on rat tissues, as a model system. Histopathological, biochemical and cytogenetic approaches were applied to assess the same. Twenty-two Sprague-Dawley rats were divided into three experimental groups. Group-1 was control received normal saline while Group II received normal recommended dose (14mg/kg b.w) intraperitoneally twice a day for three months. Group III received heavy dose (85mg/kg b.w) intraperitoneally con tenuously twice a day for nine months. Serum analysis for liver enzymes demonstrated significantly decreased ($p<0.05$) levels of ALP. While AST, ALT and bilirubin levels remain unchanged. Histological examination demonstrated pronounced fibrosis, glandular atrophy, and lumen blockade, sloughing of epithelial lining, neo-vascularization, and increased eosinophils in the small intestine. Besides increased eosinophil in the large intestine, narrowing of lumen and neo-vascularization were evident. Hepatocytes appeared damaged and nuclei became crescent shaped or pyknosed. Apart from highly increased eosinophil, the mammary gland was normal. Karyorrhexis and eosinophilia micro abscess was found in ovary.

CBGP-155

VITAMIN C AND CURCUMIN SUPPLEMENTATION PREVENTS LABORATORY MICE FROM BUPROFEZIN-INDUCED TOXICITY

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Buprofezin is a type-1 chitin synthesis inhibitor insecticide used to control a variety of insect pests at immature stages but potential adverse effects on non-target organisms and humans have been raised. The present study determined buprofezin toxicity after 4 weeks exposure to Balb/c mice and investigated the role of vitamin C and curcumin as possible protective agents. Mice were exposed orally for 28 days to low, medium and high buprofezin doses (50, 100 and 250 $mg.kg^{-1}$ bw respectively). Only high dose animals were co-treated with vitamin C and curcumin (100 $mg.kg^{-1}$ bw dose each), alone or in combination. Data were analyzed statistically; $P<0.05$. Results demonstrated that medium and high buprofezin doses were toxic to mammalian tissues. Supplementation with vitamin C and curcumin alleviated toxicity by significant ($P<0.001$) lowering of ROS, TBARS and MDA whilst increasing the levels of antioxidant enzymes SOD, POD, CAT and GSH. Similarly, serum ALT, AST, ALP, triglycerides, total cholesterol, LDH, creatinine and urea levels that were significantly elevated ($P<0.05$) and decreased tissue proteins upon exposure to buprofezin were restored to near normal values with vitamin C and curcumin. Similar protective effect was noticeable ($P<0.001$) for hematological parameters. Histology and comet assay of liver and kidney further confirmed reduction in buprofezin-induced cellular and DNA damage and preservation of tissue integrity with vitamin C and curcumin. Both vitamin C and curcumin are therefore effective remedial measures against buprofezin-induced toxicity but in combination, they are more effective.

CBGP-156

ESTIMATION OF MICRO AND MACRO ELEMENTS CONCENTRATIONS IN SILVER CARP (*Hypopthalmichthys molitrix*) FOLLOWING EXPOSURE TO BUPROFEZIN AND TEMEPHOS PESTICIDES

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The current study was conducted to estimate the micro and macro element concentrations in silver carp *(Hypopthalmichthys molitrix)* following the exposure of two pesticides buprofezin and temephos. The 96 h LC50 of both

pesticides was estimated for the fish. Based on LC50 value sublethal concentration was then determined. Treatments included single doses of both pesticides separately as well as their combined doses. After 2 and 3 weeks of treatment, whole fish sample digests were prepared in 65% pure nitric acid. The concentration of each metal (Na, K, Ca, Pb, Fe, Mg, Zn and Cu) was detected by using atomic absorption spectrophotometer. Data were compared and described as mean and SEM. One-way analysis of variance (ANOVA) was used for data comparison of both treated and control groups. The $P<0.05$ was considered statistically significant difference. Elements showed variations in their concentrations according to single and combined doses. The single dose of temephos significantly increased the level of sodium, potassium, iron and copper and decreased the level of zinc and magnesium, while lead and copper showed no alteration from control. The single dose of buprofezin significantly increased the level of zinc, sodium, copper, magnesium and iron but decreased the level of lead. In the combined dose, the level of sodium, potassium, calcium and copper were decreased when the dose were given with 5 min gap but lead showed increase. The level of iron and magnesium showed no alteration among the treatment groups. In the combined dose group (simultaneously), the level of zinc, sodium, potassium, iron and lead increased at medium dose. The level of iron and zinc showed increased concentration in the low dose group while magnesium showed increase at high dose group as compared to the control fish. In the combined dose (pre-mix), the level of zinc and copper increased while the calcium level decreased in the low dose group as compared to the other groups. The sodium and iron level significantly decreased in the high dose group as compared to other treated groups, while the level of magnesium, potassium and lead increased. So, the study indicated that combined dose (Simultaneously) of buprofezin and temephos appears to be more toxic, especially at the medium dose.

9. ANATOMY

CBGP-157

CRANIOMETRIC ANALYSIS OF EUROPEAN RABBIT (*ORYCTOLAGUS CUNICULUS*) BREEDS TO TRACE OUT INTRASPECIFIC AND INTER GENDER MORPHOMETRIC VARIATIONS.

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At the species level, the family Liproidae exhibits a great variety in morphometric characteristics. The hypothesis that there may be diversity in the morphometric characteristics of different breeds of *Oryctolagus cuniculus* is put forth in the literature that is presently available, although there is very little scientific data to support it. In order to identify their intraspecific and inter gender morphometric variations, the interbreed craniometric comparison of the European rabbit is conducted in this research work. 32 sexually mature rabbits from two different European breeds, New Zealand rabbits (eight males and eight females) and American Dutch rabbits (eight males and eight females) were obtained from various parts of the Punjab province in Pakistan. Both digital and manual vernier callipers were used to collect a total of 29 measurements from the skull and mandible of both breeds. According to the study's findings, there is a large amount of interbreed diversity between New Zealand and American Dutch rabbits in terms of nasal length. Both male and female rabbits exhibit this significant interbreed difference in nasal length ($p=0.0059$ and 0.0069, respectively). The current study also shows that the American Dutch rabbits and New Zealand rabbits exhibit inter gender differences in cranial measurements. The study provides the baseline data on the interbreed craniometric variations in the *Oryctolagus cuniculus*.

SECTION – I I

PESTS AND PEST CONTROL

PC-1

FACTORS AFFECTING SEASONAL DISPLACEMENT OF *SCHISTOCERCA GREGARIA* BETWEEN THAR DESERT AND BALUCHISTAN, PAKISTAN

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Pakistan has two breeding seasons for desert locust viz: spring breeding in Baluchistan and summer breeding in Thar Desert. Purpose of this study was to investigate the seasonal distribution and displacement of desert locust from Thar Desert, Sindh, and effects of meteorological factors on the displacement or migration of locust between two permanent breeding areas of Pakistan. During present study many extensive surveys were carried out in different localities of Thar Desert i.e. Nagarparkar, Chachro, Mahandre-jo-par, Khokhrapar and Umerkot to take an observational look over factors affecting the seasonal displacement and outbreak of this species in Thar. Absence or very low population of immature of *S.gregaria* and higher ratio of adults confirmed that adults of desert locust must have been migrated to Thar Desert from Baluchistan province. It was noticed that whenever large population of desert locust was appeared in fields at that time winds were blown from south to north and wind speed was higher with 7.0 -10.5 knots. Downwind always coincided with low atmospheric pressure which was recorded between 996-999 millibars during summer mainly from June to August 2014-17. Further, correlation between rainfall and population densities was significantly positive with strong value i.e. (r=0.634389) in 2014. Correlation between temperature and incidence of desert locust was also significantly positive with strong value i.e. (r=0.560002) in 2016.

PC-2

DIET INFLUENCE OF PHANEROPTERINAE ON DIFFERENT HOST PLANTS UNDER LABORATORY CONDITIONS

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Phaneropterinae are severe pests of agricultural crops. Many species being ecologically linked with forest biocoenosis, being phytophagous in nature, they are subjected to damaging trees and shrubs as well. They also nourish themselves by feeding on fruit orchards, berry shurbs and grasses. Present lab experiments were set in order to know the fecundity and fertility of Phaneropterinae on different diets and to investigate acceptance and rejection of diets and effects of different diets on its developmental stages. 2 species of Phaneropterinae i-e *Phaneroptera nana* Fieber, 1853 and *Phaneroptera spinosa* Bei-Bienko 1965, which were collected from district Hyderabad were tested on different diets: *Oryza sativa, Zea mays, Crataegus laevigata, Saccharum officinarum, Saccharum bengalense, Cynodon dactylon, Desmostachya bipinnata*. It was observed that *Oryza sativa, Sorgham bengalense and Cynodon dactylus* proved to be ideal diets for the individuals as the other diets were rejected or eaten in less quantity. This study will also help to identify which plant is more preferable by pest and how we can move towards crop rotation.

PC-3

APPLICATION OF *METARHIZIUM ACRIDUM* AGAINST *SCHISTOCERCA GREGARIA* IN THAR DESERT, SINDH

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During the study time period, heavy swarming of Desert locust was observed in large areas of Sindh including Thar. But, unfortunately only chemical pesticides were applied. Million liters of mainly malathion was sprayed and it caused long lasting effects not only on the environment but on human health also. Scientific research has shown that more than 95% of the pesticides now being used in East Africa to combat locust swarms harm both people and other living things like fish and birds. The creation of safe substitutes is crucial given that conventional insecticides have potentially harmful side effects. In the present, biological control is the finest and safest substitute. No single mycopesticides or pheromones were used, either for preventive control or during the emergency at the height of the invasion. It is not so easy to find alternatives to these chemicals and to integrate them into operational campaigns. This issue has rekindled interest in the creation of environmentally friendly microbial agents, which are now part of IPM strategy. Therefore, this attempt is being made to extend our knowledge on the efficacy of EPFs against locusts. At present *Metarhizium acridum* (Green Guard Sc premium) was applied on locusts. During the field survey 2,131 specimens were collected of both hoppers and adults; some of them were infested with fungal mycelium in the wild too. Prepared mixture of *Metarhizium acridum* (Green Guard) was used against 3rd-5th nymphal instars and adult stages under lab environment. It was noted that *Metarhizium acridum* isolates caused substantial death and best efficacy was seen with *M. acridum* -Green Guard. Nymphs in their third instar were shown to be the most susceptible, followed by those in their fifth instar and then adults. Using Green Guard resulted in the highest mortality rates against 3rd-instar (82% and 75.0%), 5th-instar (74% and 64.5%), and adult locusts (68% and 59%). Besides this, basic information was collected on the behaviour of the insects, insect basking in the sun at unusual times of the day, there was reduction in speed and coordination with each other, reduction in feeding, very low chance of mating some time with no interest in mating, and cannibalism in the lab was noted. According to the results of the current study, all EPF formulations have the ability to lower insect populations and can be employed in an Integrated Pest Management (IPM) strategy. Further, the study will also suggest appropriate time for use of biopesticides in desert areas.

PC-4

FIELD OBSERVATIONS ON THE INCIDENCE OF OXYINAE (A RICE PEST) FROM HYDERABAD DIVISION

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The consecutive survey of various agricultural fields of Hyderabad division during 2021 to 2022, for the collection of specimens was done. A total of 394 specimens were collected from different irrigated fields and sorted out into 5 species of oxyinae i.e. *Oxya hyla hyla* (Serville), *O. velox* (Fabricius) and *O. fuscovittata* (Marschall), *O. bidentata* (Willemse) and *Oxyina sinobidentata* (Hollis, 1971). During present study following localities were visited that included: Tando Muhammad khan, Bulri Shah Karim, Badin, Housri and Sirani. Oxyinae grasshoppers are the major pest of vulnerable crops. These grasshoppers live in different habitats, i.e. herbs, shrubs, trees, grass, maize, wheat, sugarcane and rice. These small size grasshoppers are phytophagous in nature and attack the major crops. During data

collection it was observed that oxyinae is a major pest of rice *(Oryza sativa),* considered as a sporadic pest of rice, they destroyed the rice crop during all developmental stages from seeding to elongation. Present study recommends that control measures should be undertaken at the nymphal stage of Oxyinae spp.

PC-5

EFFECTS OF ENTOMOPATHOGENIC FUNGI AGAINST LOCUST

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In 2019 and 2020, large swarms of desert locusts again threatened parts of East Africa and huge areas as far as India and Pakistan via the Arabian Peninsula. Although we have already seen classic images of these devastating swarms in the past, their impact is still impressive. Total 53 districts of Pakistan were affected with 33 in Baluchistan, 10 in KP, 08 in Sindh and 02 in Punjab. They destroyed several crops and ate anything and everything from seeds to flowers with an amazing speed of 93.2 miles per day. The food security ministry emphasized that the locusts had already caused a loss of almost 15% -25% to the crops in 2019-2020, which costs an amount of PKR 100 billion. It estimated that the damage about 25% of growing crops in 2020, losses could reach 353 billion Pakistani rupees for "rabi crops" (sown in winter and harvested in spring) and about 464 billion Pakistani rupees for "kharif crops" (summer sown crops). Many surveys have been conducted all over the world to register Entomopathogenic fungi (EPFs) but nothing is known from Pakistan. This problem has led to renewed interest in the development of eco-friendly microbial agents that are now incorporated into IPM strategy. Entomopathogenic fungi are potentially the most versatile bio-control agents due to their wide host range and natural occurrence, which makes less damaging to environment. Entomopathogenic fungi can be more effective when applied on the soil rather than spray treatment. 15% Percent damage level for the production of wheat, gram and potato only. Many districts of Sindh such as Khairpur, Tharparkar and Umerkot. Mostly damaged the wheat and cotton crops. 20% Tharparkar 18% Umerkot and 10% Khairpur. Decline in plaque locust band after treatment with *Metarhizium* in summer (maximum Temperature 38-45 ˚C) and 80% mortality with *Metarhizium* used. (*Teconella undulata)* plant damaged mostly in Baluchistan district.

PC-6

PRELIMINARY OBSERVATION ON POTENTIAL APPLICABILITY OF *SCELIO* AGAINST DESERT LOCUST

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The genus *Scelio* Latreille 1805 is known to occur throughout the world. It is one of the largest genera of Scelionid wasps with more than 225 described species. The species are obligate endoparasitoids of the eggs of locusts and in many regions including Pakistan. They are the only parasitoids associated with acridid eggs and considered important natural enemies, regulating populations of acridids in both agricultural and natural habitats. *Scelio* species are virtually restricted to parasitizing the eggs of Acrididae. The *Scelio* species have been reported from a wide range of climates so that it should be possible to introduce species from ecological homologous areas. During the present study extensive field surveys were conducted in many regions and fair numbers of egg-pods were collected in order to obtain Scelio. At the present three species of *Scelio* namely: *Scelio hieroglyphi* (Timberlake), *S.aegypticus* Priesner, *S. mauritanicus* Risbec were collected from the egg-pods and it was noted that about 39.25% egg pod were undamaged 13.98% were partially parasitized and the rest of 46.77% were fully parasitized and overall parasitism ratio was reported

significantly high in rainy season. However, it was noted that, *Scelio* is proposed as an excellent biotic potential candidate to combat the severe issue of locust other than the conventional and chemical control. Study on the trials of *Scelio* is under way hopefully, with detailed results we will be able to introduce this biocontrol agent in near future. The study is financially supported by HEC under NRPU Research Project: No.14787.

PC-7

SPREAD OF MALARIA AFTER FLOOD 2022: A CASE STUDY FROM SERVICES HOSPITAL HYDERABAD, SINDH

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Malaria is one of the most serious and complex health problem facing humanity. Malaria is considered sometimes fatal parasitic disease characterized by fever, chills and anemia, which can be transmitted from one human to another by the bite of infected *Anopheles* mosquitoes. There are four kinds of malaria that can affect humans namely *Plasmodium falciparum*, *P. vivax*, *P. ovale* and *P. malariae*. Positivity rate of Malaria raised in Sindh at large scale after the flood 2022 by increasing breeding sites, favorable conditions for the growth and development of vector and migration of localities after flood, Hyderabad is second largest city of Sindh province also faced malaria outbreak after flood. Current studies give complete data about increasing number of positivity rate of malaria from July to November of Services Hospital Qasimabad Hyderabad. Before the flood positive cases of malaria were at its lowest level as shown 03 cases of malaria positive (3-*vivax*) were reported in July 2022. Positivity rate at initial period of flood was about to equal as before the flood 04 positive malaria (4-*vivax*) patient were seen in August, In September 55 positive patient of malaria (*vivax*-52, *falciparum*-3) were reported it was considered as peak of malaria cases, positivity rate lasts also in the month of October where 49 (*vivax*-45 *falciparum*-4) cases were reported. Positivity rate was shown lower in month of November by changes in environmental conditions which are not suitable for the growth of vector and people shifted home from flood camps only 06 positive (*vivax*-04 *falciparum*-2) patients were recorded in November. Recent study suggests that awareness campaigns and terminations of breeding sites will leads to control the malaria in the region.

PC-8

INVASION OF *PECTINOPHORA GOSSYPIELLA* (LEPIDOPTERA: GELECHIIDAE) IN COTTON FROM SANGHAR DISTRICT SINDH

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The pink bollworm (*Pectinophora gossypiella*) a lepidopteran species of family Gelechiidae. Pink bollworm is one of the most damaging insect's pest infesting cotton in district Sanghar. Adult moths of *P. gossypiella* are usually short with dark-brown coloration. The head bears reddish brown coloration with pale, lustrous scales. Antennae are brownish and a pattern of five or six elongated, rigid, hair-like scales is exhibited on basal section. Pink bollworm is an inborn pest of Asia and preferably infest on cotton (*Gossypium hirsutum*) as a favourable host plant and therefore cause severe economic loss to this crop. *G. hirsutum* is recognized as white gold and is a significant cash crop worldwide. By keeping the above information in mind, the present study is intended to determine the infestation rate of pink bollworm in Sanghar district on cotton growing areas.

PC-9

MORPHOLOGICAL DESCRIPTION OF NYMPHAL STAGES OF *POEKILOCERUS PICTUS* (ORTHOPTERA: PYRGOMORPHIDAE)

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Poekilocerus pictus (Fabricius, 1775) is regarded as an Akk grasshopper *P.pictus* is a painted grasshopper. Collected specimens sorted out into different life stages and six-wise then put it into jars for description of morphological characteristics. During the march to April hatching was noted while in August insects undergo six molts to become an adult. Eyes dark brown filiform antennae. Number of antennae segments different in nymphal stages. There were yellow and black spots on the head. Black marking spots on yellow pronotum. tibia with Pale yellow color and black spots. In 2nd instar elytron and tiny wing rudiment but different dorsally pointed down. The anterior and posterior ovipositor valve is tiny but clear in females little more development in 3rd instar and overlapping occurs in 4th instar. Orange, black and white is spotted on the surface of the Body with yellow color. Antennae of male longer than head and pronotum. Females are bigger than male. It also examined that 5th infantile nymphs also have created many attempts to mate with the female of a similar stage; they are just to do the same thing as the observed in mature insects however fail in their trails.

PC-10

MORPHOLOGICAL STUDY OF EGG PODS OF DIFFERENT *CAELIFERA* (ORTHOPTERA) SPECIES FROM THAR DESERT, SINDH, PAKISTAN

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Caelifera is a suborder, comprising short-horned orthopterans. They are exclusively herbivorous insects and destroying varieties of crops therefore, this attempt is being made to : investigate weak point of life history statistics of insects so that it could be controlled at its initial stage. In this context an extensive survey was designed in various agricultural fields and about 57 egg pods of caelifera were collected from the six oviposition sites in the year 2019. And about 83% of egg pods were identified to species or subfamily level while 11% remained unidentified and 06% were collected in broken condition. There was sufficient rainfall in Thar Desert through the monsoon season as a result crops and grasses flourished and adequate moisture was available to soil. The soil was also favorable for maximum oviposition mechanism. Out of 57 egg pods, density was the highest in *S. gregaria* with 43% while other three species *A. humbertianus P. pictus* and *A. exaltata* were with 25.37%, 19.40% and 11.94%, respectively. Morphological description of egg-pods was found very helpful to indicate the pest species in the field. During this study evidence of various species relationships through similarities and differentiation in the egg patterns have been studied with some unique results. This study might be helpful to investigate the eggs in the field so that possible destruction may be made at the time.

PC-11

UTILIZATION OF *BEAUVERIA BASSIANA* AGAINST ORTHOPTERAN PESTS

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Several studies suggest that *Beauveria bassiana* (Balsamo) is an important entomopathogenic fungus. It is widely used as a bioinsecticide around the world. The conidia production is a critical step in the production of high-quality bioinsecticide. It has been noted that *Beauveria* is found more effective against orthoptera pests. During present study the potential of *Beauveria bassiana* was examined for control of Orthopteran pests. This review is done to learn more about *B.bassiana* for its application in controlling Orthopteran pests. *B.bassiana* was proved much more virulent on grasshopper species via attachment and penetration of hydrophobic conidia or blastospores essentially anywhere on the all cuticular layers that surround the internal structures of the host. When the growing hyphae reach the nutrient rich hemolymph, the fungus capable of budding into single celled, yeast like blastopores (or hyphal bodies) that evade the host immune system by destruction of host internal tissues and nutrient depletion, and hence leading to host death within 5-8 days by causing white muscardine disease (Emerging of white powdery layer of molds that produce new spores). Once the host dies, the fungus emerges from the dead cadaver and produces newly infective aerial conidia on the surface. When environmental conditions, especially humidity are permissive, the infective conidia can be disseminated by wind, rain splash and other abiotic and biotic factors and continue the pathogen's life cycle.

PC-12

OUTBREAK OF FALL ARMYWORM *(SPODOPTERA FRUGIPERDA)* IN AGRICULTURAL SECTOR IN HYDERABAD AND ITS ADJOINING AREAS

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Currently a fall armyworm (FAW), *Spodoptera frugiperda* is a global invasive pest posing serious threat to more than 80 host plants in different plant families preferably to Poaceae. After causing devastating damage to the economies of America and Africa, it has also been a serious problem for food and nutritional security of Asian countries for the past few years. From recent years, Pakistan is not devoid of FAW attacks resulting in an upset in the agricultural sector. Meanwhile, present study was confined to district Hyderabad Sindh to examine the incidence and infestation of fall armyworm. Various crops were surveyed to examine the susceptibility of crops to FAW in the study area. During study, the maize crop showed heavy infestation as being the most susceptible crop to FAW. FAW attacked on almost every part of the plant at each stage of maize crop. The specimens were collected from the infested fields and noted that each larval stage of FAW caused significant damage though most of the damage resulted from the attack of 5th and 6th larval instars. Moreover, during study cannibalistic behavior displayed by the older larval instars was prominent. Present report will serve as an influential parameter for policy makers, researchers and farmers to plan administrative policies to deal with FAW.

PC-13

USE OF MYCOINSECTICIDE *METARHIZIUM ANISOPLIAE* AGAINST VARIOUS SPECIES OF LOCUST IN SINDH

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Locust are major agricultural pests throughout world including Sindh. They destroyed the rice, sugarcane, wheat, cotton, maize and fodder crop in Sindh. It is ploy phagous insect that cause damage of millions of rupees annually when population of these insects build up, certain species exhibit gregarious and migratory behavior leading to the formation of spectacular swarm plagues. Outbreak and plagues have generally been controlled using chemical pesticides and Sindh consumes huge amount for importing pesticides for pests and their expenses reached in billions of rupees each year but increasing concern about environment effects has provided an impetus to research on non-chemical, especially biological control, alternative. Orthoptera are attacked by many vertebrates and invertebrates' natural enemies while recent review has emphasized the large number pathogenic disease being studied as possible biological control agent and in the field of biological control significant investigation have been conducted in many countries of the world to documents the parasite, predator and pathogens including entomopathogenic fungi, protozoa and viruses against locust population. During present study some observations are made to note the pathogenicity of metarhizium against (*Schistocerca gregaria*, *Locusta migratoria*, *Nomadacris succincta* and *Anacridium*) locust. It was noted that *M. anisopliae var. acridum* is highly virulent against the locust species particularly *Schistocerca gregaria and Locusta migratoria*, and probably other species, and the availability of this good candidate as may be useful in the future.

PC-14

SEASONAL PREVALENCE OF BOLLWORMS IN COTTON FIELD FROM DISTRICT GHOTKI, SINDH

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The current survey was carried out in cotton-growing regions within the Ghotki district, including Ghotki, Khanghar, Mirpur Mathelo, Daharki, and Ubauro. An exhaustive survey was carried out in order to determine the occurrence, frequency, and distribution of the primary cotton bollworms (pink bollworm, spotted bollworm and spiny bollworm). By travelling diagonally across the field, we were able to gather at least 15 randomised and 15 non-randomized samples from each section of the farmers' field. These samples were collected from the fresh ratoon crop that was readily available. After being packed in polyethylene bags and placed in an ice box, the samples were transported to the Entomology and Bio-control Research Laboratory (EBCRL) in the Department of Zoology at the University of Sindh in Jamshoro, Sindh, Pakistan for further examination. The obtained data was analysed through statistical software such as "Statistical Package for the Social Sciences" (SPSS-16), which utilised a one-way analysis of variance (ANOVA) test. These tests are utilised to manage and analyse quantitative data with frequent trial and important means were analysed by utilising these tests, which are utilised to compare the means of the various months of bollworms infestation in cotton crop. According to the findings of the current survey, the overall mean population of pink, spotted, and spiny bollworm larvae in Tehsil Ghotki was reported as 30.4012.20, 11.804.21, and 8.204.36 respectively. The overall mean population of pink, spotted, and spiny bollworm larvae was recorded as 47.6012.47, 5.601.88, and 5.402.48 in Tehsil Khangarah. These numbers are presented as standard deviations from the mean. In Tehsil Mirpur Mathelo, the overall mean population of pink, spotted, and spiny bollworm larvae was recorded as 19.00 7.88, 9.40 3.57, and 5.60 2.69 respectively. Tehsil Daharki's overall mean population of pink, spotted, and spiny bollworm larvae was recorded as

18.805.45, 5.401.74, and 3.601.93 respectively, while the population of spiny bollworm larvae was 3.601.93. In Tehsil Ubauro, the overall mean population of pink, spotted, and spiny bollworm larvae was recorded as 14.004.06, 5.001.14, and 3.201.59 respectively. In the months of November, October, September, August, and July, the population of bollworms was found to be lower than it was in the month of November. Based on the findings, it was determined that the population of pink bollworms was significantly higher than that of spotted and spiny bollworms.

PC-15

STUDY ON FALL ARMYWORMS *SPODOPTERA FRUGIPERADA* (LEPIDOPTERA: NOCTUIDAE)

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The fall army worm (*Spodoptera frugiperada*) is a specie of Lepidoptera which is an important polyphagous insect pest that affects millions of crops each year. It is regarded as a pest and can damage and destroy a wide variety of crops which cause large economic damage. The study was conducted on 33 crops growing in lower districts of Sindh, viz: Hyderabad, Umerkot, Sanghar, Tharparkar and Badin. The visited fields were mostly cultivated with fodder crops that were corn, sugar cane, potato, egg plants, and barely. As a result of survey, it was observed that out of 39 survey fields 18 were affected and 21 were non-affected. The number of conducted surveyed were five times in five different districts, where different ranges of affected and non- affected fields were observed. Out of 100 percent of fields, 46 percent fields are affected and 54 percent are nonaffected. The morphological characterization of FAW larvae, pupae, and adult were carried out. The pictures of surveyed fields, specific larval and adult characters were captured through mobile phones and later were studied on stereomicroscope. The mature larva of FAW has a typical Y inverted on head capsule and with distinct black spots on the body. Further, more studies and molecular identification should be done throughout corn growing areas of Pakistan to ensure its proper identification and entry routes in Pakistan.

PC-16

INFESTATION OF *LIPOSCELIS ENTOMOPHILIA* (PSOCOPTERA: LIPOSCELIDIDAE) ON DIFFERENT FOOD

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Infestation of *Liposcelis entomophila* (Enderlein) (Psocoptera: Liposcelididae) was studied in godam. The Psocoptera are microscopic insects. Some of the wingless Psocoptera are called booklice and are found around old books, papers, and in damp, dark rooms. *Liposcelis entomophila* is a nuisance pest that seriously threatens the safety of stored grains owing in part of pesticide resistance Decisive characters of morphological diagnosis were using Steroscopic dissecting binocular microscope (SDBM) and Significant problem of packaged foodstuffs is cause by psocids. Psocids were found in different kinds of tea, packaged pasta, rice, wheat, and flour. *L.entomophila* is identified in moldy rice stems and packaged rice. They feed on bacteria and fungi that hydrolyze. As compared with wood fungi, straw and paper that *L. entomophila* confirmed of choice for flour, damage insects and bark. Liposcelididae stay outdoors feed on organic matter and pollen of various plants, on mycelium of ascomycete fungi. In Zimbabwe *L.entomophila* (Enderlein) were occasionally found damaging farm stored tobacco. The booklouse scratches the lamella of tobacco in thinner sides, the Centre part of the vein also being absorbed.

PC-17

ANTIFEEDENT ACTIVITY OF BIOPESTICIDE ON *AIOLOPUS THALASSINUS* (F.) (ORTHOPTERA: INSECTA)

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Pakistan, as an agricultural country, every year has to face locust invasion, mostly the vegetation of western region of the country is badly affected by the locust swarms since 2019. Locust's swarms have the ability to move over hundreds of kilometer for invading and destroying every crop along their path. These injurious pests are not only causes damage to pastures and crops, but they also cause soil erosion and increase runoff due to rapid vegetation loss. Pakistan has faced recently outbreak of billions of locust in early 2020. In the present research, rearing of the locust species *Aiolopus thalassinus* (F.) of family Acrididae was successfully carried out until third generation under controlled laboratory conditions with 30±2°C temperature and 60-80% relative humidity. Their life cycle was completed within three months. The investigation has showed the bioefficacy effect of flavonoid phytochemical which was extracted from medicinal plant *Moringa oleifera* (Lam.) by using leaf dip method and investigated the antifeedent activity (AFI%) on nymphal and adult stages of species. Antifeedent activity that caused by flavonoid extracted compound revealed that AFI% of adults species was increased with the increase in concentrations i.e., 12.58% and 17.01% in 500ppm at 24 h and 48 h respectively, and lowest AFI% was showed i.e., 3.74% and 7.69% in 100ppm at 24 h and 48 h respectively. While in nymphs highest AFI% was observed at 500 ppm i.e., 7.9 at 24 h and 19.4% at 48 h and lowest AFI% value was observed in 100 ppm which was 0% at 24 h and 3.22% at 48 h. These observations indicated that the Antifeedent index (AFI%) increases while increase the dosage of treatment.

PC-18

EFFECTS OF FORMULATED BIOPESTICIDES AGAINST ACRIDIDAE FAMILY (ORTHOPTERAN INSECTA)

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Agriculture is a fundamental element of industrial resources and it is extremely vital for us to have technologies that support high yield, preferable crop production and protection in a cost economical, eco-friendly and supportable way. Agriculture was advanced in about 90 countries prior to the industrial revolution. Although nanotechnology is being used recently in industries, and has also been used in agriculture now a days. In plant pathology nanoparticle technology targets specific agricultural plant pathogen interactions and opens up new possibilities for crop protection. In the proposed research bio- efficacy test on adult Acrididae family of orthopteran pest species was determined by leaf dipping method to investigate the LC50 in four ways i.e., Chlorpyrifos was used as positive control, Terpenoid extracted from *Aloe vera barbadensis* Miller as bio pesticides, Terpenoid loaded zinc oxide nanoparticles as nano biopesticides and distilled water as negative control. All these testing were carried out in 5 concentrations with 200ppm, 400ppm, 600ppm, 800ppm and 1000ppm. The toxicity of extracted terpenoid (TRP) and formulated terpenoid encapsulated zinc oxide nano biopesticide (TRP-ZnONPs) were evaluated against locust species of Acrididae family by using bioassay tests to investigate efficacy against adults. The comparison of mortality rate that was caused by terpenoid based biopesticde and terpenoid loaded zinc oxide nanoparticles had showed that nanoparticles based biopesticides have indicated quick and high mortality rate than terpenoid based biopesticides. Nanoparticle based biopesticides showed 100% mortality even at lowest concentration at 800ppm. While in terpenoid based concentration there is no mortality rate at 100ppm and 200ppm. While it showed 80% mortality at highest concentration that was 1000ppm.

PC-19

POPULATION STATUS AND MANAGEMENT OF AFGHAN PIKA (LAGOMORPHA) IN APPLE ORCHARDS OF ZIARAT CITY, BALOCHISTAN, PAKISTAN

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The Afghan pika is a destructive vertebrate pest that debarks the apple trees in Ziarat valley, Balochistan. It attacks trunks and other main limbs, especially of young apple trees in winter. While in summer, it eats or damages peas, potatoes, wheat, and corn. The damage caused by this pest according to literature reduces 30% of apple production annually resulting in great loss to growers. The apple varieties like Kaja, Red Delicious and Golden Delicious are known to be the cash crop of district Ziarat and the main source of income. To get rid of pika destruction and to promote apple production in the area, the present study was carried out in 2021and 2022. The population count, damages assessment, and control of this pest were done in two apples (plots) orchards located at Killi Zaar Gaat (30°.36'N, 67°.69′E) and Killi Murdar Kaas (30.35'N, 67.66 ′E). Both the apple plots were of equal size with a 150 square meter area. The results showed in total 154 pikas trapped by steel rat snap trap and chemical control methods using pesticide (Zinc phosphide) in the following composition: adult male 45/102 (44.11%), adult female 36/102 (35.29%) and juvenile pikas 21/102 (20.58%). The difference indicated a high adult population compared to the juvenile. The pesticide killed 52 pikas, including 23 (45.09%) adult males, 15 (29.41%) adult females, and 13 (25.49%) juvenile were recorded. The damage percentage to apple trees was 22% (70/250 trees) during the months of January and February 2022. Out of the 7o trees, 15 (21.42%) were damaged completely, while 55 (78.57%) were found partially damaged. From the result of this study, it is concluded that the high fertility of pika evidently empowers them to respond quickly to favorable weather conditions by a large increase in compactness and by inhabiting previously empty areas. This characteristic enhances its potential as a pest species to survive in large numbers. Therefore, proper monitoring of pest population using snap traps at the time of peak emergence and pesticides with recommended usage is suggested.

PC-20

BIOLOGY OF RED FLOUR BEETLE *TRIBOLIUM CASTANEUM* (COLEOPTERA: TENEBROINIDAE) ON DIFFERENT CEREALS

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Tribolium castaneum, commonly known as red flour beetle, is the member of order Coleoptera, family Tenebroinidae is one of the most destructive and important pest of post harvesting products that causes damage to commodities all over the world. The present study was conducted to observe the biology of red flour beetle *Tribolium castaneum* on different cereal flour varieties i.e. *Triticum aestivum* (wheat flour), *Oryzae sativa* (Rice flour), *Zea mays* **(**Corn flour), *Vigna unguiculata* **(**Cow peas Flour), *Sorghum bicolor* **(**Sorghum flour) and *Hordeum vulgar* (Barley flour). The samples were collected from two sources i.e. grocery Stores/super mart (Source-I) and Flour Mills/ ware-houses (Source-II) then these beetles were cultured under laboratory condition at the optimum temperature 30^0C-40^0C and relative humidity 45% to 75% at Zoology department, Shah Abdul Latif University, Khairpur Mir's. During the present study it was recorded that *Tribolium castaneum* consistently undergoes six larval stages on each cereal flour from source-I and source-II. Among the cereal flours. It was noticed that total duration from eggs to adult remains fastest on wheat flour i.e. 41.8±0.80

followed by sorghum flour 52.9±0.90 and lowest on Cow-peas flour 65.5±1.00 followed by corn flour 61.8±0.96 and average total duration from eggs to adult on rice flour 54.9±0.83 followed by Barley flour 53.9±0.82. The length of eggs was 2.9mm and width was 0.7mm were recorded and the length of larva from 1st instar to 6th instar was 5mm to 12mm and width was 2.1mm to 3.7mm were recorded and length of pupa was 15.2mm and width was 3.8mm and length of adult was 17.2mm and width was 4mm were recorded respectively. The results of this study indicated that cow-peas flour was the least suitable for development of *Tribolium castaneum* as compared to wheat flour. Moreover, the present study was help to initiate control measure for the stored grain pest on appropriate time. The biology of red flour beetle in different cereals flours would be helpful in post-harvesting of the insect pest in various stored grain food materials.

PC-21

SPATIO-TEMPORAL DISTRIBUTION PATTERNS OF PEST SPECIES (LEPI-DOPTERA: NOCTUIDAE) AFFECTED BY METEOROLOGICAL FACTORS IN AN AGROECOSYSTEM

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Knowing pests' spatio-temporal distribution patterns is essential for forecasting popu-lation outbreaks and designing control tactics or long-term management plans. The family Noctuidae is one of the biggest families of the Lepidoptera order. The noctuid's moths are well represented in all zoogeographic regions in various habitats and have innumerable ecological and economic importance. Despite extensive studies on the species' ecology, the knowledge is rare about noctuid moths' spatial and temporal distribution patterns in an agroecosystem. Therefore, in this study, the spatial and temporal fluctuations in abundance of *Spodoptera litura*, *Hadena tripoli, Helicoverpa armigera, Hadena Jahangiri, Spodoptera exigua, Hadena stigmosa, Spodoptera furgiperda, Agrotis ipsilon, Aletia l album, Callopistria placodoides, Callopistria repleta, Earias insulana, Agrotis cinerea, Mythimna loreyi, Earias vitella, Lacanobia oleracea, Euplexia conducta, Helicoverpa platigera, Mamestra brassicae, Leucania venalba, Diarsia hoenei, Ctenopulsia albostriata, Chrysodeixis furthatai* and *Aletia decisissima* were determined. Yellow light traps were mounted in 11 different selected localities of district Multan. The maximum species abundance was observed in Septem-ber but declined in December, January, and February. The spatial contour maps were used to determine the species' dissemination over space. Meteorological factors such as temperature and humidity showed a significantly positive correlation while rainfall showed a significantly nega-tive correlation with species richness. Maximum species abundance was recorded in crop areas as compared to forest areas. This study provides a scientific basis for developing and timely ap-plying control strategies for localized pest control.

PC-22

OVERVIEW ON EFFECT OF TEMPERATURE ON THE DEVELOPMENT, SURVIVAL, FECUNDITY AND LONGEVITY OF *BACRTROCERA DORSALIS (*HENDLE)

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Effect of different temperatures ranging from 15 to 45°C at 60±5% R.H have been studied on the survival, fecundity, egg hatching duration, length of larval and pupil periods and mortality of eggs, larvae and pupae of Mango

pest *Bactrocera dorsalis*. The adult female survived for 19.62±2.18 days at 25°C, but when temperature increased its longevity decreased. The male, on other hand, survived for 13.84±2.15 days at 20°C and its longevity also decreased with increase in temperature. Maximum egg laying occurred at 30 and 35°C and declined at 20 and 40°C. Hatching period of eggs, development of larvae into pupa and emergence of adult was minimum at 35°C but the developmental periods were prolonged at 25 and 30°C. Larvae did not pupate at 20 and 40°C. Eggs hatched after 7.15±1.92 days at 35°C while it was delayed to 13.19±1.38 days at 25°C. The larval and pupal periods were considerably reduced at 35°C. The total developmental period was 60.46, 41.48 and 36.53 days at 25, 30 and 35°C, respectively. So it can be concluded from this study that *Bactrocera dorsalis* could not develop or complete its development at 20 and 40°C. The optimum temperature for development of *Bactrocera dorsalis* was 35°C.

PC-23

OCCURRENCE OF AKK GRASSHOPPER *POEKILOCERUS PICTUS* (PYRGOMORPHIDAE: ORTHROPTERA) FROM CHOLISTAN

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Pokilocerus pictus (Fab.) is reported as the principal pest of *Calotropis procera* but it also damages wheat, alfalfa, papaya, citrus, castor, brinjal and cow pea on large scale. During the present study its mating strategy has been discussed in order to know any weak phase so that diagnostic of proper management could be made. *Poekilocerus pictus* of the Family Pyrgomorphidae have extensively scattered in the tropical and sub-tropical regions of the world. *Poekilocerus pictus* is one of the brightly ornamental-colored grasshoppers originating in Malawi (November-December). Akk grasshoppers have yellow and turquoise in color morphology, green tegmina with yellow spots and pale red hind wings. Its break was reported from CUVAS in 2022 during the month of August.

PC-24

MORPHOMETRIC ANALYSIS OF AGRICULTURAL PEST GRASSHOPPERS IN MUZAFFARGARH DISTRICT

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Grasshopper is a group of jumping insects that are found in a variety of habitats i-e lowland tropical forests, semiarid regions, and grasslands. A study is being designed to assess the species diversity, seasonal abundance, and morphometric characteristics of grasshopper (Orthoptera: Caelifera) at four Tehsil of Muzaffargarh District. About 800 individuals of grasshopper comprise on various families/ genera are expected to examine. Maximum population is seen during June – October with an increasing trend in population size during these months indicating seasonal variations in their populations around the year. Fortnight field trips will be arrange & sampling will be done by hand picking and insect net following stander entomological methods sex will be identified, killed, and preserved. Based on monthly occurrence, data will be complied. The highest species abundance of grasshoppers is expected in the month of July to August and lowest in November to January. Among the collected species the status of very common (VC) less common (LC) rare (R) and not rare (NR) will be observed. For the study of inter-specific variations, morphometric analysis of

nine parameters viz. length of body, antenna, foreleg, middle, hind leg, forewing and hind wing; width of forewing and hind wing will be evaluated. The lengths or widths of these parameters will be measured by Image software (1.48v) and MS Excel 2007. Relationship among parameters and different species will determine using repeated measures ANOVA with Tukey post-test. The variation between these species and parameters is considered highly significant ($p< 0.001$) and showed the dynamic speciation. Morphometric analysis of species will be done for the first time from this region.

PC-25

CONCEPT OF ENTOMOPATHOGENIC FUNGI AS MICROBIAL AGENT AGRICULTURAL PESTS

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Entomopathogenic fungi EPFs are environmentally friendly and advantageous in many ways for controlling the major pests insect . At present, a survey was done on identification and characterization of the entomopathogenic fungi in different arid and semi-arid regions. These microbial agents are commonly famous as myco-insecticides that have great potential to kill locust and grasshopper species. Beside this; it is also beneficial to control flies, beetles and aphids in the field. During the present study lab trials of EPFs were carried out in order to note the efficacy of these strains against major pest trials against stage-3 & stage-5. It was noted that pathogenic fungi penetrate into the host's external surface after utilization of pathogenic fungi a large number of grasshoppers and locusts were killed, this finding suggests that this microbial agent is very useful against many pest species. Microbial agents that include: bacteria, virus, nematodes, protozoan and pathogenic fungi are good bio-control agents. Further, promotion of EPFs combined efforts of various scientists, farmers and other stakeholders is needed.

PC-26

DIVERSITY OF APHIDS AND ASSESSMENT OF POTENTIAL OF THEIR SELECTED NATURAL ENEMIES IN DISTRICT SIALKOT, PUNJAB, PAKISTAN

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Biodiversity plays a vital role in maintaining the ecosystem stability. A predator-prey relationship acts a driving force in structuring ecosystem whereas, pests are found to be a major reason of creating a biotic stress in cropland. Aphids have long been regarded as one of the serious agricultural pests. To eradicate the pest infestations from the vegetative area, insecticides/pesticides are being used which counteracts to eliminate the beneficial insects from the fields. So, an alternate eco-friendly strategy known as biological control gain much importance regarding this, that limits the pest population without harming the crop. Study was conducted in the four Tehsils of district Sialkot. Sampling was carried out fortnightly from February to May in the different fields of rice, wheat, sugarcane, brassica, and maize. Eleven different species of aphids with the dominant one *R. maidis* and S.*graminum* along with its predators including the species of lady bird beetle and syrphid flies were captured by using quadrat and sweep net methods. Predators were fed onto the aphids and were observed after 24 hours. The aim of the study was to check out the aphid's fauna as well as to investigate the feeding potential of different predators of aphids. Mean predatory efficiency of *E. balteatus* was maximum (215±16.4) when fed on *S. graminum* as compared to *I. scutellaris* (185.05±17.58)on the other hand, the

predatory efficiency of *C. septumpunctata* was considered to be higher when fed on *S. graminum* (495.3±48.6) and were lesser when fed on *R. maidis* (361.3±20) as thus, *A. variegate* was found to be maximum in number when fed on *R. maidis* (324±8.6) and relatively minimum when fed on *S. graminum*.(322.3±27.35) On the whole *C. septumpunctata* found to play substantial role as a biological control agent which will aid to suppress the aphid pest potential without damaging the crops and will maintain the agroecosystem permanence.

PC-27

ANTIMICROBIAL ACTIVITY OF ALGAL NANOPARTICLES TO CONTROL CITRUS CANKER AND SCAB CAUSING PATHOGENS

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Plant pathogens result in a huge loss to crop productivity. Algae have many secondary metabolites which have antimicrobial properties so to use algal extracts instead of pesticides is a cheap and contamination free method for disease mitigation. Zinc nanoparticles are especially important as zinc is a nutrient required for plant growth. For synthesis of algal nanoparticles different parameters like salt concentration, temperature and pH were optimized during the present work. It was observed that Zinc oxide nanoparticles synthesized form algal extract of Ulothrix sp. had shown good antimicrobial activity against citrus canker and scab causing microbes with zone of inhibition of 15mm and 19mm against *Xanthomonas axonopodis* pv. and *Elsinoe fawcettii* respectively. Hence use of algal nanoparticles proved to be effective against citrus pathogen scab disease.

PC-28

INVESTIGATION ON THE ATTRACTIVENESS OF DIFFERENT FOOD BAITS TO THE FRUIT FLY *BACTROCERA* SPECIES (DIPTERA: TEPHRITIDAE) IN FRUIT ORCHARD

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Field studies were carried out to find out the attractiveness of different food baits (protein hydrolysate 10%, torula yeast 10%, yeast instant 7%, casein 5% and sugar molasses 10%) to the fruit fly, *Bactrocera* species in pear orchard. Different concentrations of food baits (as mentioned above) were prepared in 200 ml of water and transferred to traps locally designed from 1.5 liter cold drinks plastic bottles by making three small holes (0.5 inch diameter) on the sides slightly above the level of the solution. The traps were hung in the fruit orchard on trees at a height of about 2 m and at appropriate distance from each other. No toxicant was used in the food baits. Data were regularly recorded at weekly intervals on the total number of *B. zonata* or *B. dorsalis* captured, their sex ratio and aggregate population of both the species. Results revealed that yeast instant attracted significantly higher number of *B. zonata* and *B. dorsalis* and hence the highest cumulative population of both species followed by treatment of sugar molasses and protein hydrolysate. Among all the treatments, Casein was found to be the least preferred attractant for *B. zonata* and *B. dorsalis*. Sex ratio (%) of *B. zonata* and *B. dorsalis* captured in different food baited traps revealed that all the baits attracted higher number of female flies than male flies with the highest percentage of female flies recorded from traps baited with protein hyderolysate. The results manifested that yeast instant, sugar molasses and protein hydrolysate were highly effective and could further be exploited in combination with certain chemicals in order to enhance their attraction towards fruit flies and developing a strong attractant.

PC-29

EFFECTIVENESS OF *TRICHOGRAMMA CHILONIS* (ISHII) WITH *BEAUVERIA BASSIANA* AGAINST FRUIT WORM, *HELICOVERPA ARMIGERA* (HUB.) INFESTATION IN TOMATO CROP

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Tomato fruit worm, *Helicoverpa armigera* is a polyphagous pest infesting more than 100 host plants and responsible for 53% fruit losses in tomato crop in Khyber Pakhtunkhwa, Pakistan. To manage this devastating pest, the study was conducted to evaluate the effect of *Trichogramma chilonis* integrated with *Beauveria bassiana* against the infestation of fruit worm, *Helicoverpa armigera* in tomato crop. Results of the experiment showed that minimum mean fruit worm infestation i.e., 0.27 larvae/ plant was recorded in treatment T_1 (Trichogramma 3000 pupae + *B. bassiana* @ $1x10^8$ spores /ml) followed by T_2 (Trichogramma 2000 pupae + *B. bassiana* @ $1x10^8$ spores /ml) such as 0.36 larvae/ plant and T_3 (Trichogramma 1000 pupae + *B. bassiana* @ $1x10^8$ spores /ml) such as 0.64 larvae/ plant as compared to control (water) treatment i.e., 1.11 larvae/plant. Tomato yield was also found maximum i.e., 60.7 kgs/48 ft^2 in T_1 followed by T_2 (52.3 kgs/48 ft^2) and T_3 (42.2 kgs/48 ft^2) while minimum mean yield was recorded in control treatment such as 33.57 kgs/48 ft^2. It is recommended that use of Trichogramma pupae integrated with *B. bassiana* could be a best control strategy for the management of fruit worm menace in tomato crop and to get maximum crop yield.

PC-30

SENSITIVITY LEVEL OF INDIGENOUS BUMBLEBEE (*BOMBUS HAEMORRHOIDALIS*) AGAINST NEONICOTINOID INSECTICIDES

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Bumblebees are the most important Hymenopteran pollinators of both wild and managed cropping system. High speed of pollination and their foraging ability at very low temperature and high altitude make these bees more effective pollinators than other bees. From the last two decades bumblebees are becoming decline throughout the world and insecticidal effect is one of the major reasons of this declining. In present study field doses of three insecticides acetamiprid, imidacloprid, clothianidin and their combination were tested for their toxic effect. Two ingestion methods, sugar solution and pollen pellet are used with three replications for each insecticide dose. Mortality data was collected after 03, 06, 24 and 48 hours and analyzed by using ANOVA (Analysis of Variance) and Microcal Origin for graphical representation of data. Overall results of sugar solution showed that imidacloprid is most toxic insecticide with 76% mortality among these three insecticides and in combinations the clothianidin+imidacloprid is more toxic insecticides with 93% mortality among these three combinations. In pollen pellet method results showed that clothianidin is also most toxic insecticide with 83% mortality among these three insecticides and in mixture the clothianidin+imidacloprid is more toxic insecticides with 76.6% mortality among these combinations and in Contact method the results indicated that imidacloprid is most toxic insecticide with 73% mortality among these three insecticides and in mixture of acetamiprid+imidacloprid is more toxic insecticides with 76.6% mortality among these combinations. Overall results showed that among these three insecticides imidacloprid was most toxic.

PC-31

MANAGEMENT OF SUBTERRANEAN TERMITES

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The subterranean termite *Heterotermis Indicola* (Wasmann) is the most destructive pest of wood and wooden structures in Pakistan. Conventionally, termites are controlled through chemicals especially synthetic insecticides but they are hazardous and cause environmental pollution and affect non-target organisms including human beings. To overcome these ill effects of synthetic chemicals in present study botanicals extracts with insecticidal characteristics were tested against termites as eco-friendly control measure. Two botanicals clove (*Syzygium Aromaticum*) and Garlic (*Allium Sativum*) were tested for their toxicity and deterrence against termites. Aqueous and alcoholic extracts of clove were prepared at 0.25%, 0.5% and 1% concentration along with 1% concentration of garlic. Clove was found comparatively more toxic and deterrent even at very low concentrations of 0.5% and 1% whereas garlic was found to be effective only on concentration above than 5%. Residual toxicity was also observed and treated arena with clove remained toxic for more than 60 days whereas garlic lost its toxicity after 15 days. Both extracts were mixed in 1:1, 1:2, and 1:4 ratios to assess their synergistic effect. The synergistic effect of both clove and garlic was effective and deterrent at ratios 1:4 and below. Over all it was concluded that clove extract can be used for the control of termites as an alternative to synthetic termiticides.

PC-32

BIODIVERSITY OF RICE INSECT PESTS IN SHAHDADKOT CITY AND ITS ADJOINING AREAS

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Rice (*Oryza sativa*) is most demanded food worldwide which provide 20% dietary calories to consumers. Rice (*Oryza sativa*) is topmost cash crops in Pakistan among all cultivated crops and also at the worldwide After wheat it is considered as second vital food crop of Pakistan, and in world rice is measured as major economical foreign earning and exchange crop later than cotton. Rice known as Asian crop due to 90% its production and its usage in this region. Pests of rice are considered as major constraints of low yield. More than 128 species of rice pest has been reported from them more than 15 to 20 species are chief significance and are frequently spotted in tropical Asia. Shahdadkot is one of the major area for rice producing in Sindh Province where Basmati 385, Basmati 2000, Super Basmati, basmati 515, Rusi Basmati, Shahen basmati and most common Sindhi Basmati D-98 are cultivated. An extensive field surveys were conducted from Shadad Kot and its adjoining areas for sampling of Pests in rice fields during May 2021 to September 2021. About 197 specimens were collected and sorted into 7 species i-e: *Atractomorpha crenulata, Chorthippus brunneus, Scirpophaga incertulas, Pelopidas mathias, Leptocorisa oratoria, Oebalus pugnax, Cnaphalocrocis medinalis.* Additionally, diagnosis of pests along with photographs are provided for easily recognition of species.

PC-33

POPULATION DYNAMICS OF WHEAT APHIDS *RHOPALOSIPHUM PADI* (LINNAEUS) AND *SITOBION AVENAE* (FABRICIUS) AT DISTRICT DERA ISMAIL KHAN, KHYBER PAKHTUNKHWA PAKISTAN

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This study aimed to determine the field population trend of *R. padi* and *S. avenae* in wheat crops. To investigate the most susceptible wheat developmental stage during aphid infestation regarding the dormancy and feeding habits of two aphid specie, i.e., *R. padi* and *S. avenae.* Estimates of the losses caused by these aphids were also investigated. We investigated the mean population of both species in the popular areas (Bilalabad, Paniala, and River site) of District Dera Ismail Khan in 2022. The mean population of *R. padi* and *S. avenae* was recorded weekly by randomly computing the numbers on plants from the favored wheat field using the diagonal methods. The estimated mean values show the increasing trends of aphids from February to April 2022 as the plant growth proceeded. The highest population growth of 8.36 ± 4.19 at (SW 7), 9.93 ± 5.75 at (SW 11), and 6.3 ± 3.73 at (SW 7) was recorded for *R. padi* in Bilalabad, Paniala, and River site. The population dynamics of specie *R. padi* was recorded due to the change in temperature this year. The highest population of *S.avenae* per plant was recorded in (SW 7) at Bilalabad was recorded as 8.57± 3.83, In (SW 9) at Paniala it was recorded about 7.6 ± 5.56, and in (SW 7) at the River site, it was recorded as about 8.57 ± 3.69. The overall mean population of *S. avenae* in all the favored areas of District Dera Ismail Khan was found to be minor as correlated to *R. padi*. Based on the accustomed study, it was concluded that the population density of both species could be suppressed by early sowing of wheat crops. Besides, the use of pesticide force the population growth of natural enemies, and due to the decreased population of natural enemies in wheat crops, aphids' convulsion appears and accounts for the firm annihilation of the wheat yields.

PC-34

EXPLOITATION OF ANTI-TERMITE POTENTIAL OF LOCAL PLANTS FOR SUBTERRANEAN TERMITE MANAGEMENT IN URBAN AND AGRICULTURAL SETUP

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The control of subterranean termites is very difficult because of their cryptic nature. Conventional use of repellent insecticide beneath the structures is considered to be major resort for control of termites for last many decades, but it's very expensive and environmental hazardous method. Therefore, there is need to adopt eco-friendly management techniques for termite control. We tested extracts of different local plants and herbs against termites for their toxicity, deterrence and residual affect. Clove extract was found very effective against termites even at lowest aqueous concentration of 0.125% but for quick knock down of termites; doses of 1% and higher were recommended. Clove when mixed with garlic in ratios 1:4 (Clove: Garlic) or less was also found effective regarding its toxicity and deterrence against termites. Garlic had antagonistic impact on mortality when mixed with clove in ratios higher than 1:5 (Clove: Garlic). Clove remains highly deterrent longer in comparison with garlic against termites even at lower concentrations.

PC-35

IMPACT OF *BEAUVERIA BASSIANA* AND *METARHIZIUM ANISOPLIAE* ON THE BIOLOGICAL ASPECTS OF THE TOMATO FRUIT WORM, *HELICOVERPA ARMIGERA* (LEPIDOPTERA: NOCTUIDAE)

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The fruit worm, *Helicoverpa armigera* is the most important and devastating insect pest of tomato crop severely hinders crop yield and productivity, damages developing fruits and causes 20 to 60% fruit losses. Many microbial insecticides from *Lecanicillium lecanii*, *Metarhizium anisopliae*, *Beauveria bassiana* and *Isaria fumosorosea* have been used worldwide to reduce many agriculturally important insect pests. Therefore, the commercial formulation of *Beauveria bassiana* (RACER®) and *Metarhizium anisopliae* (PACER®) were evaluated against the biological aspects of *H. armigera* under controlled conditions i.e., 25±2°C temperature and 60±5% R.H. with 08:16 hrs. (L:D) photoperiod. Different concentrations of both entomo-pathogenic fungi (1×10^8, 5×10^7, 1×10^7) were formed in distilled water and water alone was considered as a control treatment. Results of the experiment showed that significant maximum mean corrected mortality of tomato fruit worm was recorded in petri dishes treated with *B. bassiana* @ $1x10^8$ spores/ ml i.e., 86.9% while minimum mean corrected mortality (26.8%) was recorded in *M. anisopliae* @ $1x10^7$ spores/ ml. The minimum pupal recovery (6.67%) and no adult emergence was also recorded in *B. bassiana* @ $1x10^8$ spores/ ml. Probit analysis showed that the lethal concentration (LC_{50}) recorded for *B. bassiana* and *M. anisopliae* was 1.721×10^7 and 3.966×10^7 spores/ ml respectively while lethal time (LT_{50}) recorded for *B. bassiana* and *M. anisopliae* was 10.230 and 10.496 days respectively.

PC-36

MILLIPEDES AN EFFECTIVE ALTERNATE SOURCE OF MOSQUITO REPELLENT

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Millipedes (Diplopoda: Arthropoda) in the orders Julida, Spirobolida, and Spirostreptida are known to secrete toxic chemicals called benzoquinones and hydrogen cyanide which act as efficient mosquito repellents. These chemicals are used by millipedes as irritants, repellents, or anti-feedants, for their own defense against predators. Organisms including primates, carnivores, and mammals are reported to use these toxic chemicals to prevent mosquito. Burkina Faso is a highly malarial country and the Bobo people living there, eat toxic millipedes after boiling for 3-5 minutes to avoid mosquito bite. Capuchin monkeys, opossums, coatis, skunks, mongooses and lemurs particularly eat or rub the toxins secreting millipedes against their furs for their own defense against mosquito bite. The rubbing behavior is only shown in rainy season when there is greater incidence of mosquito. The application of high amounts of benzoquinones to *Aedes agyptii* are reported to cause death or the mosquitoes become inverted and sluggish. Benzoquinones also generated self-anointing behavior in Capuchin monkeys in which they rub the chemical treated paper against their body. Mosquito is known to be the deadliest animal in the whole world. It is a vector for many lethal diseases. So, this review can be food of a thought in the world where mosquitoes spread hundreds of diseases and make it a better place for human beings to live.

PC-37

PREFERENCE AND PERFORMANCE OF *BACTROCERA CUCURBITAE* ON VARIOUS HOSTS

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Bactrocera cucurbitae (Diptera: Tephritidae) is a polyphagous pest of various fruits and vegetables in tropical and sub-tropical regions throughout Asia. The current study was conducted to check the host preference and their ovipositional behavior in different vegetables sponge gourd, bitter gourd, cucumber and pumpkin. Its rearing was done under laboratory condition at temperature 25±2℃ and relative humidity 65-70% by providing a natural diet as well as an artificial diet such as yeast, water and sugar solution. Its host selection depend upon the color, taste, smell and texture. Females lay egg on those host plants which are ideal for growth and development. Environmental factors was also an important factor in the selection of a host. The current study conclude that the sponge gourd and cucumber was the most preferable host for oviposition.

PC-38

EVALUATION OF INSECT GROWTH REGULATORS (IGRS) AS BIOLOGICAL PESTICIDES FOR CONTROL OF *AEDES AEGYPTI* MOSQUITOES

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Ovicidal, larvicidal and pupal inhibitory effect of juvenile hormone analog; Predator Pyriproxifen) and Larvicol (Methoprin) at their field rate concentration (0.01 ppm) and higher doses; 0.02, 0.04 and 0.06 and 0.08 ppm when use singly or in their mixtures was tested against freshly laid eggs of *Ae. aegypti* in the medical entomology laboratory of the Nuclear Institute for Food and Agriculture (NIFA) Peshawar, Pakistan. Dose dependent eggs hatching and post hatching inhibition was recorded. None of the IGRs at their field rate (0.01pp) application caused any significant eggs hatching inhibition nor did their mixtures at the same dose when tested against *Ae. aegypti* mosquitoes. However, IGRs at their highest doses of 0.08 ppm resulted in from 55 to 90% eggs hatching and post hatching inhibition of *Ae. aegypti* eggs. Pyriproxifen caused (55%), Larvicol (72%) and their mixtures caused (90%) eggs hatching inhibition of *Ae. aegypti* freshly laid eggs. Mixture of Larvicol plus Pyriproxyfen also caused significantly highest mortality of the larval and pupal stages of *Ae. aegypti*. The present data provide a first step base line information on ovicidal and post hatching inhibitory and synergistic effect of IGRs in mixtures against mosquitoes.

PC-39

ROLE OF DIFFERENT PEDICULICIDES FOR THE MANAGEMENT OF HEAD LICE *PEDICULUS HUMANUS CAPITIS* (ANOPLURA: PEDICULIDAE) AMONG CHILDREN

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Head lice infestation is a common problem all over the world mostly in the school going children. They are difficult to manage due to their high transmutability among the children through direct contact or sharing of combs,

clothes and other belongings. In the current study, the efficacy of synthetic insecticide (permethrin lotion), English anti-lice shampoo, Doctor anti-lice shampoo and natural oils (Arugula, Tea tree and Eucalyptus oil) was also studied. These pediculicides were applied using standard protocols as per manufacturers guidelines. The results revealed the highest mortality of head lice caused by coopex lotion (82-84%) followed by combination of arugula oil + mustard oil (78-80%) while least mortality was observed in eucalyptus oil + mustard oil (14-15%) and as compared to control. It might happen due to the fact that essential oils contain various phytochemicals which are effective as physical blockers of spiracles, stomach poisons and nerve poisons. It is concluded that people having higher infestation of head lice should use coopex lotion and a binary mixture of arugula oil and mustard oil to effectively control the head lice infestation. However, coopex solution should be avoided in children because of its application can cause serious harmful effects.

PC-40

LECANIUM SCALE (COCCIDAE: HEMIPTERA): AN EMERGING PEST OF APPLES IN ZIARAT

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Balochistan is called fruit basket in Pakistan. Among other fruits, out of total apple production of the country, about 75% is produced in Balochistan. In the province, Ziarat is recognized as center of apple production. Apple farming is a major source of income for the farmers of Ziarat, and their bread and butter depends upon cultivation of apple, and allied businesses. Like other many factors, insect pests like codling moth, mites, tip borers, hairy caterpillars, aphids and fruit flies are important limiting factors of low production of apple in Balochistan, especially Ziarat. Since last few years, a homopterous scale pest is being reported to attack on apple orchards. This commonly called Lecanium scale (Coccidae: Hemiptera) is a soft scale that infest wide range of plants include fruit trees and ornamental plants. Adult female of the pest is 1/8 inch in length, hemispherical in shape and reddish to brown in color. Lecanium scale infest Apple, cherry, plums, apricot and peach. The scale causes both direct and direct loss to fruit trees. It sucks the sap directly from phloem tissues and excretes honeydew which attracts the ants, and spread sooty mold disease. Infestation of this scale has been reported regularly since last few years, while the worst was in 2015. Farmers routinely use pesticides suitable for sucking insects for its management. Although, the pest has been seen in fruit orchards since last many years, but the entomological literature is still lacking for its authentic identification. Institute of Plant Protection, MNS-University of Agriculture, Multan is working on its dentification and management strategies, too.

PC-41

EFFICACY OF DIFFERENT BOTANICAL INSECTICIDES AGAINST *SITOTROGA CEREALELLA* (OLIVIER) (LEPIDOPTERA: GELECHIIDAE) UNDER LABORATORY CONDITIONS

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Sitotroga cerealella (Olivier) is a noxious insect pest of stored cereals, as well as on small scale it also harms the standing crop in the field. Wheat is grown once annually, but is consumed throughout the year hence its storage is done

in warehouses. During its storage, the wheat is attacked by *S. cerealella*. One larva can give an economic damage about 13-24% to a single grain. Therefore, a study of evaluating efficacy different botanical insecticides against the *S. cerealella* was carried out to reduce the impact of damage in a safe manner, during 2021-22 at Bio-pesticide laboratory, Agriculture Research Centre Tandojam. Neem, Eucalyptus, Nazboo and Conocarpus leaves powder followed by a control replicated thrice, were used in the experiment. All the botanicals were used in powder form at 3% concentration (0.725g powder/ 25g of wheat grain) at the temperature 28±2°C and 65% Relative Humidity. Adult emergence, infestation (%) and weight loss parameters were recorded in the present study. Adult emergence was observed for ten consecutive days since first adult emerged. The results showed that the emergence of adult was significantly different (F=31.04, P=0.0000) among botanical powders. Nazboo was found as most effective botanical that resisted emergence of moth than all the other treatments. The minimum population emergence of moth was observed in nazboo on day one (1.33±0.33 adults), whereas, the maximum population (9.00±0.57 adults) was recorded in conocarpus on day ten. Among other treatments i.e., neem and eucalyptus, the maximum adult emergence was recorded as 5.66±0.33 and 6.33±0.88 adults, respectively. Furthermore, the lowest emergence was recorded in control (7.66±0.33 adults) on day one whereas, the highest population observed was 12.66±0.33 adults on day ten. Nazboo was also found effective on overall mean population of moth with minimum adult emergence was recorded 1.83±0.26 adults, while, the maximum adult emergence was recorded 10.40±0.40 adults in control. Adult emergence observed in neem, euclypatus and conocarpus were 3.23±0.25, 4.76±0.51 and 6.00±0.43 adults respectively. Besides, the minimum infestation (%) was observed in nazboo (27.41±0.43%), whereas, the maximum infestation was recorded in the control (87.16±1.64%), followed by infestation was observed, in neem, eucalyptus and conocarpus were 41.66±0.09, 49.59±0.31 and 60.21±0.39% respectively. Furthermore, the minimum weight loss was recorded in nazboo (2.66±0.33g), while the maximum weight loss of grain was observed in the control (14.33±0.33g), followed by weight loss of grain was observed, in the neem, eucalyptus and conocarpus were 4.33±0.33, 7.00±0.57 and 9.33±0.33 g respectively. Therefore, from present findings nazboo powder has been concluded as best botanical powder for the management of *S. cerealella*, and showed heights efficacy on adult emergence, infestation (%) and weight loss grains.

PC-42

RESISTANCE STATUS OF *MUSCA DOMESTICA* L. (DIPTERA: MUSCIDAE) AGAINST SOME SELECTED INSECTICIDES IN POULTRY FORMS OF SARGODHA

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House flies act as major pest as it carries various disease-causing organisms such as protozoan, bacteria, and various viral infections. Its increasing number seems like a challenge to overcome; to cope with such situations different insecticides are used. The purpose of the current study was to *Musca domestica* assess the resistance status against selected insecticides from neonicotinoid (acetamiprid and thiamethoxam), organophosphate (triazophos and profenofos), pyrethroid (cypermethrin and deltamethrin) classes and some mixtures of pyrethroid and organophosphate insecticides (profenofos+cypermethrin and deltamethrin+triazophos). *Musca domestica* populations were collected from two different localities of Sargodha. For neonicotinoids, the resistance ratios were in the range of 7.47-9.86 fold for acetamiprid and 10.17-13.21 fold for thiamethoxam, in comparison to a laboratory reference strain. For organophosphates, the resistance ratios were 10.29-16.97 fold for triazophos and 12.7-19.43 fold for prefenofos. For pyrethroids, the resistance ratios were in the range of 48.29-65 fold for cypermethrin and 6.0-8.75 fold for deltamethrin. In the case of mixtures of pyrethroid and organophosphate insecticides, the resistance ratios were in the range of 11.57-

12.84 fold for prefenofos + cypermethrin and 9.86-15.7 fold for deltamethrin + trizophos. Inappropriate and excessive use of insecticides must be controlled through proper mechanisms and strategies. Mosaic, rotational, and periodic application strategies must be used to delay resistance development.

PC-43

STATUS OF PHOSPHINE RESISTANCE IN *TROGODERMA GRANARIUM* STRAINS COLLECTED FROM DIFFERENT AREAS OF THE PUNJAB

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All stored product pests are now developing pesticide resistance, which makes the pest control programme more difficult. Phosphine has been used successfully to combat a variety of stored-product pests in various types of goods and facilities. Nevertheless, numerous important insect species have developed resistance as a result of its incorrect and ongoing use. The present investigations were carried out to determine the level of phosphine resistance against Khapra beetle larvae collected from godowns of different areas (Lahore, Gujranwala, Layyah, Khairpur, Mughalpura and Sialkot) of the Punjab. The larvae exposed to different doses of phosphine at different time intervals (72h, 48h and 24h). Results reveal varying levels of phosphine resistance. The most phosphine-resistant insects were from Layyah, while the least phosphine-resistant ones came from Khairpur. This study recommends measuring the phosphine resistance level prior to beginning fumigation to decontaminate stored goods.

SECTION – I I I
E N T O M O L O G Y

ENT-1

NEW SPECIES *AGRYPNUS KHAIRPUENSIS* SP.NOV (ELATERIDAE: AGRYPNINAE) FROM KHAIRPUR SINDH PAKISTAN

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Agrypnus khairpurensis sp.nov is carried out in the month of March upto December (2019 -2020) from the different district of Sindh such as Khairpur, Sukkur and Nawabshah, from genus *Agrypnus* 1 new species and new records are identified out of which 67 specimens, Key, tables of distribution of species, photography of adult as well as genitalia, male are provided.

ENT-2

SYSTEMATIC STUDY ON DUNG BEETLES (SCARABIDAE; COLEOPTERA) FROM DISTRICT BADIN SINDH PAKISTAN

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Dung beetles are important group of insects which help in breakdown and recycling of dung into the soil, enabling the nutrients in the dung to cycle through the ecosystem. An extensive survey was carried out 2021-2022.A total 234 specimens were collected from different host plants in the district Badin. material was sort out into 5 species belonging to 4 genera. It was followed by *Digitonthophagus gazzalla* (Febricius, 1787) with 27.80%, *Melolontha hippocastine* (Febricius,1775) with 12.83%, *Melolontha pectoralis (*Megerls,1812) with 18.18%, *Eutheola humilis* (Bates,1888) with 8.02% and *Protaetia pryeri* (Janson, 1888) with 33.15%. The study of their systematic and fauna from District Badin. These species were collected from the dung of Cattles, sugarcane plants and Flowers with the help of Hand picking and pitfall trap and identified up to species level with the help of available literature. The Most abundance species is *Protatia pryeri* (Janson, 1888) with the highest number while the *Eutheola humilis* (Burmeister, 1847) is very low number have found from district Badin. Present study will helpful to know the existing numbers of this genus in locality.

ENT-3

STUDY OF DIVERSITY OF *ENSIFERA* SPECIES FROM RAHIM YAR KHAN

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The present study was carried out to investigate the biodiversity, richness and evenness of Ensifera species from

Rahim Yar Khan, Punjab, Pakistan. The district Rahim Yar Khan has vast agriculture as well as sandy areas. The total 10 species of Ensifera were recorded both from agriculture and sandy areas which were *Trigonocorypha unicolor* (Stal, 1873), *Trigonocorypha angustata* (Uvarov, 1922), *Phaneroptera spinosa* (Bei-Beienko, 1965), *Phaneroptera roseata* (Walker, 1869), *Euconocephalus incertus* (Walker, 1869), *Euconocephalus pallidus* (Redtenbacker, 1891), *Euconocephalus mucro* (De Haan, 1842), *Euconocephalus nasutus* (Thenberg, 1815), *Euconocephalus indicus* (Redtenbacher, 1891), *Euconocephalus maculates* (Le Guillou, 1841). The biodiversity, richness and evenness of these species from both agricultural and sandy areas were compared. The more biodiversity, richness and evenness of these species were recorded from agricultural as compared to sandy areas. The biodiversity indices i.e. Shannon index (H) and Simpson index (D) of agricultural and sandy areas were 0.7665, 2.2196, and 0.3973, 0.6960 respectively. The species richness trend was 5.6724 agricultural and 2.4013 sandy areas respectively. The species evenness recorded were 0.5709 and 0.4163 in agriculture and sandy areas respectively.

ENT-4

DIVERSITY AND SPIDER GUILD OF SPIDER FAUNA FROM WHEAT FIELDS OF DISTRICT LARKANA, SINDH, PAKISTAN

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We investigated the diversity and guild structure of spider fauna dwelling in the associations with wheat crop of the district Larkana (located at 27° 33' 30′ N, 68° 12' 40′ E.). From all wheat crop fields spiders were collected often by pitfall slope traps while digging holes in wheat fields, hand picking and sweep net. Collection was started after the one months of wheat sowing and end up to harvesting. Five extensive surveys were organized each year along with four Taulkas along with four sites of wheat crop fields in the year 2021 and 2022 and above 3000 specimens. Spider diversity here its means variety and rage of spiders found in the wheat crop while guild structure means a union or group or assembly of spider species that exploit the same class of ecological resources in a similar way or the mode of acquiring nutrients and the habitat areas. The quantity of guilds structures occupying an ecosystem is known as its disparity. Members of a guild within a given ecosystem could be competing for resources, such as space or light, while cooperating in resisting or detecting predators. Here it was observed that spider prey on wide range of insects, often wheat crop pests. The ecological guild concept has been of great interest to arachnologists, and the different manner in which spiders forage for a common resource like prey and arthropods has led to numerous attempts to classify them into guilds. During the present study two guilds structures were observed in the wheat crop fields of the district Larkana. Guilds were identified on the basis of circadian behavior and feeding behavior of the spiders. Within wheat crop fields species richness was measured low while more species were found in wheat field edges. Provincial and local management were found using malpractices while applying herbicides and pesticides on the wheat which have observed some effect on species richness. Along with it was observed that the spider diversity of farmland wheat fields was predisposed by variances at two of the four-dimensional scales like edges vs centre and simple vs complex wheat fields. Our research submits that sponsoring heterogeneity in land and use of diverse varieties of wheat species is one of the keys to promoting spider diversity in agroecosystems and increasing yields of the crop on the other side.

ENT-5

STUDY ON THE DIVERSITY OF ORTHOPTERA FROM NARA DESERT SINDH

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During present study, fair number of specimens from different localities of Nara Desert Sindh was carried out during the year 2021-2022 they were sorted out into following 7 species i.e *Heteracris littoralis* (Rambur, 1838) highest number of specimens found from Nara desert followed by *Acrotylus humbertianus* Saussure, 1884 *Acrida exaltata* (Walker, 1859) *& Chrotogonus trachypterus* (Blanchard, 1836) average number of specimens and *Bispinosa deserti,* (Bey-Bienko, 1951)*, Atractomorpha accutipennis blanchordi* (Bolívar, 1905) *& Trilophidia annulate* (Thunberg, 1815) was lowest number of specimens were found. Still others show huge population variability, often becoming local and temporary keystone species, while entire communities of these insects may be essential to ecosystem functioning over long periods of time. Therefore, this attempt has been made. Results revealed that the agriculture land community has the potential to support insect diversity and act as effective refugia for some insects from the rocky area. Moreover, this study recommends that these habitats should be given conservation priority so that they promote biodiversity of Orthoptera. Overall, a survey has shown that Nara is rich with Orthoptera biodiversity. It has also been documented, probably for the very first time, the Orthoptera fauna in Nara. This information will assist all stakeholders to optimize the beneficial amidst them while managing noxious species. Further studies should be conducted using other sampling techniques and by also expanding the geographical scope of the study. There is a need to also expand the duration of the study as seasonal variations affect population dynamics of Orthoptera.

ENT-6

UPDATED SYSTEMATIC STATUS OF TETTIGONIOIDAE (ENSIFERA: ORTHOPTERA) ON THE BASIS OF DNA BARCODING FROM SINDH, PAKISTAN

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Family Tettigoniidae is the largest in Orthoptera families. They are cosmopolitan in nature and are widely distributed. Family Tettigoniidae has more than 6,000 species. The previous reported species were classified on the basis of their traditional morphological characteristics. The list of species reported by extensive surveys in 2020-2022 and about 1287 specimens with 10 genera and 23 species collected from different areas of Sindh. We also adopted the same way of traditional classification of morphological characteristics while some were also classified on the basis of color polymorphism. On the other hand, some of the Tettigonoiidae species were barcoded. However, the parallel mitochondrial genome sequence showed significant similarities among species. Hence, we re-identified our reported species that we identified on the basis of their morphological characteristics and concluded that some of the Tettigoniidae species have similarity in their mitochondrial genome and we can't report them as different species, after analysis of DNA sequencing many of similar species was declared differ and many of conflict species got its exact identification. In this study we try to provide a correctly updated list of Tettigonioidae fauna from Sindh. We believe that it will also fill many evolutionary gaps that exist in the taxon.

ENT-7

REPRODUCTIVE ACTIVITIES OF *HIMERTULA VIDHYAVATHIAE* (TETTIGONIIDAE: ENSIFERA: ORTHOPTERA) FROM SINDH

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Sindh is agricultural land and it is full of astonishing insect fauna, a wide variety of insects have been studied here in Sindh but no attention has been paid to the Ensiferan (long horned grasshoppers) from this region. The Phaneropterinae are phytophagous and they are commonly called leaf crickets, leaf katydids or truly bush crickets. The paper presents the mating and ovipositional behaviour of undescribed tettigoniids species, *Himertula vidhyavathiae* Ingrisch. & Muralirangan 2004. In this study, pre-copulation, copulation duration, total numbers of mating, pre-oviposition, oviposition, fecundity and fertility was observed. The males are smaller than the females' males when sexually Mature, make a species-specific mild calling sound to attract nonspecific females for mating If the female is receptive, she also touches male with her antennae and if she in not interest she reject the call of male this sexual behavior was study in detail.

ENT-8

BIODIVERSITY OF GRYLLIDE (ENSIFERA: ORTHOPTERA) FROM DISTRICT MIRPURKHAS-SINDH

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Mirpurkhas is very diversified land because of its thick vegetation, climatic conditions and suitable temperature provide the favorable environment for rapid growth of insects. An extensive survey was carried out to investigate the diversity of Gryllide in this region. In the result of field survey, a total of 626 specimens were captured from 7 localities of District Mirpurkhas. Collected material was sorted out into 12 species namely *Acheta domesticus 30.51*%, *Acheta chudeaui* 6.54%, *Acheta meridionalis* 6.23%, *Acheta thoracica saeed et al.* 0.79%, *Gryllodes sigillatus* 23.32%, *Gryllodes supplicans* 19.64%, *Gryllus bimaculatus* 7.66%, *Gryllus (Gryllus) assimilis assimilis subspecies* 0.15%, *Gryllus quadrimaculatus apicalis* 0.79%, *Gryllus multipulsator* 1.27%, *Telogryllus mitratus* 0.79% and *Pteronemobius concolor* 2.23%. A detailed survey is underway for exploring more wealth of this group form this region.

ENT-9

IDENTIFICATION OF *CHROTOGONUS* (SERVILLE, 1838) (ORTHOPTERA: PYRGOMORPHIDAE) WITH SPECIAL REFERENCE TO ITS EYES SHAPE

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During the present study a total of 384 specimens were collected from different areas of lower Sindh, Pakistan, from July 2021 to April 2022. Beside these six different species/subspecies of *Chrotogonus*, Serville, 1838 (Orthoptera:

Pyrgomorphidae), consisting on *C. (Chrotogonus) senegalensis senegalensis* (Krauss, 1877), *C. (Chrotogonus) trachypterus trachypterus* (Blanchard 1836), *C. (Chrotogonus) homalodemus homalodemus* (Blanchard 1836), *C. (Chrotogonus) oxypterus* (Blanchard, 1836), *C. (Chrotogonus) turanicus* (Kuthy, 1905), *C. (Chrotogonus) hemipterus (*Schaum, 1853) were identified. The investigation was also based on a comparative study of eyes shape of six species/subspecies of genus *Chrotogonus*. The eyes shape of *C. (Chrotogonus) s. senegalensis* are oval, *C. (Chrotogonus) t. trachypterus,* have brown prominently granular, *C. (Chrotogonus) h. homalodemus* have oval, *C. (Chrotogonus) oxypterus*, have circular, *C. (Chrotogonus) turanicus* have oval in warded and in the head region of *C. (Chrotogonus) hemipterus* eyes are oval and outward.

ENT-10

THE MODELING AND FORECASTING OF GRASSHOPPER DISTRIBUTION IN THAR DESERT PAKISTAN

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The relationship between species and environment are an important source for the study of biodiversity patterns. Most academics have found the distribution of indicator insects such as grasshoppers at the local community scale; nevertheless, a few analyses on the distribution of indicator insects in grassland in Pakistan. Here, we predict Thar Desert of east and south of Pakistan species richness distribution, and to ascertain the potential underlying causal factors. The diversity hotspots are placed in the southeast and east of the research area which have moist environment, the grasshopper is mainly influenced by temperature and precipitation. The findings highlight the significance of management and conservation strategies for grassland with Desert and also offers evidence for assessing grasshopper diversity in various areas of Thar Desert.

ENT-11

SYSTEMATIC STUDY OF TWO SPECIES OF GENUS *HEDOTETTIX* OF FAMILY TETRIGIDAE (CALIFERA: ORTHOPTERA) WITH NEW RECORDS FROM SINDH, PAKISTAN

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Pygmy grasshoppers are between ~14-20 mm in length, and they may be identified by their lengthy pronotum, which runs the whole length of the abdomen. Pygmy grasshoppers frequently inhabit ponds and streams and rarely encountered in dry settings, sand with lichen, rice fields, woods, and sandy areas. These grasshoppers particularly harm crops by eating the root systems of plants, saplings, wet meadows, fungus and algae. In this regard, two Tetrigidae species of the genus *Hedotettix* Bolivar, 1887 are studied viz., *Hedotettix costatus* Hancock, 1912 and *H. angustivertex* (Bolivar, 1908), being new national and state records. The systematics of Tetrigidae in Sindh have been disclosed by identification based on morphological characterization, ecological dispersion, images, line art, and measurements of several metrics in order to provide a taxonomic key to the Sindh species.

ENT-12

ANALYSIS ON EVOLUTIONARY PERSPECTIVE OF UNUSUAL SEXUAL BEHAVIOUR IN ACRIDOMORPHA SPECIES

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The courtship and mating behavior of orthopterans provide some of the most complex and fascinating spectacles of the insect world. Orthoptera use sound visual, tactile, olfactory signals and Visual communication for mating, where males often have bright, species-specific markings on different parts of their bodies, displayed in carefully choreographed sequences during courtship. However, this fantasying behaviour is little studied from this region. Therefore, present effort is being made. During the present study it was noted that empirical observations of homosexual sexual behaviour in animals cause evolutionary aspects by the same participants. Although indiscriminate sexual behaviour was less focused. Therefore, we provide a strong hypothetical statement that dominant individuals may express their social status, including mounting subordinate, pair bonding, copulation, or genital contact. However, indiscriminate sexual behaviour was likely to be more in passive males who were less attractive or less choosy by females or misidentifying the sex partners. Our findings imply that homosexual interaction can be costly and may have significant ramifications for the evolution of the mating system and show indirect benefits for controlling insect pests to valuable crops.

ENT-13

COMPARATIVE STUDY ON THE PHALLIC COMPLEX OF TWO GENERA OF *OXYA* AND *OXYINA* (OXYINAE: ACRIDIDAE: ORTHOPTERA)

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A comparative study of phallic complex was carried out in eight species representing two genera *Oxya* and *Oxyina* of subfamily oxyinae. An attempt has been made to describe and illustrate the different structures, namely, epiphallus, aedeagus, supra-anal plate and cerci of the male, and spermatheca, ovipositor, subgenital plate, supra-anal plate and cerci of the female, in *Oxya* and *Oxyina* with an aim to discover their significance in order to make the identification of genera and species, together with other generic characters more perfect and convenient. Distinct family characters are shield or bridge-shaped condition of epiphallus, oval sclerites and lophi on epiphallus; divided, undivided or flexured condition of aedeagus; presence or absence of gonopore process on aedeagus; condition of apical and pre-apical diverticula of spermatheca, female subgenital plate rounded or conical. Stable characters for separating the genera are taken to be presence or absence of ancorae on epiphallus, long or short condition of aedeagal sclerites, elongate, slender or short and broad condition of ovipositor valves: presence or absence of setae on posterior margin of female subgenital plate and shape of diverticula of spermatheca. Useful generic characters are shape of male supra-anal plate and cerci, broad or narrow condition of bridge, presence or absence of branch of bridge connecting lophi with bridge of epiphallus; presence of lophi of epiphallus, length and upcurved or downcurved condition of apical valve of aedeagus, shape of posterior margin of female subgenital plate, presence of setae on the whole posterior margin or confined to lateral margins toothed, tuberculate or smooth condition of ovipositor valves, length of the lateral apodeme in relation to the dorsal valves. Specific characters are shape of egg-guide of female subgenital plate, shape of ovipositor valves and apical tips, shape of male supra-anal plate and cerci, size of anterior and posterior lobes of lophi of epiphallus, size and shape of ancorae, shape of apical valves of aedeagus; and size of apical and pre-apical diverticula and presence of protuberance on pre-apical diverticulum.

ENT-14

SOME INTERESTING FACTS OF CICADAS (HEMEPTERA: CICADAS) FROM SINDH, PAKISTAN

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Cicadas are the most wandering group of insects. They have very unique characteristics. They are easily recognized by their loud noise. Its members were captured at 3.30 o, clock of noon which is a very preferable time of the species at the village of district Larkana. Species were collected, identified and preserved in the entomological method. The measurement and drawing line were taken and their indicative feature was also discoursed. During this study its defense mechanism predator fool hardiness, playing dead, alarm squawk mortality factors were discussed on different host plants along with its management through natural enemies.

ENT-15

REVIEW OF GENUS *GRYLLUS* (GRYLLIDAE: ORTHOPTERA) FROM SINDH PAKISTAN

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Field crickets are connected with superfamily Grylloidea, order Orthoptera and suborder Ensifera and they are also known as long-horned grasshoppers because they consist of long antennae. Sindh is agricultural land which consists of different types of crickets such as field crickets, mole crickets and house crickets. The crickets of genus *Gryllus* are known as field crickets. Sindh is the agricultural land which consist of different types of habitats such as herbs, grasses and shrubs, here we selected three species of subfamily Gryllinae which are *Gryllus (Gryllus) bimaculatus* Degeer,1773, *Gryllus (Gryllus) campestris* Linnaeus, 1758, and *Gryllus septentrionalis* Walker, 1869. The population of genus *Gryllus* is maximum in Sindh in the months of April to September. Climate and weather conditions are varied time by time and these variations bring changes in rainfall. In these months the average temperature is 25^0C to 42^0C respectively. The various interesting facts are found in genus *Gryllus* that they produce aggressive behavior for two reasons, one for the mating process secondly to protect their territory. The review of this genus is necessary from Sindh because research on these field crickets are very significant for us and for agriculture. This type of exertion will be the first of its kind and will be of great help to organizations, agencies and institutes dealing with pest control.

ENT-16

MORPHOMETRIC DIFFERENCES BETWEEN *HIEROGLYPHUS ORYZIVORUS* AND *HIEROGLYPHUS BANIAN* (HEMIACRDIADANE: ACRIDIDAE: ORTHOPTERA)

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Hieroglyphus are the important pest of agriculture especially paddy crops, they occur throughout Indo-Pak agriculture and important ecological zones. From the genus *Hieroglyphus oryzivorus* are serious pest and has tendency to produce weak swarm in favourable condition and pay considerable loss to crops while *Hieroglyphus banian* is morphologically are very similar to *H.oryzivourus* but do not produce swarm so it is necessary to clarify this confusion . Both species have medium size Integument of *H.oryzivorus* is finely shallow and pitted while Integument of *H.banian* is finely raguse .In H.*oryzivorus* Fastigium of vertex twice as board as along , and the carinula of vertex absent in other specimen of *H.banian* Fastigium of the vertex as board as long with an elongated depression in the center.Forntal ridges of *H.oryzivorus* is divergent downward with moderately shallow sulcus while in the case of H.banian Frontal ridge is with moderately deep sulcus. In the *H.oryzivorus* The posterior sulcus of the pronotum is bow- shaped at the center , posterior at the center , posterior margin of the metazoanais rounded meanwhile in the *H.banian,* The first sulcus present laterally second centrally , third and posterior sulcus entire wavy , posterior margin of the metazoan obtuse – angular. Both species has the Prosternal process conical.In the *H.oryzivorus* Mesoternal interspace is closed while in the *H.banian* it is open about twice longer then maximum width , Both species has metaasternal interspace is closed. Apices of the folded tegmina and wings extend as long as the tip of the abdomen in *H.oryzivorus* but in the *H.banian* Tagmina and wings reach up to abdomen. Hind femur of both species is moderately cylindrical. Supra – anal plate relatively broad in *H.oryzivorus* while in the *H.banian* Supra anal plate longer then wide apical part with two ridge-like elevation. General coloration of *H.oryzivorus* is pale green or buff brown patches , sulci on the brown with black bands yellowish stripes , all sulci on pronotum are black , winge hyline , small pale brown , hind femur sulcus joins knee with black pronotum pale green with of tabia is brown sulci sides of the thorax black bands between segments , wings the veins pale green . buff or black. Brown. While in the case of *H.banian* General coloration green or yellowish with antennae brown with pronotum with broad laterally , second sulcus with only black patches each end , third veins dark first laterally , dorsum of greenish buff , hind narrow , pale patches on both sides , base with black above tabia blueish gray , tip of spines black tip of bifurcate circus hyline.

ENT-17

COMPARISON OF GRASSHOPPER COMMUNITY BEFORE AND AFTER THE FLOOD 2022 IN HYDERABAD DIVISION, SINDH PAKISTAN.

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Recent flood-2022 not only, affected millions of people but also deprived the living habitat of invertebrates including orthoptera insects. The study was planned to estimate diversity and distribution of grasshoppers and locusts after flood in crops land of Hyderabad Division, Sindh. The diversity assessed by sampling 6 randomly selected sites during Sep to Dec 2022. Maximum population were recorded during September (45%) and lowest population were recorded during December (11%). Total 433 specimens were collected amongst 217 were immature while 216 were adults. Data were subjected to statistical analysis and interpretations which indicate the presence of 13 species from 8

genera, 4 subfamilies and 3 families. The most abundant sub-family was Oedipodinae (genus *Aiolopus*) which was found (174). The less abundant sub-family Acridinae (genus *Acrida*) which were found (22). Usually, these species are found in maize, cotton and rice but in the month of Sep-Nov these species were mostly found in mango and banana fields. Post-flood results were also compared with pre-existing species of grasshopper in this region. It was noted that densities were reduced to less than 67.5% of their average values immediately after the 25-year flood in Sindh.

ENT-18

FLOOD EFFECT ON HABITAT AND BURROW CHARACTERISTICS OF *SCHIZODACTYLUS MONSTROUS* (DRURY, 1773) IN SINDH PAKISTAN

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The *Schizodactylus monstrous* (Drury, 1773) usually known as moochaar, dune and maize cricket. They are nocturnal, carnivores and cannabolic in nature, they live inside the burrow and are very active at night, particularly between 2Am to 5Am. However, information pertaining to the habitat and architecture of burrows determining the occupancy of these burrowing insects are unknown. The present study was carried out to understand the external and internal burrow features and to identify those factors determining the insect assemblage and their co-occupancy in Sindh after flood 2022. An extensive field survey was carried out during June-August 2022. It was noticed that burrow excavating behavior is very unique each stage has its own barrow with different size, they prefer to lives in humid area and avoid dry places and direct contact to the sunlight they are burrow maker species they continue burrowing until they found moist place, mostly specimen collected from the slope region, the deepest burrow of adult is calculated about 70-74 cm in depth and 6-7.1 cm in width. The width and burrow of various nymphal stages is different from each other. Due to its digging behavior, they increase the fertility of agriculture fields, it has been observed that in flood 2022 their emergence was reported significantly higher at Larkana Madeji Sukkur and they migrated to the nearest agriculture field and feed on agriculture pest, however, they consume vegetation as well when they are not comfort. The study involves non-invasive methods of camera trapping and the use of a burrow video camera to understand the burrow architecture and assemblage of insects dwelling inside.

ENT-19

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

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Mehrano forest is situated in Khairpur District of Pakistan province of Sindh. It comprises agricultural land, forest, and hunting area and considers home to various flora and fauna. Due to this reason, it has a wide diversity of insect's fauna particularly orthoptera but still it is untouched, and no single survey was conducted before this to document and discover the hidden wealth of this desert. Therefore, a present attempt is being carried out and fortnight surveys were designed to explore its orthoptera wealth. In the result of survey, a total of 618 specimens were collected and sorted out into 02 super families i-e Acridoidea and Pyrgomorphoidea pertaining to 02 families: i-e Acrididae and Pyrgomorphidae along with 17 species viz: Acrididae *Acrida exaltata* (Walker, 1859), *Truxalis eximia eximia* (Eichwald, 1830), *T. fitzgerald* (Dirsh, 1950), *Duroniella laticornis* (Krauss, 1909), *Acorypha glucopsis* (Walker, 1870) ,

Heteracris notabilis (Uvarov, 1942), , *Oxya hyla hyla* (Servile, 1831) and *O.fuscovittata* (Marschall), 1836. *O.velox* (Fabricius, 1787), *Anacridium aegyptium* (Linnaeus, 1764), *H. littoralis* (Rambur1838), *Aiolopus thalassinus* (Fabricius, 1781) and *A.thalassinus tumulus* (Fabricus, 1798). *Chrotogonus trachypterus trachypterus* (Blanchard, 1836), *Pyrgomorpha bispinosa bispinosa* (Walker, 1870)), *Pyrgomorpha bispinosa deaerti* (Bei-Bienko & Mistshenko) *Poekilocerus pictus* (Fabricius, 1775). Detailed taxonomic study is an immense need of this group from Mehrano forest which is under process. We believe exploring this fauna will be a good addition to the existing pool of knowledge.

ENT-20

NEW RECORDS OF SUBFAMILY TENEBRIONINAE AND PIMELIINAE (COLEOPTERA: TENEBRIONIDAE) IN LOWER SINDH PAKISTAN

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Tenebrionidae is the fifth largest and one of the most diverse families within the order Coleoptera that contains more than 18,000 insect species (15000 described) worldwide. Darkling beetles widely existed in Pakistan and caused economic damage to the number of agricultural crops including diversity injure in bulk, mold/conditioning issues, and regulatory issues surrounding foreign material, stored raw commodities ranging from loss of volumes. In the processing, manufacturing, distribution, and retail segments, these pests pose a food safety risk for adulterating items produced or stored. Still nothing exists on the said subject; therefore, present study was planned. This study was conducted on the diversity status of two sub-families of Tenebrionidae which has significant impact on crops. Extensive surveys were carried out during the year 2020-2021 light and pitfall traps were used for collection (traps were monitored fortnight) however, large samples were also picked up by hand from various regions of Sindh Pakistan. While 05 species belonging to subfamilies of Tenebrioninae and Pimeliinae of family Tenebrionidae were determined as new records from lower Sindh Pakistan. In this survey a total of 300 specimens of Tenebrionidae were collected and sorted out into five species. The number of species belonging to subfamily Pimeliinae were *Pimelia capito* (Krynicky, 1832) and *Trachyderm phalistinia,* (Reiche and Saulcy, 1857). However, subfamily Tenebrioninae comprise to *Ulomo simplex* (Kaszab, 1980*), Aphitobius diaperinus* (Panzer, 1797) and *Gonocephalum hispidocostatum* (Fairmaire, 1883) from lower Sindh Pakistan were increased. The most dominant species was *Trachyderma phalistinia* (Reiche and Saulcy, 1857), Followed by *Aphitobius diaperinus* (Panzer, 1797) were captured for the first time; they are new records for this region. It was also noticed that many of the larger species are flightless and not capable of high flight. i.e., *Ulomo simplex,* this behavior is under observation and needs more research in the near future.

ENT-21

SYSTEMATIC & INCIDENCE OF BLISTER BEETLE *HYCLEUS PUSTULATUS* (COLEOPTERA: MELOIDAE) FROM HATRI, DISTRICT HYDERABAD SINDH

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Hycleus pustulatus (Thunberg, 1791) is a species of blister beetle belonging to the Meloidae family found in South Asia. The present study focuses on the Diversity of *H.pustulata* (Blister Beetle)in District Hyderabad. During field

work it was observed that *H.pustulata* mostly feed on the flowers of *Luffa aegyptica* (Toree) and eliminate waste material on the leaves of toria plant. Field surveys for studying the host range of blister beetles were conducted in this region. The waste material of blister beetles contains the chemical called Cantharidin, a very toxic substance that protects the beetle from predators that would kill and eat the blister beetle. Blister beetles (Meloidae) are cosmopolitan in distribution except from New Zealand, Antarctica and most Polynesian islands. Many host plants of the blister beetles belonging to various families were reported. Blister beetles were once considered minor pests but have assumed a major pest status in recent years in various parts of the world. Adults feed mainly on flowers from a wide range of plant families. The first larval instar is an active triungulin form that is a predator of soft insects such as aphids. While the young are often beneficial to crops by suppressing other plant feeders, the adults can be a problem when present in large numbers. Flower feeding leads to lower yield and this can be a problem in some leguminous crops. They are however easily controlled by manual collection. The study highlighted that one of the many handicaps in the management of blister beetles is the occurrence of a wide range of alternative hosts.

ENT-22

OBSERVATION ON CICADELLIDAE (HEMIPTERA: INSECTA) FROM THAR SINDH

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Leafhoppers are abundant in the tropics and subtropics areas. The damage is worse on the second harvest of the year. Amongst the number of pest species leaf hoppers are major agricultural pest in Tharparkar injuring many crops through both direct feeding and transmission of viral and bacterial plant pathogens. Leafhoppers prefer sheltered parts of plants such as aboxial sides of leaves, whorls and stem tissues and this is the greater protection from predators and greater access to vascular tissues from which they feed. Feeding with piercing sucking mouth parts results in phloem blockage within the plant and produces yellowing of the leaf (Chlorosis). This symptom is known as hopper burn which causes reduced photosynthesis resulting in shorter and less productive plants. The damage is worse on the second harvest of the year. During the present study preliminary survey were carried out to know the infection of this pest. Leafhoppers are the vectors that transmit the largest number of propagative viruses of any vector group, in addition to their capacity to transmit semi-persistent viruses.

ENT-23

DIVERSITY AND PHYLOGENETIC RELATIONSHIP OF ACRIDIDAE (CAELIFERA: ORTHOPTERA)

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During the present study extensive survey were carried out in Sindh and fair numbers of specimens were collected and sorted out into 26 species i.e. *Acrida exaltata, Acrida willemsei, Acrotylus humbertianus, Acrotylus longipes longipes, Acrotylus longipes subfasciatus, Aiolopus simulatrix*, *Aiolopus thalassinus thalassinus, Aiolopus thalassinus tumulus, Anacridium aegyptium, Eyprepocnemis alacris alacris, Heteracris adspersa, Heteracris littoralis, Hilethera aelopoides, Locusta migratoria, Ochrilidia geniculata, Ochrilidia gracilis gracilis, Oedaleus senegalensis, Oxya hyla hyla, Oxya velox, Phlaeaba tenebrosa, Schistocerca gregaria, Spathosternum prasiniferum, Sphingonotus savignyi, Truxalis eximiaeximia, Truxalis fitzgeraldi and Hieroglyphus nigrorepletus* were collected which belong to family

Acrididae 8 sub families Acridinae, Oxyinae, Spathosterinae, Gomphocerinae, Eyprepocnemidinae, Cyrtacanthacridinae, Oedipodinae and Hemiacridinae. In addition to this, biodiversity Index, Simpson Index of Biodiversity and Species Richness were done in order to know the diversity of species. Present study is very helpful for extension wings and other agencies to adapt control measures at appropriate time. This is the first ever effort on documentation of grasshopper diversity in upper Sindh province, Pakistan. In addition to this, for molecular characterization about 26 species were submitted to iBOL Guelph University, Canada out of which 5 species were successfully barcoded. Among the various taxon distance summaries within species, genus was noted with the lowest value distance was 0.3%, average mean distance was 1.18%, and distance variance 0% - 0.35% however, within families, it was noted that the minimum and maximum distances were both 0% - 0.5%, and SE distance 1.25% - 5.23% was analyzed maximum. The identification of species in this study, which contributes to taxonomy, mainly relies on molecular methods like DNA barcoding. DNA barcodes will be an essential phylogenetic tool for revealing community evolution as well as an accurate forensic tool for examining community dynamics.

ENT-24

OBSERVATION ON SELF-PROTECTIVE SOUND FABRICATION IN SUBSPECIES *MANTIS RELIGIOSA RELIGIOSA* (MANTODEA: INSECTA)

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Mantodeans (Praying Mantids) are bunch of fascinating insects because of their spectacular body shape, colour and behaviour. Among the insects, mantids are the creepiest group of creatures because they walk with a slow deliberation, smacking in plain sight, normally undetected by even the utmost attentive of nature's assessors. When mantids feel defenseless, many species stance tall and spread their forelegs, with their wings fanning out wide this fanning of the wings makes them look bigger and more aggressive, few species amplifying this effect with bright colors and decorations on their hind wings along with inner surfaces of their front legs like stick mantis, show rocking behavior in which the insect makes rhythmic, repetitive side-to-side movements display resemblance to vegetation moving in the wind. Few species during bluffing threat display produce a hissing sound by expelling air from the abdominal spiracles. Mantises lack chemical protection, so their displays are chiefly bluffed. Numerous species of mantids execute self-protective displays during close-range flukes with predators. In adult *Mantis religiosa religiosa*, this display involves both visual and aural by abdominal-alarming stridulation. Such type of bi-model (visual-acoustic) defensive display that occurs in this subspecies is not unusual among other mantids. During rearing period the audio-visual defensive behaviour was perceived in collected rearing subspecies i-e *Mantis religiosa religiosa*. Especially a magnificent self-protective snake like “Hissing” sound was detected in female.

ENT-25

NEW RECORDS OF GRYLLIDAE (ENSIFERA: ORTHOPTERA FROM RICE CROPPING SYSTEM IN SINDH

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Sindh is famous for agricultural fields. It has a different cash cropping system mostly sugarcane, rice, wheat, maiz, fruits and vegetables grown here. Rice is cultivated on 2.5 million hectares which occupies about 10.9% area. Which

produces 5.1 million tons of milled rice. Gryllidae covers the wide habitats such as trees, herbs /shrubs, small vegetation / grasses to swarmp etc. An extensive survey was carried out in Sindh and fair numbers of species including 8 new records viz: *Absonemobius septentrion* Desutter-Grandcolas & Hugel, 2016, *Absonemobius alatus* Otte, 2006, *Mirigryllus nigrus*. He *et al.,* 2020, *Modicogryllus (Modicogryllys) pallipalpis palustris* (Chopard, 1959), *Modicogryllus truncate* (Tarbinsky, 1940), *Gryllus lineaticep* Weissman (1980), *Lepidogryllus siamensis* Chopard, 1961, *Gryllomorpha (Gryllomorpha) dalmatina* (Ocskay, 1832**)** were reported from rice field. We believe that data obtained through this study will be very beneficial in many ways and it will help policy makers regarding pest control strategies. It will guide the extension wing of agriculture department pest warning agencies entomologists, academics, farmers too.

ENT-26

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-27

REARING OF PRAYING MANTIDS (MANTIDAE: MANTODEA) AND THEIR PREDATORY EFFICIENCY FROM SINDH, PAKISTAN

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The food or the prey is procured differently by different predators with the help of special capabilities i.e Mantidae and Mantodea is amazing especially when they capture large prey. Mantodea is a group of mostly large and conspicuous predatory insects with versatile, unique and special capabilities. They prey upon a wide array of animals,

ranging from springtails to small vertebrates hence are the best biological pest control agent. Observing the feeding behavior of praying mantids under natural conditions is difficult due to their speed, camouflage, low lying in vegetation etc. That's why this study was under taken to rear the praying mantids in the green house and in Laboratory conditions to check their predatory efficiency. Consequently their oothecae (egg case) were collected sorted out for raring. The collected oothecae fixed in aerated cadges with all required factors.

ENT-28

FOOD SELECTION IN *EUCONOCEPHALUS* SPP. (TETTIGONIOIDEA: ENSIFERA) IN CHOLISTAN DESERT

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Tettigonioidea are phytophagous insects some of the species are important pests of agricultural crops while many species are ecologically associated with forest biocenoses, damaging trees and shrubs. In addition to herbaceous plants, these facts extend the range of injurious plants to forest, fruit orchards, berry shrubs and grasses. For this purpose, food selection was studied by the observation of individuals feeding in the field, by analyses of crop contents and fecal materials, and by differential feeding tests. The first two measure the choice of food made by the insects in their natural environments because of their food preferences, the availability of their foods, and other factors. The resulting data, notwithstanding an expected variation, show a gratifying overall agreement sufficient to warrant the conclusion that food selection can be rather accurately measured using several simple techniques, each of which contributes in its own way to the result. The stock of insects were collected from desert and semi-desert regions encompassing vegetation with the assistance of examination script-net as well as by hand picking. Nymphs and adults was collected during the field survey and carefully put into large plastic jars and transferred to the laboratory for rearing where 25 plant leaves were serve them individually and in captivity. Fertility, fecundity, and survival of insects were noted on different food plants. In this study I just focus on food selection of *Euconocephalus spp.* species but the parameter concerned with element composition will be helpful to plan the control method at appropriate time but it is recommended that, with the addition to the more straightforward plant-herbivore- natural enemy interactions, plant chemistry may also mediated indirect interactions between different herbivores feeding on the same host plant, between herbivores and pollinators, pollinators and natural enemies, and even between different types of natural enemies. This study could be also fruitful to undertake control methods at the time.

ENT-29

OBSERVATION ON FIELD EFFICACY OF *BEAUVERIA BASSIANA* AGAINST ADULT INSECTS

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Entomopathogenic fungi *Beauveria bassiana* (EPF) are regarded as viable alternatives to insect pest control chemicals that contain a large amount of protease enzyme, which degrades the proteinaceous substances in insect cuticles. The aim of this study was to evaluate the field efficacy of protease-producing EPF against adult insects. For this

purpose, different insects from different order were collected and application of *Beauveria bassiana* were adopted after each spray observation was noted. Suppression in population of insects was main target of study.

ENT-30

DIVERSITY OF BEETLES FAUNA FROM CHOLISTAN DESERT

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Almost 40% of described insects and 25% of all known animal life-forms; new species are discovered frequently, with estimates suggesting that there are between 0.9 to 2.1 million total species. Some species are serious agricultural pests, such as the Colorado potato beetle, while others such as Coccinellidae (ladybirds or ladybugs) are important predators of a number of soft-bodied insects and mites, including aphids, scales, and mealybugs. Insect pests are undoubtedly the most adapted form of life as their total numbers far exceed that of any other animal category. Unfortunately, the insect fauna of Cholistan is still untouched. Keeping in view the importance of presence of insect diversity, a faunal survey was carried out at Cholistan desert in order to record The Coleoptera, with about 400,000 described species, is the largest of all orders, constituting the faunal biodiversity in selected habitats along with collection, identification and comparison of species richness, abundance and evenness of insect fauna. For the first time, the insect species diversity of the region is described. Beside this, an introduction is provided to threatened species of insects, and a strategy for conservation of insects were also discussed. This study helped in learning a great deal about the behavior and relationships between insects and plants in the fields; it also helped in the management of agro-ecosystems. It is also likely that important insights gained from such research can be exploited to develop more effective control of these species in near future. The collected insects were identified on dissection microscope based on morphology with the help of the keys available in literature. Statistical analysis was performed to evaluate the relevance of prevalence according to the animals or sampling regions by the Chi square test using SPSS and ANOVA. In this survey study about 8 species were found in large numbers that includes *Blaps pruinose, Pimelia bipuncata, Scarabaeus cristatus, Cyclocephala borealis, Julodis aequinoctialis, Anthia sexguttasta, Calosoma eremicola* and *Trachyderma lima. Blaps pruinose* were found in greater number that was followed by *Pimelia bipunctata* and the beetle that was found in lesser number was *Julodis aequinoctialis.*

ENT-31

SYSTEMATIC STUDY OF TETTIGONIOIDEA SPECIES FROM BAHAWALPUR

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Tettigoniidae (katydids) are a diverse group of insects that are well known for their leaf-like camouflage and acoustic signaling. During the present study a detailed survey has been carried out in different regions of Bahawalpur and fair numbers were collected and sorted out into different species it was noted that they have many ecological importance which, make them a strong model for studying variation amongst different taxa. However, detailed morphological study is under way in order to know better about this group.

ENT-32

BIODIVERSITY OF CAELIFERA (ORTHOPTERA) FROM TEHSIL YAZMAN

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Yazman is located at a starting point of Cholistan, 32 kilometers from District Bahawalpur, Punjab. In fact, it is a seven to eight decades' older city. Apart from it, it is also largest tehsil of this district. Yazman is commonly known as gateway to the Cholistan desert. Cholistan desert, a stretched part of great Indian desert, located in the southern part of the Punjab province of Pakistan. It is a chunk of the world's seventh largest desert, the Great Desert. In local dialect, it is called as Rohi, having latitudes 27º42′ and 29º45′North and longitudes 69º52′and 75º24′East, covers about 2.6 million hectares having a length of about 480 km while its width varies from 32 to 192 km. Based on texture, soil type, topography and vegetation structure this desert is divided into two distinct regions: the northern region which is also called Lesser Cholistan that covers about 7,770 km2 and the southern region which is also called as Greater Cholistan covers about 18,130 km2. In order to explore biodiversity of Caelifera from Yazman, seven different localities of Cholistan desert surrounding Yazman, were surveyed including 44 D.B, 12 B.C, 99 D.B(w), 39 D.B, 45 D.B, 98 D.B and 95 D.B. The research was carried out from Jan 2022 to Dec 2022. Sampling was accomplished during four trips arranged in following manner; first trip (Jan to March), second trip (April to June), third trip (July to Sep) and fourth trip (Oct to Dec). Total 730 Samples were collected by handpicking and aerial netting. Out of samples, 319 were males and 411 were females. Samples were sorted into 5 sub-families and 7 species including *Chrotogonus tracypterus tracypterus, Heteracris littolaris (*Rambur, 1838)*, Schistocerca gregaria, Oxya spp., Poekilocerus pictus* (Fabricius, 1775) and *Truxalis eximia eximia. Heteracris littolaris* was found to be most abundant species followed by *Poikilocerus pictus*. Least abundant specie was *Schistocerca gregaria*. Cholistan desert, rich in grasshoppers' fauna is still understudy.

ENT-33

SYSTEMATICS STUDY OF DESERT BEETLES (COLEOPTERA) FROM CHOLISTAN

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Coleoptera is the largest organismic group on the Earth comprising 400,000 species that inhabit a variety of habitats. Their hardened upper wings which are known as Elytra distinguish them from all other insect groups. Being one of the diverse habitats they are also abundant in the desert ecosystem. In these harsh conditions they had attained such adaptations that helped them to be successful animals in deserts. One of the hottest and driest deserts of Pakistan is Cholistan desert that is located in the southern part of Punjab, Pakistan. The Cholistan desert covering an area of 26,000 km^2, lies within South of Bahawalpur in the Punjab extending through the Nara and Thar deserts of Sindh between 27°42′N and 29°45′N latitude and 69°52′E and 75°24′E longitude at an altitude of about 112 m above sea level. This desert has a length of about 480 km while the width varies from 32 to 192 km. Beetles constitute the main component of insect communities in arid landscapes. They inhabit these landscapes in close interaction with plants, using them as food resources, for shelter, and as development sites. This study aimed to explore the Cholistan desert and to identify their systematics. The research was carried out from Jan 2022 to Dec 2022. Sampling was accomplished during four trips arranged in the following manner; first trip (Jan to March), second trip (April to June), third trip (July to Sep) and fourth trip (Oct to Dec). 940 beetles were collected during the trips. 9 species belonging to the families Tenebrionidae,

Carabidae, Scarabidae, Buprestidae, Curculionidae and Coccinellidae were collected. These 5 families contained 9 different species which are identified by their morphological features. Despite being the tough ecosystem, beetles are numerous. Further molecular study is under way for their accurate classification and tracing its phylogeny.

ENT-34

DIVERSITY OF PRAYING MANTIS (MANTODEA: DICTYOPTERA) FORM TEHSIL HASILPUR

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Praying mantids (Mantodea Burmeister 1838) form an order of exclusively carnivorous insects. Mantids belong to the top predators of the arthropod community. Some species wear cryptic colours and resemble leaves, flowers, sticks or bark. Mantids are characterized by their highly specialized raptorial forelegs and a mobile head with powerful compound eyes that allow for binocular sight. An elongated prothorax is also typical. During survey a total of 73 praying mantids, were collected from different habitats. A detail morphological and morphometry account of 10 species were prepared and present in this study and extensive survey is still under progress.

ENT-35

INFESTATION OF MACROPARASITES (*EUTROMBIDIUM LOCUSTARUM*) IN GRASSHOPPERS POPULATION FROM RICE FIELD

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The results of this study showed that host range of *Eutrombidium* is obviously restricted to Acrididae. At present, it was observed that proportional survival was found to be lower in mites-parasitized specimens. Females of these three species had reduced initial and total reproduction as compared to un-parasitic species. Egg production significantly reduced to 47.23±510.23, 98.67±11.43 and 51.56±12.40 with mite's parasitism species while Riffat and Wagan (2007) collected significantly high numbers of eggs as 57.02±17.93, 114.16±39.05 and 60.16±18.22 for *H. perpolita, H. oryzivorous* and *H. nigrorepletus* respectively. As far as survival time of individuals is concerned, mites parasitism is also significantly effective for the present survival of *Hieroglyphus* species and was reported as 20.32±3.43, 42.39±8.46 and 37.25±7.93 days for male and 16.30±2.61, 35.73±10.26 and 25.63±8.40 days for females of *H. perpolita, H. oryzivorous* and *H. nigrorepletus* respectively, while for non-parasitic species, Riffat (2008) recorded 25.81±3.79, 50.83±8.40 and 44.62±7.60 days for male and 19.92±2.13, 41.82±10.89 and 35.10±7.85 days for female of *H. perpolita H. oryzivorous* and *H. nigrorepletus* respectively. These findings showed that mite's parasitism has significant effect on the reduction of the fecundity and longevity of host species.

ENT-36

OBSERVATION ON HABITAT OF PHANEROPTERINAE (ENSIFERA: ORTHOPTERA)

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The Phaneropterinae family is commonly known as leaf crickets, leaf katydids, or true bush crickets. These insects feed on organic matter and are classified as predatory. In their natural habitat, they are nocturnal, which means that during the day they are much less active than they are at night, when they are completely active. This means that they become less active during the day. Species belonging to the family Phaneropterinae spend the day hidden in thick vegetation consisting of the leaves of trees and shrubs. During the night, these species engage in reproductive activities after emerging from their daytime slumber. They are very active during the night but not at day. Rice, sugarcane, wheat, fruit orchards, berries, herbs, shrubs, and bushes are the agricultural crops that contain significant quantities of them. They are also found in bushes and shrubs. Other crops include the following: They do this in specific locations, such as underneath bushes and trees, or in the branches or leaves of those locations.

ENT-37

STUDY ON OVIPOSITION BEHAVIOR OF ACRIDIDAE (CAELIFERA: ORTHOPTERA)

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During oviposition behaviour the ovipositor expresses several different sequences of rhythmical movements. The first part of the behaviour consists of digging a deep hole in the ground. To accomplish this, the animal begins by pressing the abdomen tip into the ground while making sweeping opening and closing valve movements. Once the ovipositor has become engaged in the substrate, the female simply stands on the surface while the ovipositor burrows beneath her. The result is that the abdomen becomes enormously extended into the ground. To allow this, the soft cuticle between some abdominal segments and the intersegmental muscles are modified permitting about 10-fold length changes without damage. After the hole has been dug, the abdomen tip retracts slightly from the bottom, and pauses. Soon, very rapid opening and closing movements of the valves ensue, and then the first egg slowly emerges during a sustained gaping posture assumed by the valves. Once the egg has emerged the valves close, whereupon the egg drops to the bottom of the hole. The closing of the valves reverses the initial orientation of the egg (50-100 eggs in all), which assures that when the future embryo develops the head will be positioned upwards. Following the deposition of each egg, rapid opening and closing movements are repeated. These movements are accompanied by the secretion of a small amount of white frothy substance from the accessory glands. The egg-laying process continues until all eggs are laid forming an 'egg-pod' while the abdomen slowly retracts from the bottom of the hole. The final portion of oviposition behaviour is the capping of the egg-pod with a large amount of the frothy substance.

ENT-38

A FIRST SYNTHESIS OF BALOCHISTAN SPIDERS (ARANEAE) FAUNA: ENDEMISM, VARIETY, AND TAXONOMY

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Describing and understanding the diversity of Balochistan spiders is a huge challenge in many aspects and lot of factors to research on comprehensive starting with a number of species of a mega diverse group, and the geographic distance and variety of habitats, from crops fields, indoor, rain, foliage, tress, deserts, Grasslands etc. Taxonomic studies in the region, as studying type specimens is fundamental for taxonomy, yet an expensive and laborious task. Currently this study is based on field surveyed and few families were identified from different districts. Total 2270 collected material examined during the month of march to February 2018-2020. This result comprises of the findings which were obtained through out the study total six families identified on basis of legs posture, eye pattern body size, pattern and colour number of silks producing glands and claws. the description of obtained six families from the current study were written followed by checking detail study with updating literature and keys. After description writing at family level the result was statistically analysed using morphometrics also followed. During analysis Lycosidae family was most abundant and numerically predominant family forming 42.02%, of the sample it was followed by family Tetragnathidae 18.36%, Salticidae 18.1%, it was followed by Pholcidae family 12.36%, Araneidae 9.03% and Theridiidae 0.08%. During present study the family with highest number of total families is Lycosidae. All families were recorded first time from province of Balochistan. This study is the pioneer step in the exploration and identification of Baluchistan's spider fauna. This will open doors for research in the fields of taxonomy, biodiversity behavioural and environmental studies of fauna present in Balochistan. Although it is not to easy task but we are working hard to achieve our objectives and full fill the requirements.

ENT-39

REVIEW ON MANAGING CANOLA APHIDS THROUGH CULTURAL PRACTICES

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Aphids are the major insect pests in canola crop. Aphids harm crops not only by sucking cell sap and secreting honey dew resulting in the formation of sooty mold but also by transmitting viral diseases. In extreme circumstances, losses may exceed up to 75% of the overall crop yield. The most common aphid control method among farmers is the use of pesticide. But these pesticides residues sustain in the environment resulting in pollution and human health hazards, which require any alternate method to control aphids. In Pakistan, to manage insect pests, cultural method had been praised by many workers. Such cultural practices play important role to minimize the aphid infestation in a number of crops and contribute considerable increments in farm produce. Cultural method involves altering sowing dates, planting methods, crop rationing and crop rotation, and intercropping and proves efficient in increasing crop yield. Garlic used as an intercrop with canola proves effective in increasing canola yield. Moreover, canola intercrop with cereals also reduced aphid population and enhance canola yield. Row to row distance more than 30cm with 9cm plant to plant distance considered as an effective component in IPM to control aphids. Despite the fact that these techniques significantly reduce insect pests, they were never truly examined. Hence, future research needs to explore different cropping patterns which ensure greater canola yield with higher oil contents and lesser aphids attack. Using these cultural practices can manage canola aphids without causing any hazardous effects to environment and other natural enemies.

ENT-40

DUNG BEETLES ARE AN IMPORTANT COMPONENT OF AGRICULTURE ECOSYSTEM

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Due to severe weather condition and other human activities arise many problems in Agriculture ecosystem. So that we can easily maintain agriculture ecosystem through Dung beetles. It's help to break down manure and transport nutrients to the subsoil, improving nutrient cycling, feeding soil biota, improving soil structure and reducing pasture spoilage. Species of dung beetles are also reported to be control agents for gastrointestinal parasites of livestock. Dung beetles are major members of agricultural ecosystems, and many researchers have explored how dung beetles help support the production of food. For example, flies that bite and disturb cows and other farm animals, lay their eggs in dung and the immature fly larvae then feed on dung when they hatch. Dung beetles help to keep farm animals like sheep, cows, and horses healthier by burying farm animal dung, so that it is not available for the flies to breed in. Dung beetles also help to reduce parasite infections of farm animals. Parasitic nematodes, which are tiny worms, are eaten by animals grazing in the pastures. The nematodes then multiply in the animals and their eggs are excreted in the dung. When the eggs hatch, the larvae migrate to the grass and are ingested by grazing animals, like cows or sheep, which quickly increases the infection rates. When dung beetles' tunnel through dung, they cause it to dry out. This kills the eggs, and reduces the numbers of parasitic nematodes in the pasture, which leads to fewer infected animals. This tunneling action also helps with the recycling and mixing of the soil, which aids the movement of nutrients through the soil so they can be available by plants. Because dung beetles are relatively small and often secretive, many farmers may not even recognize that dung beetles live on their farms. However, despite their small size, dung beetles save the cattle industry in the United Kingdom alone about £367 million per year. It's very effective way if we want to maintain our agriculture ecosystem. We need to focus on beneficial insects like that dung beetle because this species of insects maintain ecosystem through feeding behavior and nesting features. It's also maintained tropical species of plants in ecosystem. Species of dung beetles are also reported to be control agents for gastrointestinal parasites of livestock. We can easily use as bio control agents and as pollinators for different organisms.

ENT-41

EFFECT OF X-RAY IRRADIATION ON PUPAL DEVELOPMENT OF *BACTROCERA ZONATA* AND *BACTROCERA DORSALIS* REARED ON DIFFERENT DIETS

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In the present studies the strategies were made to determine the effect of different X-ray doses such as 20, 40, 60, 80 and 100 Gy on the pupae of the *Bactrocera zonata* and *Bactrocera dorsalis* reared on different diets. The tests were conducted on the laboratory strains of the Peach fruit fly and Oriental fruit fly reared on natural diet (Guava and Mango) and artificial diet. Results shown that ($P<0.05$) a significantly greater number of deformed adults (Males and Females) of *B. zonata* (27.20±1.43, 29.20±1.80) respectively were recorded from un-irradiated pupae reared on artificial diet followed by *B. dorsalis* (22.60±0.51, 28.20±0.86) respectively while minimum number of deformed adults (Males and Females) of both fruit fly species were recorded when reared on mango and provided with 100 Gy X-ray dose. Significant ($P<0.05$) maximum normal adult (Males and Females) emergence of both *Bactrocera* spp. (22.80±0.86,

21.40±0.68 and 34.60±1.33, 29.20±2.20) respectively were observed in non-radiated pupae reared on mango. Reduced number of normal emerged adults (males and Females) were recorded when maggots of both fruit fly species were provided with artificial diet and pupae irradiated with 100 Gy X-ray dose. Furthermore, ($P<0.05$) significantly higher partial pupal emergence of *B. zonata* and *B. dorsalis* (20.60±1.21, 19.60±0.51) respectively were recorded when larvae of fruit flies were reared on artificial diet of un-irradiated medium. Interestingly greater number of pupae did not emerge when larvae of both fruit fly species were reared on artificial diet and pupae supplied with 100 Gy dose of X-rays and higher number of emergence was observed in control with artificial diets. From above results it's determined that *B. zonata* is more tolerant to different irradiation doses. Results of the present investigation would be useful in developing suitability of X-ray irradiators to integrate the SIT programme in the orchard agro-ecosystem.

ENT-42

JUMPING SPIDERS OF PAKISTAN (ARANEAE: SALTICIDAE) TAXONOMIC AND NEGLECTED TAXA DIVERSITY

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The Faunistic surveys to explore the hidden biodiversity of Pakistan this is part of the ongoing Project of Taxonomy and Phylogeny of Jumping spiders (Araneae: Salticidae) of Pakistan since 2013. A total of 1000 specimens in the North-West part of Pakistan have been collected in the present study aimed to improve the understanding of species distribution, diversity and new to-science species. More diversity of spider communities was observed in refuges of small mountains than in agroecosystems. Climate change, Land conversion, desertification, flood and anthropogenic activities in mountains were observed as the major threads for the degradation of taxa diversity in North-West Pakistan that may lead to shifting/loss of novel and endemic species were observed due to.

ENT-43

POPULATION DIVERSITY OF SUBFAMILY CALLIPTAMINAE (ACRIDIDAE: ORTHOPTERA) FROM DISTRICT MATIARI, SINDH

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The present work was conducted during the year 2022. A total number of 85 specimenswere collected from various localities of district Matiari, Sindh. Material was sort outinto a single genus and 4 species followed by, Calliptamus baluchabalucha(Uvarov1938) 17.6%, C.italicus italicus (Rme 1930) 25.8%, C.barbarus barbarus(Costa1836) 49.4%, and C.tenuicerics (Tarb 1930) 11.7% under the subfamily calliptaminae. The current study was calculated from Shinnon and Simpson's diversity indextocalculate the species richness and evenness in the crops. The analysis of thisstudyindicates the highest number of C.barbarus barbarus (Costa 1836) 49.4%specieswhilelowest number of species was C.tenuicerics (Tarb 1930) 11.7%. This studywill contribute to know existing number of the genus Calliptamus fromthis district.

ENT-44

DIVERSITY OF FAMILY LABIDURADAE (DERMAPTERA) FROM DISTRICT HYDERABAD SINDH, PAKISTAN

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A total of 203 specimens were collected during the year 2019-2020 from Hyderabad district, Sindh, Pakistan. Materials were sort out into 1 family labiduradae belonding to 5 genus and 7 species followed by genus pseudoisolabis have 1 species is *pseudoisolabis burri (*Borelli, 1909*)* 12.31%, genus Forcipula have 2 species which is *forcipula quadrospinosa (*Dohrn, 1863*)* 15.76%, *Forcipula akbari (*M.s Wagan and N. Balouch*)* 18.71% and genus labidura have 1 species, *labidura riparia* (Palls, 1773*)* 14.77%, genus Nala have 2 species which is *Nala lividipes (*verhoeff, 1902*)* 12.31%, and *Nala Basilis (*B.Benkoi, 1970*)* 14.77% and genus Allostethus have 1 species *Allostethus indicum (*Bur Meister, 1838*)* 9.85%. These species were collected from different host plants. Its good addition in existing dominate species from this District.

ENT-45

STUDIES ON THE BIOLOGICAL PARAMETERS OF PREDACEOUS EARWIG *LABIDURA RIPARIA* (DERMAPTERA: LABIDURIDAE)

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Labidura riparia (Pallas), the earwig found worldwide in the tropical and sub-temperate regions. It is a nocturnal generalist predator that is considered an important potential biological control agent. It is the most studied predaceous earwig. In current studies the striped earwig, *Labidura riparia* (Pallas), was successfully reared at Advanced Entomology laboratory, Department of Zoology, University of Sindh Jamshoro under controlled laboratory conditions the eggs hatched in 8 to 10 days and developed into nymph on 34th day. While studies on similar parameters were also observed under field conditions as well and eggs were emerged from shallow tunnels in 6 to 8 days and development of nymphal stage occurred on 30th day at 34.1±1.1°C. Females are smaller and had 5 nymphal stages whereas larger male had 6 nymphal stages. Females with permanent mates produced an average of 10 egg batches during their adult life (114.8 days). Fertility and fecundity were reduced when females were paired with males for only 24 hours and then separated.

ENT-46

BIODIVERSITY AND GUILD STRUCTURE OF SPIDERS (ARACHNIDA ARANEA) FROM BANANA PLANTATION OF DISTRICT MATIYARI, SINDH, PAKISTAN

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Pakistan is rich in spider fauna and has diverse habitats, Spiders are ancient and successful group of invertebrates and known as poisonous arthropods. Mostly all species are poisonous and may feed on adults, sub-adults, and nymphs

etc. This quality makes them the most suitable potential bio-control agents for regulating the population of insect pests in different agro-ecosystems and requires their extensive study Present study open gate for exploration of spider fauna of Balochistan, the main objective of our research project. In present study for the first time different families' genera and species any area of Hyderabad Sindh had been reported. This study has commercial value, because it provide information about the taxonomy of spiders leading to more promising field of spiders leading to more promising field of spiders in IPM. During the present study, the banana crops of district Matiyari having three talukas were visited and banana spiders were collected from ground, grass, foliage, leaves, stems, canals and webs.900 specimens were collected in the month of January to October 2021.The identification was based on the morphologiacl characters with the help of taxonomical keys (Ursani, 2014).The collected banana spiders were sorted out into four families:Araneidae 65.54%,Lycosidae 18.62 %,Oxyopidae 12.34%,Teteragnathidae 3.37%.

ENT-47

EFFECT OF CLIMATE CHANGE ON DISTRIBUTION OF SPODOPTERA (NOCTUIDAE: LEPIDOPTERA) IN THE WORLD

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The migratory action, ability to reproduce and adaptability of Spodoptera species make them the successful pest. They have survival range of temperature between 18℃ to 32℃ ±1℃. The slight change in temperature leads to decrease or increase in their population by change in duration of larval instars, altering developmental rate, reproduction and survival etc. Increase in temperature leads to increase in their development and results in early completion of larval instars to pupae and adults. This change also alters its feeding behavior. Since the initiation of industrialization, due to anthropogenic activities, concentration of CO2 is being increased day by day. Due to which nutritional quality of crop changed ultimately the larval stage elongated. Pests especially Lepidopteron pests performed well in high temperature. Due to increase in human populations, food requirement has also been increased manyfold. For more production, monocultures and use of synthetic inputs have been implied. Such practices fringed with climatic change factors synergize cross-border dissemination of pests like many in genus Spodoptera. All these factors cause Spodoptera to enhance their geographical ranges from native to whole world and allow to act as invasive species. S. litura is native to Oriental region and now spread across Palearctic region, Australia, Africa Asia and Americas. S. furgiperda is native to eastern and southern America then found in Africa in 2013 and spread in India, Sri Lanka, Pakistan and South Asia in 2018-2019, Australia in 2020 and now all over the World. Above mentioned factors promote geographical ranges of native species to non-native areas. These invasive alien species may be a potential threat to global food security. This situation can be managed by active IoT based surveillance, strong quarantine enforcement, diversification of crops and IPM practices etc.

ENT-48

TRAPS FOR SAND FLIES (PSYCHODIDAE: DIPTERA): AN EFFECTIVE APPROACH TO MANAGE LEISHMANIASIS

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Sand flies (Diptera: Psychodidae) are minute, hematophagous insects that feed on humans and other vertebrates, and spread a variety of bacterial, viral, and protozoan diseases around the world. The protozoan parasite leishmania is

among one of these that cause leishmaniasis; a notorious disease in humans. Various management strategies used for control of vector sand flies. Among these, use of synthetic chemical pesticides is widely accepted and implemented throughout the world. Injudicious use of these pesticides has many side effects like insecticidal resistance, ecosystem deterioration and effects on non-target organisms etc. Traps are used for surveillance and control of different pests in various parts of the world, by avoiding the aforementioned associated hazards of synthetic pesticides. Various types of traps are being used for management of sand flies viz., light traps including different colors and ultraviolet (UV) light, sticky traps, soil emergence traps, malaise traps, animal baited traps, bed net traps, carbon dioxide (CO_2) traps, Shanon traps with black and white color, male courtship pheromones traps and aspirator collection. Among all these traps, the most effective traps are light, sticky, and soil emergence traps. Shanon traps are used with both black and white color where the black color is more attractive than the white. However, it was demonstrated how a light trap with a UV LED of 395 nm performed best for capturing sand flies than other LED traps with blue, green, white, or red lamps.

ENT-49

ON SOME COMMON BEES (HYMENOPTERAN) OF TANDOJAM

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Pollinators are extremely diverse, with more than 16,000 pollinator bee species described worldwide (Michener, 2000; Kevan, 2003). Insect pollinators take part actively in pollination of agricultural plants other plants (Fontaine et al., 2006; Klein et al., 2007). Bees are the members of Hymenoptera and are one of the more important pollinators of crops, and the solitary bees are also important pollinators, such as carpenter bees, sweat bees, mason bees, polyester bees, squash bees, dwarf carpente bees, leafcutter bees, alkali bees, digger bees. For present studies bees were collected from various localities of Tandojam, Sindh, Pakistan, they were imaged for their morphological characteristics and were compared with literature to explore. The study revealed the occurrence of some common bees; *Xylocopa confusa* Perez, 1901, *X. fenestrata* (Fabricius, 1798), *Apis (Apis) cerana cerana* Fabricius, 1793, *Thyreus histrio* (Fabricius, 1775), *Amegilla confusa* (Smith 1854) and *Megachile lanata* (Fabricius 1775). The audience will have incite to most common bees and their important characteristics with more closer observation.

ENT-50

RECORDS OF ORDER DIPTERA OF PAKISTAN IN FAUNA OF BRITISH INDIA

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Present study is aimed to provide the comprehensive records of order Diptera of Pakistan in Fauna of British India. This is the first attempt to initiate and present an inventory of selected order. Order Diptera in Fauna of British India revealed 121 species within 12 families. Diptera consists of 159,294 species worldwide (Zhang, 2011), of which 121 species are mentioned in Fauna of British India as reported from the present geographical (geo-political) boundaries of Pakistan. It is a species rich order having human and agricultural importance as the prominent members of the order include; mosquitoes, hoverflies, midges, gnats, leafminers, parasitoids of human and several are pests of economic importance, many are vectors of plant and human diseases due to their feeding habits, like dengue etc. All Taxa Biodiversity Inventory (ATBI) is actually an attempt to document and identify the biological species in some defined

area hence is form of a check list of our assets, as to what pests, predators and parasitoids are present in country. While ruling India, the British government published a series of book on animal diversity The Fauna of British India including Ceylon & Burma'. It was never filtered for the elements living within present boundaries of Pakistan. Pakistan is located in southern Asia between India on the East and Afghanistan and Iran on the West. Pakistan is on the west edge of the Oriental region, and the fauna of this country has some transitional features between the Palaearctic and Oriental regions (Lelej et al., 2007). It is hoped that this checklist will help to understand the diversity of Diptera.

ENT-51

GENUS *BAGRADA* STAL, 1862 (STRACHIINI, PENTATOMIDAE, HETEROPTERA) FROM SINDH, PAKISTAN

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Genus *Bagrada* Stal, 1862 are members of family Pentatomidae Leach, 1815 and the members are frequently found in Sindh Province of Pakistan. The members of this family are recognized by the presence of five-segmented antennae, and the genus with head impunctate, mandibular plates and clypeus not equal in length. During present study specimens were collection from various locations of Sindh Province, which resulted availability of *Bagrada abeillei* Puton, 1881 and *Bagrada hilaris* (Burmeister, 1835), however there was more population of later. *B. abeillei* had the body narrowly elongate, sub ovate, general color brown with dominant pale yellow and reddish markings somewhere and the *B. hilaris* black with reddish to pale markings. Both species were dissected and genital complex were studied and line drawings were produced. Further, key characteristics of species are provided.

ENT-52

STUDY ON THE GENUS *CLYTRA* LAICHARTING, 1781 (CRYPTOCEPHALINAE, CHRYSOMELIDAE, COLEOPTERA) FROM PAKISTAN

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Genus *Clytra* Laicharting, 1781 is a genus of leaf beetles in the subfamily Cryptocephalinae. These beetles are known for their ability to roll up their elytra (wing covers) into a tight spiral, resembling a ball, as a defensive mechanism against predators. The genus is found in many regions worldwide including North America, Europe and Asia. They are usually small to medium-sized beetles, with a length of around 6-15 mm. Some species are metallic in color and have a distinctive shape, making them easy to recognize. They feed on the leaves of various plants, and some species are considered agricultural pests. They feed on the leaves of various plants, and some species are considered agricultural pests. Some species are also used for biological control of invasive plants. They are also known for their metallic colors and patterns. During present study specimens of genus were collected from various regions of Pakistan, that revealed two species of the genus; *Clytra (Clytraria) afghanica* Reineck, 1937 and *Clytra subfasciata* (Lacordaire, 1848). Both species were characterized following available keys of the region and male genitalia was dissected and studied. The audience will have incite to the important characteristics of species with material examined from various regions of Pakistan with distributional map generated for each species.

ENT-53

SYSTEMATIC AND SEASONAL DISTRIBUTION OF GRASSHOPPERS (ACRIDIDAE) FROM TALUKA RATODERO, SINDH, PAKISTAN

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Grasshoppers belongs to order Orthoptera family Acrididae are well known as short horn grasshoppers. This is the largest family of Orthoptera. It includes all the true locust and grasshoppers. The grasshoppers and locust are one of the very familiar groups of insects to mankind. The fact is that the locusts are notorious members of the group and are of common sight during swarms. Moreover, the grasshoppers attack not only the agricultural crops but also the rangeland fields and they cause considerable loss to valued crops. An extensive field surveys were conducted to collect Acrididae fauna from taluka Ratodero. A total of 253 specimens were collected and identified 06 species in 05 genera, belonging to family Acrididae. The species were *Oxya velox*, *Acrida exaltata*, *Truxalis eximia eximia*, *Aiolopus thalassinus thalassinus*, *Acrotylus longipes longipes* and *Acrotylus humbertianus.* The highest population of species was found in Site Lashari with 32.80% and lowest was observed in Site Banguldero with 14.22%. In addition to this seasonal distribution of various species in different areas was also observed species occurrence was dominant in spring and summer while less in winter. Description of species, digital images and line drawing of genitalia is provided for easily identification of species.

ENT-54

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 f *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-55

TAXONOMY OF CONOCEPHALINAE FROM TALUKA RATODERO, LARKANA SINDH PAKISTAN

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Ratodero is a biodiverse region because of its temperate climate and abundant vegetation that make it a better environment for grasshopper species, particularly that of the Conocephalinae species. The Conocephalinae are commonly known as cone-headed bush crickets or meadow katydids. Body generally elongated size moderate to small, coloration generally green or brownish, sometimes with darker stripes, particularly on pronotum, head typically sub conical to strongly pointed, antennae longer than body. At present total of 121 specimens were captured. Collected samples were sorted out into 2 genera: *Conocephalus* and *Euconocephalus* and 3 species namely: *Conocephalus maculates*, *Euconocephalus incertus,* and *Euconocephalus pallidus*. The maximum population was recorded from Site Jumo Agham with 49.58% followed by Site Bosan with 23.14% and Site Tayyab with 16.52% and minimum population was observed in Site Walidad Veesar with 3.30% followed by Site Naudero with 7.43 %. Furthermore, Description of species and significant variation in different body components (i-e cerci, ovipositor) have been documented.

ENT-56

ORTHOPTERAN FAUNA OF NARA DESERT SINDH, PAKISTAN

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One of the largest orders of grassland insects is called Orthoptera. The Orthopterans are found throughout the world's physiographic zones, although the vegetation found in grasslands, woodlands, and agricultural fields plays a significant role in how widely they are distributed. Due to their role as essential main herbivores (particularly grasshoppers) and their contribution to the food of several other creatures (birds, spiders, and reptiles), orthoptera play a significant role in the economy of grassland ecosystems. They are a key component of food webs since they are primarily herbivorous and provide a plentiful source of food for other species including lizards, raptors, and birds. The natural ecosystems of Sindh include deserts, marshes, grasslands, and agricultural areas. Orthoptera are well known for contributing significantly to both the biodiversity of agricultural lands and grasslands. For four reasons, orthopterans are particularly fascinating to examine in connection to semi-natural grasslands. Sampling of the orthopteran fauna was conducted in Nara (desert) from March 2020 to March 2022 and field sites included Sikandarabad, Choondiko, Khehwari, Nara proper and kot-jabo having sandy, loamy, and few patches of medium fertile soil with cultivated field area. During the present study, a total 23 species namely : *Acrida exaltata* (Walker, 1859), *Acrida gigantea* (Herbst, 1786), *Truxalis eximia eximia* Eichwald, 1830, *Duroniella laticornis* (Krauss, 1909), *Heteracris littoralis* (Rambur, 1838), *Anacridium aegyptium* (Linnaeus, 1764), *Spathosternum prasiniferum* (Walker, 1871), *Acrotylus humbertianus* Saussure, 1884, *Acrotylus longipes longipes* (Charpentier, 1845), *Aiolopus thalassinus thalassinus* (Fabricius, 1781), *Oxya velox* (Fabricius, 1787), *Cyrtacanthacris tatarica tatarica* (Linnaeus, 1758), *Anacridium rubrispinum* Bey-Bienko, 1948, *Schistocerca gregaria* (Forskål, 1775), *Gryllodes sigillatus* (Walker, 1869), *Gryllodes supplicans* (Walker, 1859), *Gryllus bimaculatus* De Geer, 1773, *Acheta domesticus* Linnaeus, 1758, *Turanogryllus histrio* Saussure, 1877, *Turanogryllus lateralis* (Fieber, 1853) *Conocephalus (Anisoptera) maculatus* (Le Guillou, 1841),

Bolivaritettix nilgiricus (Hebard, 1930), and *Eucriotettix montanus* (Hancock, 1912) have been documented. Beside this detail study on genitalia, description of species and key to species is provided.

ENT-57

STUDIES ON THE IMMATURE STAGES OF ACRIDINAE (ORTHOPTERA: ACRIDIDAE) FROM SINDH

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The Acridid hoppers causes the severe damage to the economically important crops. The short horn grasshoppers belonging to Acridinae abundantly found in all over the Sindh. The slant faced hoppers seemed to be the pest of rice, sugarcane, wheat, maize, cotton, and different types of cereals, vegetables, orchards, and pastures in world including Pakistan. Naturally, they are herbivorus. Such insects active themselves during daytime. Their increasing population destroys healthy cultivated crops. The hoppers are seemed to be more epidemic than the adults due to lack of functional wings the constant feeding on crops. These hoppers generally found on sides of channels, agricultural fields, marshy places, wet pastures, common grasses along nearby sides. In the result of this work a total of 8067 adults and nymphs were collected and sorted out into two subfamilies with 5 genera i-e *Acrida* Linnaeus, 1758. *Truxalis* Fabricius, 1775*,* belongs to Acridinae 4 species: i-e *Acrida exaltata*, Walker1859, *Acrida gigantea,* Herbest 1786, *Truxalis examia examia* Eichward 1830, and *Truxalis fitzgeraldi* Drish 1951, of subfamily Acridinae were identified. Collected material was brought to laboratory and preserved by adopting standardized entomological method, identification keys for photographs, drawing lines measurement tables of various body parameters of different species along with host plants were given. In this study occurrence of various numphal stages were highlighted from the field, beside this, preferred host plants of various species were also noted in field, it was observed nymphs eat more than adults.

ENT-58

BIODIVERSITY OF DARKLING BEETLES (TENEBROINIDAE: EBROINIDAE: COLEOPTERA) FROM DISTRICT SUKKUR, SINDH

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Family Tenebrionidae are commonly called the Darkling beetles. They are one among the first five largest families following Staphylinidae, Carabidae, Curculionidae, and Chrysomelidae. It includes 18000 to 20,000 species in 10 subfamilies and 96 tribes. Family name Tenebrionidae is taken from the Latin word *Tenebrio*, which means "one who loves darkness". In their habitat and nature species of darkling beetles are nocturnal. According to feeding nature tenebrionids are predominantly detritivores, they are plant eaters (herbivorous) and animal mater (Carnivores), and omnivorous. As a pest organism of species of family Tenebrionidae cause damage to the economy; therefore, darkling beetles identification is very important to control them as pest. In Present study a total of 210 specimens were identified into 07 species under 05 genera, belonging to Family Tenebroinidae in district Sukkur. The species were, *Tribolium castenum* (Herbest 1797)*, Tribolium confusum (*Jacquilin, 1863)*, Tribolium destructor (*Uyttenboogaart, 1934)*,*

*Alphitophagus bifasciatus (*Say, 1824*), Tenebrio molitor (*Linnaeus, 1758), *Trachyderma hispida (*Forskal.1775), and *Thriptera kraatzi (*Haag-Rutenberg, 1876).The highest population of Genus *Tribolium* was recorded with three species *Tribolium confusum (*Jacquilin, 1863) was recorded 28.57% with highest population followed by *Tribolium confusum*, and *Tr. destructor*, while lowest population of *Thriptera kraatzi* (Haag-Rutenberg, 1876) was recorded 0.47%. Beside this, description for genera and species along with digital images were also provided for easily identification of species. Present study is an initiative step towards the biodiversity of darkling beetles fauna of district Sukkur.

ENT-59

TAXONOMY AND DISTRIBUTION OF BUTTERFLIES (LEPIDOPTERA) FROM TALUKA LARKANA

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The Lepidoptera order includes butterflies. They are exceedingly graceful, lovely, and endearing because of their colourful, extended wings, which are regarded as a sign of beauty and elegance. Of the group of insects, they are the most prevalent. They attracted a lot of interest from both residents and scientists due to their stunning colours. With the exception of Antarctica, they are present almost everywhere in the world where flowering plants are. The goal of the current study was to look into the taxonomy and distribution of butterflies in the Larkana taluka. During the present study about 287 specimens were captured from taluka Larkana sorted into 4 families; Danaidae, Nymphalidae, Papilionidae and Pieridae. Six Species were *Danaus chrysippus,Eurema hecabe,*, *Papilio demoleus, Vanessa cardui Junonia almana ,* and *Pieris canidia.* The highest population of species were observed in Mahmood dero followed by Agani with 15.9% and Dhamrah with 15.2% . Lowest population was found in Rasheed Wagan with 3.8% followed by Mahotta with 4.1% respectively. Beside this, morphological description, line drawing of genitalia along with distributional data and photographs are provided.

ENT-60

ABUNDANCE AND DIVERSITY OF FAMILY ACRIDIDAE FROM DIFFERENT HABITATS OF TALUKA GARHI YASEEN, DISTRICT SHIKARPUR SINDH PAKISTAN

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Acrididae are commonly known as true grasshoppers. They are diverse group amongst order Orthoptera . Acrididae insects are economically significant and 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. Those plants are necessary because of their high rate of production and high nutritional value. The Acrididae grasshoppers were captured from taluka Ghari Yaseen , district Shikarpur Sindh Pakistan. The collected specimens were 253 which were sorted out into Family Acrididae and 04 subfamilies i-e: Acridinae, Eyerpocnemidinae,Cyrtacanthacridinae and Spathosterninae falling into 06 genera and 07 species i-e: *Acrida exaltata , Acrida gigantea , Anacridium aegyptium, Truxalis eximia , Spathosternum prasiniferum, Heterocris littoris , Duruniella laticornis.* Beside this highest population of species was

found in Madeji with 32.80% followed by Ghari Yaseen with 22.92 % and Dhakan with 18.57 % . While lowest was observed in Torband with 14.22% followed by Gaheja with 15.41 % respectively. Beside this, morphological description along with distributional data and photographs are provided.

ENT-61

USING NATURAL PROTANDARY OF MALE FORMATION IN THE SEX SEPARATION OF *AEDES AEGYPTI* SPECIES OF MOSQUITOES IN THE CONTEXT OF STERILE INSECT TECHNIQUES

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Dengue is a deadly disease and has become endemic in Pakistan with alarming spreading potential due to wide prevalence of the *Aedes* mosquitoes in the country. *Aedes aegypti* of the Aedes genus are the key vectors of Dengue fever, Dengue Hemorrhagic Fever, Yellow Fever, Zika and Chikungunya etc. Currently, no vaccine for the disease is available globally, therefore, vector control is the main option in the present scenario. The use of insecticides for vector control is the core option in emergency conditions of outbreaks, however, due to environmental pollutions, health hazards and resistance development in mosquitoes, other environment friendly vector control strategies are needed. Reliance only the on the use of pesticides for dengue vector control has caused health hazards, entomological as well as environmental problems and thus need the development of an environment friendly dengue vector control e.g. (Sterile Insect Technique (SIT). In SIT practice, only sterile males are required for releasing into the field, consequently, sex separation especially at pupal stage due to easiness in handling operation at this stage, is considered as fundamental factor for launching successful and risk-free SIT program. The natural protandary by the onset of male pupae were therefore, exploited in the separation of male/female *Aedes aegypti*. Natural protandory i.e the natural trend in the eclosion of male earlier than female can be exploited in the production of strain that have significant dimophisim. For this purpose, Male pupae were selected from the early pupae coharts and were crossed with the female pupae of the late puape cohorts and were subjected to different tests up to five generations. Differnt random slections of 100 male pupae from the early cohorts were crossed in replicated trial with the 100 pupae of female puape from late cohorts. Data on the mating comatibility, collected the eclosion of male/female in earler and late houre (1 to 7 h). The trials were also repeated for the sex seperation. Results indicated that the natural trend in the eclosion of male earlier than female observed in earlier hours in each respective generations, no female was observed in the earlier hour (up to six hours) while, traces of female (1-2 %) was recorded after 7 hours. Data recording was terminated after the onset of the female pupae. With increase in time period, the eclosion of male/female also varied. At F1 generation, after 1 h exposure time, 35 pupae were collected earlier and checked under stereo microscope for sex conformations. All the collected pupae were male while no female was recorded at the same time period. The similar trend was observed up to six hours of pupae collection in the same generation. In case of observation after 7 hours, both the sexes were observed as male (43.66 %) and female (2.00 %). Similarly, in case of F2 up to F5 generation, desirable male was observed earlier than female at the same time interval (up to six hours). These results finally revealed that the eclosion of 100 % male was effectively found only up to 6 hours and the onset of female pupae was observed at 7th hour. It was concluded that the male eclosion (100 %) was observed earlier than female up to 6 hours' time period in five generations continuously. This early hours' time is recommended for the sex separation of the female from the mix culture.

ENT-62

COMPARATIVE ASSESSMENT OF BIOLOGICAL TRAITS OF *AEDES AEGYPTI* WILD AND IRRADIATED STRAINS FOR THE PRODUCTION OF QUALITY STERILE MALE MOSQUITOES

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The current research study entitled comparative assessment of biological traits of *Aedes Aegypti* wild and irradiated strains for the production of quality sterilized males mosquitoes will be carried out at the Medical Entomology Laboratory of the Plant Protection Division of Nuclear Institute for Food and Agriculture (NIFA) during the year 2022-2023. During the study focus will be given on evaluating the effects of different doses of irradiation on survival, flight ability, reproductive capacity and sexual competitiveness of sterile males as compared to wild males from local strains of under laboratory and semi-field conditions with the intention of future use of SIT to control dengue vectors. Main objectives include working out the effect of larval diets on the biology of *Ae. aegypti,* to calculate and standardize the amount of effective diet, to study the comparative biological qualities (larval/pupal periods & weights, adult morphology, flight and mating ability) of wild and irradiated strains and most importantly to improve the male sexual performance for SIT. To initiate the study, first of all collection of local wild strains of *A. aegypti* mosquitoes will be done from different areas through ovitraps and brought them to the lab for colonization in Medical Entomology Laboratory. The biological parameters; will be studied. These basic biological parameters of *Aedes* species will be investigated for detection of quality sterilized colonies by considering various endogenous biology factors of the wild and laboratory strains. After colonization, the low dose irradiation will be determined / standardized for the efficient male's sterilization. The work will be carried out in comparison to the already established laboratory colony. The pupae from the resulted diets will be irradiated with various doses. The resulted adults from irradiation set of the three diets and the un-irradiated of the wild strain will be compared for the male competitiveness. For this purpose, various irradiation doses viz., 50, 60, 70 Gy will be tested by utilizing the Co60 irradiation source. At least 100 Single pair, Iso-male and iso-female families of each promising sterilized colony will be selected and screened on small scale under semi-field conditions for male sterility, competitiveness, mating compatibility & potential and effect of the field climate on their initial establishment as compared to the wild male *Aedes*.

ENT-63

SUSCEPTIBILITY OF FLEXIBLE PLASTIC PACKING AGAINST HOUSEHOLD ANTS

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This Research was conducted with purpose to evaluate the susceptibility of different flexible plastic packaging against house hold ants. Experiment was conducted at faculty of Agriculture and Environment Baghdad campus The Islamia University of Bahawalpur. Different corners were selected near water source for maximum population of ants. Experimental cages were placed at selected places near foraging of ants. Cages used for experiment were built with wood and iron. The size of single cage was 8 × 8 square inches. Three different flexible packaging materials used namely opaque polyethylene (high density), transparent polyethylene (low density) and polypropylene. Thickness of

these plastic packaging was 0.02 mm, 0.04 mm and 0.06 mm. Packaging of different thickness were evaluated to check their susceptibility. Trials were conducted thrice from 25th June to 5th July 2022, 15th July to 25th July 2022 and 5th August to 15th August 2022. This study results showed that aat the level of 0.02 mm thickness, all packaging were susceptible to ants. At higher thickness level, polypropylene became resistant to ants at level of 0.06 mm while polyethylene was susceptible to ants at level of 0.07 mm. So, that more than 0.07 mm thickness packaging of polyethylene should be used for food against household ants. In case of polypropylene, more than 0.04 mm thickness level should be used for food packaging. In all thickness levels, no damage was recorded in packaging without food. Maximum ant damage was in first dates (25th June to 5th July 2022) than in second or third dates. Correlation with weather factor showed temperature had positive effects on ants' infestation; relative humidity had negative effect on ants' population. Atmospheric pressure and wind speed had also positive effect on ant's infestation.

ENT-64

IS HONEY A NECESSARY EVIL? PESTICIDE PERSPECTIVE

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Honey has immense medicinal and nutritional value. Honey is a mixture of monosaccharide, fructose, glucose, unfortunately now pesticides are the well-known constituent of honey. Modern pest management mostly rely on chemical control. So, nectar collected by honey bees contain acaricides (used in bee hives) for treatment of *Varroa destructor,* synthetic pyrethroids, organochlorines, aldrin, cypermethrin, deltamethrin, permethrin, DDT, chlorpyrifos, malathion, antibiotics and so on. Recent researches proved presence of all mentioned pesticides in honey. Its consumption without any proper testing may leads to serious health problems including neurological problems, irregular heart rhythms, convulsions and in some cases even death due to high toxicity level. It should be tested from certified laboratories and should be mentioned on honey jars that it is "free from contamination", otherwise it should not be given to the patients and infants. Extreme climatic conditions drastically increased pest populations in recent years. If these conditions increase with constant rate, we may face food security and economic challenges. Severe weather conditions have a significant impact on crop production and agricultural pests. As all organisms including insect pests respond different under the changing atmospheric conditions. These different responses from insect pests might be due to rising temperatures and increasing carbon dioxide levels that directly or indirectly. Similarly, as precipitation patterns have changed rapidly during recent years, it exerts great pressure on agricultural insect pests. Since temperature is the most vital environmental factor having drastic impacts on insect population dynamics. So, it is expected that world-wide climate warming may trigger significant changes in the herbivorous behavior of agricultural pests. In addition, it would also lead to increased overwintering survival, higher number of generations and insect transmitted plant diseases. Similarly, it also changes the interaction with host plants and natural enemies. With the sudden changes in environmental conditions, we also need to alter the traditional integrated pest management techniques. Several research priorities can be identified to change traditional integrated pest management in a better way by which we can minimize the pests attacks under changing climate. These may include advanced integrated pest management techniques, including alterations in cultural practices, improved pest resistant varieties, advanced weather forecasting system, tech-based monitoring of pest populations and also the use of modelling prediction tools to minimize the consequences of climate on insect pests.

ENT-65

POPULATION DYNAMICS OF SAND FLIES IN RELATION OF TEMPERATURE

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The insects belonging to the Diptera order contains one of the life threatening insects to humankind. As of the documented record, until now 1000 plus species of Sandflies have been recorded from different genera. However, within the documented species, species belonging to *Phlebotomus* and *Sergentomyia* genera are known to cause public human diseases like Cutaneous, Visceral and Mucocutaneous Leishmaniasis. In both Old and New world, Leishmaniasis is available in more than 98 countries. Thus it is much important to know that which biotic and abiotic factors the spreading of deadly vector. Thus, study was designed, and sandflies were captured by using A4-sized sticky by randomly placing on the selected sites. The result outcome showed that Temperature is one of the most important factors in terms of population dispersion / suppression. Positive correlation was evident in terms of population boosting in case of *Phlebotomus alexandri* while the negative relation was seen with the *Phlebotomus major* in terms of population suppression. Thus, these available results will help the scientists in understanding the availability of Sandflies in relation with temperature.

ENT-66

DIVERSITY AND SEASONAL VARIATION OF MOSQUITOES OF DISTRICT KOHAT, KHYBER PAKHTUNKHWA

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Mosquitoes belong to family Culicidae containing 35000 species. Mosquitoes are vectors for number of diseases causing mortality worldwide. The present study was conducted to determine the species diversity and seasonal variation of mosquitoes of district Kohat. The survey was conducted from January to December 2022 in four localities of District Kohat. Adult mosquitoes were collected by using aspirator, light trap, hand net, spray catch method and preserved in 80% ethyl alcohol. Mosquitoes were observed under stereomicroscope and identified by standard taxonomic key. The collected specimens belong to 3 genera *Culex, Anopheles and Aedes*. *Culex* (76%) was the dominant genera in all four localities, followed by *Anopheles* (22%) while *Aedes* (2%) was the least abundant genera. The species recorded were *Culex quinquefasciatus* (40%), *Culex mimeticus* (22%), *Culex theileri* (14%), *Anopheles stephensi* (11%), *Anopheles culicifacies* (8%), *Anopheles annularis* (3%), *Aedes aegypti* (2%). Jarma village had the highest mosquito diversity (1.74) and similar species evenness (0.8) with Lachi. The highest mosquito density (5260) was recorded in June and lowest (100) in January. The findings might be helpful in devising vector control and preventive measures in the area.

ENT-67

ROLE OF CULTURAL PRACTICES IN CONTROLLING MANGO INFLORESCENCE MIDGE ON WHITE CHAUNSA AND SB CHAUNSA

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Mango inflorescence midge is an important pest of mangoes. This pest attack at inflorescence formation stage of mangoes, infested inflorescence withers off & mango fruit is not formed. Heavy infestation may lead to no fruit formation in orchards. Hence it is important to design low cost, environmentally friendly practices with less pesticide use for management of mango inflorescence midge. Mango inflorescence midge pupate in the soil; hence it is important to kill the pupal populations so that upcoming population buildup and infestation can be avoided. Keeping in view, bio-ecology of the pest, an experiment was conducted in mango orchards of Mango Research Institute Multan Punjab Pakistan. The experiment comprised of four treatments including control viz., hoeing/scraping during whole flowering season, irrigation without hoeing/scraping during whole flowering season and irrigation + hoeing during whole flowering season. The experiment was laid out in randomized complete block design with three replications. Each tree was considered a replicate. The experiment was conducted on two varieties White Chaunsa and SB Chaunsa. The infestation intensity of mango inflorescence midges was first noticed in the first week of March (2021-2022). The mean infested inflorescence percentage was 1.85 at the start of season which later on increased to 9.99 infested inflorescence per tree in the last week of April. Later on the population declined. Among treatments, hoeing+ irrigation proved highly effective in reducing inflorescence midges on both varieties SB Chaunsa and White Chaunsa.

ENT-68

HOT WATER TREATMENT CAN BE AN EFFECTIVE METHOD OF CONTROLLING MANGO FRUIT FLIES POPULATION

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Mango fruit fly is an important quarantine pest of mangoes. Pakistani mangoes are liked in the international community because of excellent aroma and taste. The export of mangoes to the world bring high foreign exchange and enhances the GDP of country, however, the export consignments may be rejected on the dry ports because of presence of this devastating pest. In order to control this often hot water treatment is relied on. However, due to hot water treatments often the mangoes become soft and hence their shelf life is reduced. To combat this, experiment was conducted consisting of six treatments with different duration of hot water treatment viz, 10, 20, 30, 40, 50 and 60 minutes at 48C in hot water treatment plants installed at Mango Research Institute, Shujabad. The experiment was conducted on varieties viz., Anwar Retaul, Sindhri, SB Chaunsa, Sufaid Chaunsa, Chenab Gold, Azeem Chaunsa, Sensation and Dusehri. Mango fruits were kept in the fruit fly cages filled with mango fruit flies male and female insects. The Ovid females were allowed to lay eggs on the fruits for 24 hours. After that the fruits were treated with the treatments and dried. The dried fruits were allowed to ripe fully for 3-4 days. The fruit flies infestation in fruits was recorded. Data was analyzed statistically. Overall, the maximum infested fruits were observed in Sensation and lowest infested were observed in Sindhri. Fruit fly contamination was recorded in all varieties; however, 20 minutes were enough to kill eggs/larvae while further increase in timings may jeopardize the fruit health.

ENT-69

IN VITRO STUDY THE EFFECTS OF TEMPERATURE FLUCTUATION ON THE LIFE TABLE OF FALL ARMYWORM *SPODOPTERA FRUGIPERDA* TO BT CORN GROWN IN DIFFERENT CROPPING AREAS OF DISTRICT FAISALABAD, PAKISTAN

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The fall armyworm, *Spodoptera frugiperda*, is a polyphagous pest native to the tropical and subtropical regions of America which recently invaded Africa. The effect of temperature on the development of *S. frugiperda* was studied at four different temperature regimes, i.e., 22, 26, 30 and 32 ± 1 °C in three different cropping areas of Faisalabad. The fecundity of the pest population was found to be high with eggs that were hatched out at temperatures ranging from 22 to 32 °C. Continuous low temperatures, although above the lower thermal limit, therefore, had slow down the development and may reduce population numbers as a result of high mortality. The optimal range for egg, larval and egg-to-adult development of *S. frugiperda* in lab conditions were determined to be between 26 and 32 °C. Our data reveals that the developmental rate of *S. frugiperda* increased linearly with increasing temperatures between 22 and 30 °C and larval survival was also the highest between 26 and 30 °C. The optimum temperature with the fastest development rate and lowest mortality for larvae was recorded at 30 °C. Pupal developmental time varied from 7.82 to 17.06 days (32 – 22 °C) with a mean pupal development time of 17.06 days at 22 °C, but only 11.43 days at 26 °C. The development period of the egg-to-adult stage decreased from 41.64 at 22°C to 20.2 days at 32 °C. This preliminary information would be helpful in devising sustainable control strategies for the management of fall army worms.

ENT-70

EFFECTS OF UNPRECEDENTED RAINFALL ON VECTOR BORNE DISEASE SINDH PAKISTAN

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Vector borne diseases like Malaria and dengue are most common diseases of many tropical and sub- tropical parts of the world. Every year thousands of peoples died due to these diseases. Present study was carried out in Hyderabad Division from June 2022 to November 2022. Due to climate change in Sindh very unprecedent environmental changes observed during study period. Previously most period of this region remain hot and dry but during 2022 the very unprecedented rain fall recorded so the humidity and Temperature in reported period was also observed moderate and favourable for mosquito breeding habitats. Presently it was observed vey huge burden of malaria reported across the province which was not reported in near past. The dengue fever cases also reported in huge number in rural areas specially in villages previously it was reported from some parts of big cities.

ENT-71

ABUNDANCE OF SCARAB BEETLES (COLEOPTERA: SCARABAEIDAE: MELOLONTHINAE) IN HYDERABAD AND ADJOINING AREAS, SINDH

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Phytophagous scarab beetles belong to order coleoptera, family scarabaeidae and sub-family melolonthinae. They are exclusively phytophagous and also named chafers. Adults may attain the size up to 3-58 mm with black or even reddish brown coloration. Head devoid of horns equipped with well-developed mandibles. Adults as well as larvae are highly important because of their destruction to variety of crops, pastures and grassy lands. Majority of them are nocturnal and crepuscular. Fortnightly observations were made and the specimens were caught by multiple methods (mercury light trap, pitfall trap and hand picking) for six months starting May 2022 to October 2022. Total 1245 specimens were collected and identified into three species of genus *Melonatha*.

ENT-72

TAXONOMIC STUDY OF WHITEFLIES (ALEYRODIDAE: HOMOPTERA) FROM PUNJAB, PAKISTAN

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Small whitish insects belong to the family Aleyrodidae are known as whiteflies. Their wings and body is covered with white mealy powder. Whiteflies are polyphagous in nature and feed on a large number of host plants like field crops, fruit trees, vegetables, ornamentals and weeds. A total of eleven whitefly species viz., *Aleurocanthus russellae, A. woglumi, A. spinosus, A. walayarensis, Aleurolobus barodensis, A. hederae, A. marlatti, D. abbotabadensis*, *D. citri*, *D. kirkaldyi*, *B. giffardi* were recorded from the pupal cases infesting different plants. These specimens were infesting *Citrus sp*., *Jasminum sambac, Murraya exotica, Psidium guajava, Rosa hybrid*, *Saccharm officinarum, Sapindus saponaria, Syzygium cumini.* Specimens were collected from Multan, Rahim Yar Khan, Sargodha, Lahore, Rawalpindi, Mianwali, Layyah and Dera Ghazi Khan respectively**.** These species differ in antenna, colour, size, margin, submargin, dorsal disk, transverse moulting suture, caudal furrow and vasiform orifice. Shannon-Weiner Index value for richness is maximum 1.72 at Faisalabad followed by Sargodha, Rahim Yar Khan, Rawalpindi, Multan, Mianwali, Lahore, Dera Ghazi Khan and Layyah respectively. A key for the whitefly species attacking citrus plants in Punjab is also prepared.

ENT-73

CHECKLIST OF THE MOTH (LEPIDOPTERAN) FAUNA OF DISTRICT BUNER KHYBER PAKHTUNKHWA, PAKISTAN

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An annotated checklist of the Moth (Lepidopteran) fauna of District Buner, KP, Pakistan was presented. In the current study 563 specimens of Moth were collected. Throughout entomological investigation a total of 28 species

belonging to 25 genera names as*Cyana hemata* (Walker, 1854), *Aloa lactinea* (Cramer, 1777), *Creatonotos transiens* (Walker, 1855), *Olene mendosa* (Hubner, 1823), *Cyana puella* (Drury, 1773), *Syntomoides imaon* (Cramer, 1779),*Spilosoma obliqua* (Walker, 1855), *Stigmatophora palmata* (Moore, 1878),*Marumba sperchius* (Menetries, 1857), *Psilogramma increta* (Walker1865), *Leucophlebia lineata* (Westwood, 1847), *Polyptychus dentatus* (Cramer, 1777), *Theretra alecto* (Linnaeus, 1758),*Theretra oldenlandiae* (Fabricius, 1775), *Biston suppressaria* (Guenée, 1858), *Declana atronivea* (Walker, 1865), *Dysgonia torrida* (Guenee, 1852), *Polytela gloriosae* (Fabricius, 1781), *Chasmina candida* (Walker, 1865),*Anua tirhaca* (Cramer, 1777), *Aegocera venulia* (Cramer, 1777), *Anua coronata* (Fabricius, 1976), *Bradina diagonalis* (Guenee, 1852), *Archernis capitalis* (Fabricius, 1794), *Dinara combusta* (Walker, 1855), *Phalera raya* (Moore, 1849), *Euthrix potatoria* (Linnaeus, 1758) and *Ocinara varians* (Walker, 1855) were reported. The species recorded under 8 families. i.e.Family Erebidae, Family Sphingidae, Family Geometridae, Family Noctuidae, family Crambidae, Family Notodontidae, Family Lasiocampidae and Family Bombycidae. Among them the most abundant family was Family Erebidae.

SECTION – I V

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

PAR-1

TREMATODE COLLECTED FROM THE BODY CAVITY OF MIGRATORY BIRD *FULICA ATRA* (GRUIFORMES: RALLIDAE) IN SINDH

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Trematodes of genus *Cyclocoelum* Brandes, 1892 are reported to infect various aquatic birds of the families Scolopacidae, Rallidae, Anatidae, Recurvirostridae, Ardeidae, Corvidae, *Oidemia*, *Megalornis*, *Vanellus*, *Nettapur*, etc from Europe, Asia and America. During present study, trematodes of the genus *Cyclocoelum* Brandes, 1892 were collected from the body cavity of Black Coot *Fulica atra* (Gruiformes: Rallidae). Birds were collected from Manchhar lake and bough to parasitology laboratory of department of Zoology, University o Sindh, Jamshoro. On the basis of oblique testes forming triangle with ovary, genital pore prepharyngeal, vitelline fields ventral and immediately lateral to ceca, not reaching cecal bifurcation anteriorly, not uniting posteriorly and uterine coils not extending beyond outer walls of ceca, these specimens were placed in genus *Cyclocoelum* Brandes, 1892 and identified as *Cyclocoelum* sp.

PAR-2

INVESTIGATION OF TICKS BURDEN WITH HOST RECORD AND SEASONAL DYNAMICS IN THE LIVESTOCK OF DISTRICT DIR LOWER, KHYBER PAKHTUNKHWA, PAKISTAN

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Ticks are ectoparasite found throughout the world, on all terrestrial and semi-terrestrial animals. Approximately, there are 900 tick's species comprised of Ixodidae and Argasidae species but nuttalliellidae has only one species. Ticks also act as vector for the transmission of different pathogens cause different zoonotic disease in livestock and in the wild host such as, theileriosis, Anaplasmosis, Babesisosis etc. A total of 500 ticks were collected from the livestock in the study area, in month of April to October, 2022. In tehsil Khall the genus *Rhipicephalus* species were recorded as, 95/245, followed by genus *Haemaphylis* 105/245, genus *Hyalomma*, 35/245, and Soft ticks genus *Argas* were 10/245. In tehsil Timergara, the genus *Rhipicephalus* species were recorded as, 130/255, followed by genus *Haemaphylis* 92/255, genus *Hyalomma*, 26/255, and soft ticks genus *Argas* as 07/255. The species of *Rhipicephali*s were recorded in high ratio as compared genus *Argas* with lowest species number in the study area. The recent study aim to investigate tick diversity with seasonal dynamics, host record, and prevalence rate of ticks in the tehsil Khall and tehsil Timergara of district lower Dir.

PAR-3

NEW RECORD OF *HYMENOLEPIS BICAUDA* MAKARIKOV, A. A, 2013(CESTODE: HYMENOLEPIDIDAE) RECOVERED FROM THE RATS AND MICE OF DISTRICT HYDERABAD, SINDH, PAKISTAN.

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In continuation of the ongoing NRPU research project No. 9412 funded by HEC, Islamabad on the Helminth parasite of Rat and Mice, *Hymenolepis bicauda* Makarikov, 2013 (Cestode: Hymenolepididae) was reported from the Intestine of Black Rat (*Rattus rattus*) and House mouse (*Mus musculus*) from Hyderabad district Sindh, Pakistan. *H. Bicauda* can be differentiate from all other species of the genus is having gravid segment craspedote, inter- segment partitions, Cirrus sac pear- shaped, the antiporal side of cirrus sac is overlapped the excretory canal, and meanwhile other club shaped part the of cirrus sac were without spines. Seminal vesicle bipartite, internal shape is pisiform, whereas, internal seminal vesicle fusiform and elongated. Previously this species is reported from the type host *Apomys microdon* of Luzon Island, Philippines. However, present findings from Black Rat (*Rattus rattus*) and House mouse (*Mus musculus*) set as first record as well as new host from Pakistan.

PAR-4

PREVALENCE OF HAEMONCHOSIS IN RELATION WITH DIFFERENT EPIDEMIOLOGICAL PARAMETERS IN DISTRICT SARGODHA, PUNJAB, PAKISTAN

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Pakistan is a developing country in which a large part is rural and is dependent on livestock for their living expenses. Haemonchosis is a parasitic disease spread by the genus *Haemonchus* that causes severe health and economic losses to livestock. *Haemonchus contortus* is a blood-sucking parasite of small ruminants, especially sheep, goats, cattle and buffaloes. But in Pakistan, this parasite is not given due consideration. The current study focuses on the epidemiology, intensity of infection and association of multiple risk factors with the disease prevalence of *Haemonchus* species in goats of district Sargodha. For epidemiological investigations, butcher shops and local abattoirs were visited from September 2021 to February 2022 to collect abomasum samples of the goat species from each tehsil of Sargodha. Abomasum was taken from the host animal after slaughtering and examined thoroughly. Out of 1066 collected samples, 546 were found *Haemonchus* positive with a prevalence of 51.20%. Higher incidence was recorded in females than males. Younger individuals were more susceptible to haemonchosis than adults. High rate of infection was recorded in autumn followed by winter. The study found the highest incidence of haemonchosis in Kotmomin (55%) followed by Bhera (52.66%), Sillanwali (52%), Sargodha (50.83%), and Sahiwal (49%) with the lowest incidence found in tehsil Bhalwal (47%). Furthermore, morphometric assessment confirmed the significant difference between males and females *H. contortus* parasites. It was concluded that the high incidence of haemonchosis in goat species was due to poor hygiene, lack of adequate health facilities and lack of integrated control policies by agriculture. Moreover, different control practices and awareness programs are also needed to control the parasitic infection of *H. contortus*.

PAR-5

PREVALENCE OF TICKS IN GOAT FROM DERA GHAZI KHAN

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The current study aims to determine the current prevalence of ticket in goats of Dera Ghazi Khan During this study different species of goats were scanned regardless of sex and stages. The ticks were collected randomly and snowball sampling in the morning and the evening time. The ticks were collected systemically using small forceps as per starting from the head towards the tail direction and placed in a Petri dish. Care was kept in mind to avoid recapitulation and shedding of the legs. From Petri dishes, ticks were transferred in plastic bottles. Five to seven holes were made in cap of these plastic bottles for proper aeration, and moisture level were maintained by soaking of cotton swab with water inside the. The tick samples were brought to zoology department where they were boiled in 10% KOH solution in test tube over the flame for cleaning of abdomen and ease of examination. The collected ticks were identified on dissection microscope based on morphology with the help of the keys available in literature. The hard ticks (*Ixodida*) are most commonly found on goats with horns and more specifically at the base of the horns. Occasionally, some hard Ticks are found in the ears of the animals. They are reddish brown with pale reticulations and very similar to, but slightly smaller than soft Ticks. The hard tick is considered a presumed vector of *Ehrlichia ruminantium*, the rickettsial causative agent of heartwater, an African disease of ruminants. This study would be very beneficial for planning control methods.

PAR-6

PALLISENTIS OPHIOCEPHALI (THAPAR, 1930) BILQEEE, 1976 (FAMILY: QUADRIGYRIDAE, FROM THE FISH OPHIOCEPHELUS (*CHANNA STRIATUS*) IN DISTRICT NAUSHAHRO FEROZE, SINDH, PAKISTAN

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In result of ongoing helminthological studies on ten *Channa striatus* (Ophiocephalus) were purchased from fish market of District Nausharo Feroze, Sindh, Pakistan. These freshwater fishes were kept in plastic bags filled with oxygenated water and carried to the Parasitology laboratory, Department of Zoology, University of Sindh, Jamshoro. The fishes were autopsied and examined for helminth parasitic infections. 3 males and 14 females' specimens were collected from the small intestine of three infected *Channa striatus* and these were fixed in hot steaming 70 % ethanol. Later the nematodes were stored in a solution of 5 parts glycerine and 95 parts 70 % ethanol and cleared in either glycerine or lacto phenol for detailed study. A detail study was conduct and identified as belonging to genus *Pallisentis ophiocephali* (Thapar, 1930) Bilqeee, 1976. The specimens are characterized by having: **Male:** Creamy white in colour when alive. Body is spinose, slender, tubular with pseudo segmentation in certain specimens. Proboscis is short, globular, with 4 transverse rows each of 8 hooks, broad at base and pointed at tip. The bases of the hooks are embedded inside the tissue and superficially these are protected by folded cuticle or tegument. The apical hooks are the largest, the hooks of the second, third and fourth row are comparatively smaller, The neck is a non-spined area behind the proboscis. The anterior portion of trunk has 13 rows each of 12 hooks, broader at the base and pointed at the tip. Besides the anterior closely set mantle of hooks, rows each of 12 hooks are present throughout the body length. The trunk hooks of anterior and posterior region are similar in shape.

The proboscis receptacle is a single-walled elliptical sac, fastened to inner surface of proboscis wall and hangs into pseudocoel. In the presoma, at the base of the proboscis, the lemnisoi extend posteriorly to the trunk pseudocoel. one at each side of the proboscis receptacle and hangs free into pseudocoel. They are unequal, The testes are two in number, cylindrical and oval in shape. The cement gland is elongate, cylindrical, and syncytial. The cement reservoir is variable in shape from pear—shaped to cylindrical. The vesicula seminal is varies. The snefftigen 's pouch. The bursa is retractile. **Female:** The female is cylindrical, tubular with pseudosegmentation in certain specimens. The proboscis is small. The hooks on the proboscis are similar in shape and number to the male. The hooks of the first row are the largest followed by second, third and fourth row. Neck followed by Proboscis sheath is single—layered. The anterior mantle of trunk hooks are similar in number to male while the posterior hooks of the trunk. The lemnisci are unequal. In most of the females examined the body cavity gas filled by larger number of eggs. it appears therefore, that ovary ripens and dissociates at an early stage .Uterine bell funnel-shaped opening into uterus. Vagina thick surrounded by muscle sphincter. Genital pore terminal. Eggs oval, brown in colour.

PAR-7

ECHINOSTOMA HECKMANNI SP. N. (TREMATODA: ECHINOSTOMATIDAE POCHE, 1926) FROM THE BIRD *EGRETTA GARZETTA* IN LARKANA SINDH, PAKISTAN.

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During current studies on the helminth parasites of Egretta garzetta were collected from District Larkana, Sindh, Pakistan. The birds were anaesthetized, autopsied and examined for helminth parasitic infections. Out of three, two were infected with Seven specimens. The worms were mounted permanently according to standard procedure for further detail study and identified as belonging to genus Echinostoma Rudolphi, 1809 and proposed as Echinostoma heckmanni sp.n. is described from the intestine of Egretta garzetta in larkana, Sindh, Pakistan. The new species is characterized by having elongated body size, aspinose body, number of collar spines, absence of isthmus, different-shape and size of eggs, new host and locality and other morphometric characters. New species cannot be included in any of the previously existing species because of aspinose body, number of collar spines, and absence of isthmus which is present in E. sindhensis, Dharejo et al. 2009 and E. kashmirensis, Chisti and Ahmad, 1991 in which it joins the two testes. These differences indicate that the present specimens are an un-described species. Therefore, a new species Echinostoma heckmanni is proposed. The new species name refers to Dr. Richard A. Heckman, well known and famous emirates Parasitologist in USA.

PAR-8

CURRENT STATUS OF ENTOMOPATHOGENIC NEMATODES IN PAKISTAN AS BIOCONTROL AGENTS

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Entomopathogenic nematodes of the family Heterorhabditidae and Steinernematidae are obligate parasites of insects and are used worldwide as well as in Pakistan as biological control agents of economically important insect pests.

On the other-hand insects pests such as red palm weevil of dates, fruit fly of mango and vegetables and armyworm of cotton are considered as major pests for these crops and trees. Entomopathogenic nematode maintains a symbiotic relationship with the bacteria of the Genus *Xenorhabdus* and *Photorhabdus* without compromising the environmental health it kills the insect host rapidly. Pakistan is an agricultural country, agriculture contributes about 24% of Gross Domestic Product (GDP) of Pakistan , insect pests such as pink bollworm, American bollworm, brinjal fruit borer, rice weevil , red flour beetle, rice stem borer, subterranean termite, field cricket, maize shot fly, cigarette beetle, mango mealy bug are one of the major insect pests in Pakistan accounting major economical losses and directly influences agricultural production in the country. Some EPN species in Pakistan such as *S. asiaticum*, *S. pakistanense*, *S.balochiense* , *S. abbasi*, *S. feltiae* , *S. carpocapse*, *H. indica* and *H. bacteriophora* are very susceptible to the insect host. The intensity of infestation varies with the species and life stage of the insects. More need is required for further research on these EPNs and their isolation to explore and exploit their potential as bio-pesticides in Pakistan.

PAR-9

BIODIVERSITY OF NEMATODE FAUNA OF PAKISTAN

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Nematodes are the most abundant invertebrates on earth. Nematodes of different kinds are found all over the environments and habitats. These can be found as parasites of animals and plants. Nematodes can be observed as free-living soil, marine and as entomopathogenic nematodes (insect parasitic nematodes). Phyto-parasitic nematode as plant parasitic nematodes are most abundant and highly diversified group that on massive scale effects the agricultural crops which results in low yield and inferior quality of crops which then ultimately leads to one of the limiting factor in agricultural productions. The systematic and scientific studies were carried out on these nematodes to find out their biodiversity. Surveys were made on number on substantial nematodes of agricultural importance from different localities of different agro-climatic zones. The total number of nematode fauna comprises on 261 genera, 81 sub-families, 85 families, 24 super-families, 19 sub-orders, 12 orders and 2 classes. Specifically 15 species of entomopathogenic nematodes of two genera have been identified.

PAR-10

DESPORTESIUS RAFIAE SP. N. (NEMATODA: ACUARIIDAE SEURAT, 1913) FROM THE BIRD *ARDEOLA GRAYII* IN LARKANA, SINDH, PAKISTAN

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Parasitic infection is a serious health problem in the world, especially in developing countries. This study was conducted to find the Helminth parasites in *Ardeola grayii* from District Larkana, Sindh, Pakistan. The birds were anaesthetized, autopsied and examined for helminth parasitic infections. Fifteen birds were dissected, out of fifteen, ten were found infected with 106 (12 males, 94 females) specimens these were identified and belonging the *Desportesius Rafiae* sp.n. These were fixed in hot steaming 70 % ethanol. Later the nematodes were stored in a solution of 5 parts glycerine and 95 parts 70 % ethanol and cleared in either glycerine or lacto phenol for detailed study. The new species is

characterized by having. Cordons extended posteriorly behind the cephalic end. Esophagus Muscular and glandular. Cervical papillae situated posterior to the cordons, tricuspid and directed backward. Nerve ring prominent and cervical papillae long from anterior end of the body. Excretory pore long from anterior end. Vestibule clear visible. Pedunculate caudal papillae present; supported by 3 pairs and 1 single preanal and five pairs of post anal papillae. Spicules are usually unequal and dissimilar in shape left spicule long and right spicule short. Anus located in posterior end of body. Body of the worm is stout, medium sized. Cordons extended posteriorly behind the cephalic end. Muscular esophagus, Cervical papillae situated posterior to the cordons, tricuspid and directed backward. Nerve ring and cervical papillae long from anterior end of the body. Excretory pore situated close to posterior end of cordons and far from anterior end. Vestibule prominent. Vulva located in posterior part of body immediately in front of anus. Anus located posterior end of body. Tail is short. Uterus is monodelphic. Eggs are oval in shape. The new species refers to Dr. Rafia Rehana Ghazi, well known and famous Parasitologist from University of Karachi, Pakistan.

PAR-11

EPIDEMIOLOGICAL FACTORS AFFECTING INCIDENCE OF PARASITIC INFECTIONS IN SCHOOL CHILDREN OF RURAL AREAS OF DISTRICT MULTAN (PUNJAB), PAKISTAN

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This study was conducted from March 2022 to May 2022, among school children to recognize to the role of age and sex as epidemiological factors favouring the spread of parasitic infections among the children of 8 schools located in rural areas of district Multan. For this, a total of 1122 fecal samples were collected. Used direct smear method and formal ether sedimentations concentration technique for processing the samples. Differences were noted in overall incidence of protozoans and helminthic infections in boys and girls as well as age differences were encountered. The results showed that an overall incidence of protozoans 25.56% in younger boys and 15.3 % in younger girls, while overall of incidents of helminths was 12.35% in boys and 7.3% in younger girls. The pathogenic protozoa *Giardia lamblia* was more prevalent than amoebiasis while *Ascaris lumbricoides* was the most common roundworm prevalent. Such a survey first of its kind in distric Multan draws the attentions of parents, to safeguard the health of children.

PAR-12

THE CONTROL OF HOUSE FLY LARVAE BY PLANT ORIGIN OIL AND SYNTHETIC CHEMICAL AND THEIR INHIBITORY ACTION ON CHOLINESTERASE AND TOTAL PROTEINS

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This research covers the comparative toxic and biochemical action of essential oil of *Cedrus deodara* (deodar oil) and carbosulfan against housefly larvae. Both insecticides were applied through Feeding mehod. The LC_{50} of deodar and carbosulfan were 13000 and 240 ppm respectively. Enzyme cholinesterase and total protein contents were found to be inhibited in the LC_{50} treated larvae with deodar oil and carbosulfan.

PAR-13

HISTOLOGICAL CHANGES IN INTESTINE OF FISH (*ARIUS ARIUS* HAMILTON, 1822) BY NEMATODE (*RAPHIDASCARIS ACUS* BLOCH, 1779) OF KARACHI COAST

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The recent study reveals the histological changes in the intestine of fish *Arius arius* (Hamilton, 1822) caused by the nematode (*Raphidascaris acus* Bloch, 1779). Infected fish were brought to the parasitological laboratory of the University of Karachi and dissected. The nematodes were collected from its intestine. Histological studies of intestine were carried out by standard techniques. Prominent changes included ulcerative lesion with complete disruption of mucosal layer. Total disintegration of cellular architecture of lamina propria was prominent. Foci of larval nematode were observed in some sections. Mucosal and submucosal region appeared atrophic and mucoid in intestine section. Atrophied muscularis mucosa was observed. Hyperplasia in muscularis externa was obvious. Mast cells were recorded in a few sections.

PAR-14

PATAGIFER ALYKHANI SP. N DIETZ, 1909 (DIGENEA: ECHINOSTOMATIDAE) FROM THE LARGE EGRET (*ARDEA ALBA*) IN DISTRICT HYDERABAD, SINDH, PAKISTAN

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During a helminthological survey of the bird, large egret (*Ardea alba*) (Ciconiiformes: Ardeidae), in Hyderabad, Sindh, Province of Pakistan, Nine specimens of trematode belonging to genus *Patagifer* Dietz, 1909 were recovered from small intestine of the three host birds. A new species *Patagiferalykhani* is proposed. The new species is characterized by having: The body of fluke is aspinose, elongated and large in size, tapering at both ends, maximum width at the middle of the body. Head collar is well developed, It has 38 spines of which 19 are on each lobe, arranged in a single dorsally interrupted row. The oral sucker is terminal and well developed, pharynx is globular, short esophagus, Ventral sucker is prominent larger than oral sucker, Ovary is elliptical and median, Uterus full of eggs, restricted between the acetabulum and ovary. Testes are elongated, slightly lobed, tandem, sub-equal post-equatorial and slightly overlapping each other, The eggs are numerous and thin-shelled, Excretory vesicle is Y-shaped and excretory pore is terminal. This is new species and host recorded in Hyderabad, Sindh, Pakistan.The Species name is in honour of Dr. Aly khan Ex- Director and Chief Scientific Officer (C.S.O) and Crop Diseases Research Institute, SARC,PARC, Karachi.

PAR-15

METAZOAN PARASITES OF THE GIANT RIVER CATFISH SPERATA SEENGHLA (SYKES, 1839) (SILURIFORMES: BAGRIDAE FROM RIVER INDUS AT SUKKUR, SINDH, PAKISTAN

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Giant River Catfish Sperata seenghala are species of family Bagridae commonly found in fresh water bodies rarely in brakish water. A fish is ectothermic animal, has a streamlined body for rapid swimming, extracts oxygen, has two sets of paired fins, usually one or two (rarely three) dorsal fins, an anal fin, and a tail fin, has jaws, has skin that usually cover scales, and lays eggs. The metazon parasites like trematodes, cestodes, nematodes, acanthocephalan, copepods, and cyclopes of infected fishes. When host is affected with these parasites, it loses its weight, reduce in laying capacity, weakened body resistance, decrease in feed consumption and finally causing death to its host. These parasites cause many diseases in fishes which create great economical loss as well as create health problems in in human and other vertebrates by consuming these fishes. During current study, 17 host fishes were collected from the study area. Among these fishes only three genera; contracaecum, Rhabdocona and Goenzia were identified. Further hosts will be collected and examined for the record of metazoan parasites.

PAR-16

INFESTATION ASSESSMENT OF ROOT-KNOT NEMATODES (*MELOIDOGYNE* SPP.) ON CUCUMBER IN THE POTHOWAR REGION OF PAKISTAN

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Studies to estimate root-knot nematode infestations on cucumber were conducted during mid to late season at 378 randomly selected sites in 126 villages of the four districts across the Pothowar zone of the country. The overall mean infestation of root-knot nematodes in the region was found to be 16%. The studies revealed variations in the incidence and severity of root-knot nematodes in the four districts. The incidence of root-knot nematodes was the highest in Rawalpindi district (22%), followed by 14% in Attock. Of the four districts, the minimum incidence of 11% was recorded in Jhelum district. The maximum mean severity (3.8), measured in terms of the galling index, was found in Rawalpindi district, while the minimum (1.9) was observed in Jhelum district. The mean severities of root-knot nematodes in the districts of Attock and Chakwal were 2.7 and 2.2 respectively. Variations in incidence and severity were also observed among subdivisions of the districts. Of all the associated species of root-knot nematodes, *Meloidogyne incognita* constituted 79%, *Meloidogyne javanica* 19%, *Meloidogyne arenaria* 2% and *Meloidogyne hapla* 1%. *M. incognita* and *M. javanica* were recorded in all of the districts, with *M. incognita* predominating. *M. incognita* as a pure population was recorded in 30% of the villages, while the other three species were found as mixtures. The most common mixed population was *M. incognita* and *M. javanica*, observed in 70% of villages in the region. *M. arenaria* and *M. hapla* were not found together in any of the population mixtures. The results indicate that cucumber is severely attacked by root-knot nematodes, warranting adoption of strict control measures for its management.

PAR-17

THE PREVALENCE OF GASTROINTESTINAL PARASITES IN CATTLE, GOAT, AND SHEEP IN NORTHERN PAKISTAN

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Globally, gastrointestinal (GI) parasite is a serious issue in livestock species important for food and agriculture. This study was conducted to assess the prevalence of GI parasites in cattle, sheep and goat in District Lower Dir, Khyber Pakhtunkhwa, Pakistan. A total of 600 fecal samples were randomly collected including 300 from cattle and 150 each from sheep and goat for this study. The fecal samples were tested through direct microscopic examination, fecal flotation and sedimentation technique for the detection of GI parasites. The data was analyzed through Chi-square test using Statistical Package for Social Sciences (SPSS) to find out the effects of breed, age, parity, feeding practices, deworming status and herd size on the prevalence of GI tract parasites in these species. The parasites were more prevalent (75.68%) in Jersey cross breed. Endoparasitic infection was higher (88.23) in male cattle. Greater than 2 years cattle had higher (71.02%) incidence of GI parasite. In herds of ≤ 5 animals had 67.28% positive samples and 6-8 animals per herd had 67.47% positive samples. *Taxocara vitulorum* prevalence was high (46%) in single parasitic infestation, while *Taxocara vitulorum* + *Haemonchus contortus* were more (34.6%) prevalent in double parasitic infection. *Haemonchus* + *Taxocara* + *Fasciola* spp were detected more (33.3%) in triple parasitic infection in cattle. Among goat, Teady hairy goat and Beetal had 83.33 and 80% prevalence rate of GI parasite. Goats with 1-2 years had higher 81.53% prevalence rate. In herds of 16-20 goats higher (85.71%) prevalence rate was reported. Local breed of sheep had more (73.52%) prevalence rate of parasitic infection. *Haemonchus* parasite was more prevalent in sheep and goat. It can be concluded from this study that all these livestock species in Lower Dir had highest prevalence of gastrointestinal parasites and need effective control measures to enhance productivity.

PAR-18

THE GENUS *CICONIPHILUS* (AMBLYCERA: MENOPONIDAE) PARASITIZING THE WADER BIRDS OF PAKISTAN WITH NEW HOST ASSOCIATIONS OF *C. DECIMFASCIATUS* (BOISDUVAL & LACORDAIRE, 1835)

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The present study is based on the fauna and the distribution of chewing lice on various wader birds of Pakistan. This study was conducted during 2019-2021 in which various species of wader birds of order Charadriiformes, order Pelicaniformes, order Gruiformes and order Ciconiiformes were collected and examined for their chewing lice. For the infestation of particularly species *Ciconiphilus decimfasciatus* (Boisduval & Lacordaire, 1835), it was observed that with other species of parasitic lice, this species is euryxenous in nature and found more than one family and infested multiple host species including *Chroicocephalus ridibundus* Linnaeus (Brown-headed Gull) of family Laridae, *Recurvirostrata avosetta* Linnaeus (Pied Avocet) and *Himantopus himantopus* (Linnaeus) (Black-winged Stilt) of family Recurvirostridae, *Tringa glareola* (Linnaeus) (Wood sandpiper) of family Scolopacidae, *Ciconia ciconia* (Linnaeus) (White stork) of family Ciconiidae, *Ardea purpurea* Linnaeus (Purple heron) of family Ardeidae and *Fulica atra* Linnaeus (Eurasian Coot) of family Gruidae. Except family Ciconiidae, all families of wader birds were found in new

association with *Ciconiphilus decimfasciatus* and put new host and new locality on the record of fauna of chewing lice in the world.

PAR-19

BIODIVERSITY OF CHEWING LICE AND HELMINTHES PARASITES OF DOMESTIC FOWLS *GALLUS GALLUS DOMESTICUS* (LINNAEUS, 1758) (AVES: GALLIFORMES) FROM HYDERABAD, SINDH, PAKISTAN

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Birds are valuable and precious for many purposes. They are individually representing greatly inhabited life forms and also super indicators of fitness of various ecosystems. Galliform birds (Aves: Galliformes) cover up a most important part of our poultry industry including domestic fowls, *Gallus gallus domesticus* (Linnaeus, 1758). These are commercially and in expensively important birds and are affected by different ectoparasites and endoparasites especially under traditional and unhygienic conditions of rearingin our country. The present research work was conducted to calculate the diversity of species of chewing lice and helminthes parasites and their rate of prevalence in domestic fowls, *Gallus gallus domesticus* (Linnaeus, 1758). For this study the domestic fowls *Gallus gallus domesticus* (Linnaeus, 1758) were collected live from different urban and rural areas of Hyderabad, Sindh, Pakistan. The study was carried out from 2017-2019. A total of 95 fowls were observed and then dissected for the collection and examination of parasites. Over all prevalence were recorded 91.57%. The species of chewing lice (Phthiraptera) were recovered from wings, belly and body feathers and helminthes parasites were from small intestine only. The identified chewing lice and their prevalence were *Menacanthus stramineus* (Nitzsh, 1818), (16.89%), *Menopon gallinae* (Linnaeus, 1758), (18.72%), *Menacanthus pallidulus* (Neumann, 1912), (12.36%). *Goniocotes gallinae* (de Geer, 1776) (10.64%), and *Goniodes dissimilis* (Denny, 1842) (11.99%). The identified helminthes parasites and their prevalence were *Choanotaenia infundibulum* (Bloch, 1779) (11.01%), *Raillietina cysticillus* (Molin 1858), (9.54%) and *Cotugnia dignophora* (Pasquale 1890), (8.81%). The results of present study discovered that the less care and attention were required for handling and rearing of domestic fowls in study area.

PAR-20

ERGASILUS SANGHARENSIS N.SP. (POECILOSTOMATOIDA: ERGASILIDAE) IN STRIPED SPINY EEL *MACROGNATHUS PANCALUS* (SYNBRANCHIFORMES: MASTACEMBELIDAE) IN SINDH, PAKISTAN

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Throughout up-to-date studies going on the metazoan parasites of the Striped Spiny Eel *Macrognathus pancalus,* a total of 30 hosts were examined from district Sanghar, Sindh. Among these hosts, 30 Crustaceans belonging to the genus *Ergasilus* Nordmann, 1832 were collected from gills of only three hosts. Present species differ from its congeners in shape and size of body and cephalothorax, number and arrangement of setae on antennules, number and arrangement of seta and spines on legs, shape of antenna, shape and segments of legs, size of egg-sac, shape of eggs. On the basis of these distinguishing diagnostic features, a new species *Ergasilus sangharensis* is proposed. The name of new species refers to the locality of the host fish.

PAR-21

INCIDENCE OF LEISHMANIASIS IN DISTRICT DADU, SINDH, PAKISTAN

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Leishmania is one of the vectors borne zoonotic protozoan disease caused by a parasite Leishmania and transmit by the bite of a female sand fly in human as well as other vertebrate animals. During 2021, initially 62 cases of Leishmaniasis were recorded and analyzed. Among these 62 cases, 34 cases were recorded for females and 28 cases were recorded for males. Among these 62 cases, 26 cases were infected on legs, 20 on face and 16 on hands. A total of 79% of cases were recorded from the residents of taluka Johi and 21% from Dadu. All cases were identified with Cutaneous leishmanisis.

PAR-22

TOXOPLASMA GONDII INFECTION IN SHEEP, GOATS AND FARMERS FROM BAHAWALPUR, PAKISTAN

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Toxoplasmosis is a disease that has been reported from all over the world. The objective of the current study was to evaluate the prevalence of Immunoglobulin-G (IgG) antibodies specific to *Toxoplasma gondii* (T. gondii) simultaneously in sheep, goat and humans associated with the sheep and goat farming from Bahawalpur, Pakistan from May, 2016 to April 2017. 640 blood samples were taken from sheep, goats, farmers and non-farmer humans (160 each). Blood sera were examined to detect anti-Toxoplasma antibodies (IgG) by employing latex agglutination test (LAT). The findings showed the seroprevalence of T. gondii 36.25% (58/160) for sheep, 28.1% (45/160) for goats, 21.2% (34/160) for farmers and 6.8% (11/160) for non-farmers. A significant difference (P-value 0.00; OR: 3.655; CL: 1.77-7.51) was found between seroprevalence of toxoplasmosis in farmers and non-farmers. Furthermore, the infection rates higher in females as compared with male subjects. The results suggested that milk and meat of infected sheep and goats might be responsible for transmission of T. gondii from sheep and goats to farmers of study area.

PAR-23

A NEW SPECIES OF *RAILLIETINA* FUHRMANN, 1920 FROM *GALLUS DOMESTICUS* (COMMON CHICKEN) IN KORANGI, KARACHI, SINDH

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The present investigation deals with systematic observations of the cestode parasite *Raillietina rafiae* n.sp. in common chicken from Korangi, Karachi. Fourteen worms were collected from the small intestine, preserved in 70%

alcohol, stained with Mayer's carmalum and mounted in Canada balsam, camera Lucida drawing were prepared. All the measurements are in millimeters. Size of parasite 35-65 long, 0.15-0.16 at the neck region and 1.02-1.05 at the region of mature segments and 0.87-1.5 at the gravid segments in diameter. Strobila crasperate. Scolex small, globular, in some specimens flower shaped 0.20-0.21 in diameter, rostellum small, armed with tiny spines. Suckers round to oval, small 0.05-0.08 in diameter, armed with minute hooks. Neck thicker and short nearly equal to width of head, immature and gravid segments are much mature then wide. Genital pores unilateral, situated at the anterior, lateral margin of the segments. Testes rounded 24 to 26 arranged in the median field, cirrus sac flask shaped 0.14-0.19 long, vas deferens coiled in mature segments, ovary a little on poral side appears to be roughly branched and bilobed 0.23-0.25 in diameter. Uterus breaks up into egg capsules in the gravid segment, each egg capsule 0.06-0.16 in diameter and contains 8-10 small egg inside. As mentioned above scolex flower shaped and round testes are different from all the previously described species of *Raillietina.* The species is named in the honour of Dr. Rafia R. Ghazi, Ex-Director, VPCI, PARC, University of Karachi.

PAR-24

ANTHELMINTIC POTENTIAL OF BACILLUS THURINGIENSIS TO COUNTER THE ANTHELMINTIC RESISTANCE AGAINST HAEMONCHUS CONTORTUS

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H. contortus produce resistance to nearly all available anthelmintics medication. However, alternative strategies are required to counter the anthelmintic resistance. In the current study, the anthelmintic potential of B. thuringiensis was checked out against the H. contortus. The identification of the B. thuringiensis bacteria was performed through conventional method and confirmed by PCR of bacterial 16S rRNA gene. PCR amplicon of 750bp was observed on the agarose gel stained with ethidium-bromide. Amplified products were sequenced, and sequence data was confirmed by using the basic local alignment tools (BLAST) which significantly aligned (97.98 %) with B. thuringiensis and B. cereus. Identified B. thuringiensis was used for isolation of crystal proteins. The protein profile confirmed by SDS-PAGE, showing three main bands at 70, 36, and 15 kDa. The effects on egg hatching and larval development of H. contortus were performed and found that crystal protein at the concentration of 108 significantly (P

PAR-25

NEW SPECIES OF GENUS *STEPHANOPRORA* ODHNER, 1902 (TREMATODA: ECHINOSTOMATOIDEA: ECHINOCHASMIDAE) IN *LARUS CANUS* (CHARADARIFORMES: LARIDAE) FROM INDUS RIVER, SINDH, PAKISTAN

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During the examination of gut contents and visceral organs of Common gull, *Larus canus* (Charadariformes:Laridae) from river Indus, a total of 15 trematodes of genus *Stephanoprora* Odhner, 1902 were

collected from gizzard of seven hosts and identified as new species. Diagnostic differences appeared between body size, shape and size of testes, ovary size and number of eggs. Specimens were compared with the different species of genus *Stephanoprora* and identified as new species and named as *Stephanoprora canus*. Name of new species refers to the species name of the host bird *Larus canus*.

PAR-26

NEW HOST RECORD FOR *ECHINOCHASMUS PASSERI* DHAREJO *ET AL*., 2010 FROM JAMSHORO, SINDH, PAKISTAN

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Trematodes of genus *Echinochasmus* Dietz, 1909 are found throughout the world in birds of family Podicipedidae, Ciconiidae, Ardeidae, Accipitridae, and Anatidae. It contains a number of species that are transmitted to human as food borne trematodes. A total of seven Paddy bird, *Ardeola grayii* (Pelecaniformes: Ardeidae) were collected from different areas of the Jamshoro. A total of three trematode of genus *Echinochasmus* were collected from the intestine of a single host. On the basis of diagnostic characters including body shape, number of collar spines, shape and position of testes and ovary and distribution of vitellaria, these specimens are identified as *E. passeri* Dharejo *et al.,* 2010. Previously this species is reported from the gall bladder of host *Passer domesticus* of Hyderabad, Sindh, Pakistan. This makes new host record of *E. passeri* Dharejo *et al.,* 2010.

SECTION - V

FISHERIES, ECOLOGY, WILDLIFE, FRESHWATER BIOLOGY, MARINE BIOLOGY

1. **FRESHWATER BIOLOGY, FISH BIOLOGY AND FISHERIES**

2. **MARINE BIOLOGY**

3. **PALAEONTOLOGY**

4. **WILDLIFE**

5. **BIODIVERSITY**

6. **ENVIRONMENTAL BIOLOGY / ECOLOGY**
   ENVIRONMENTAL POLLUTION

1. FRESHWATER BIOLOGY, FISH BIOLOGY AND FISHERIES

FEWFM-1

AN INNOVATIVE TECHNIQUE OF FISH-CUM HORTICULTURE

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Large area of an aquaculture farm is available in the form of dykes some of which is used for normal farm activities, the rest remaining fallow round the year infested with deep-rooted terrestrial weeds. The menacing growth of these weeds causes inconvenience in routine farm activities besides necessitating recurring expenditure on weed control. This adversely affects the economy of aqua-farming which could be considerably improved through judicious use of dykes for production of vegetables and fish feed. An integrated horti-agri-aquaculture farming approach leads to better management of resources with higher returns. Several varieties of winter vegetables (cabbage, cauliflower, tomato, brinjal, coriander, turnip, radish, beans, spinach, fenugreek, bottle gourd, potato and onion) and summer vegetables (amaranth, water bind weed, papaya, okra, bitter gourd, sponge gourd, sweet gourd, ridge gourd, chilly, ginger and turmeric) can be cultivated depending upon the size, shape and condition of the dykes A huge quantity of cabbage, cauliflower, turnip and radish leaves are thrown away during harvest. These can be profitably utilised as supplementary feed for grass carp.

FEWFM-2

REPRODUCTIVE PERIODICITY OF FRESHWATER CATFISH, WALLAGO ATTU FROM RIVER INDUS, JAMSHORO

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Studies on the reproductive periodicity of freshwater catfish, *Wallago attu* was design to supply information on ova diameter, Gonadosomatic index, fecundity and length-weight relationship and relative condition factor (Kn) from River Indus District Jamshoro. Total 120 specimens ranging from 25.1-56.0 cm in total length and from 367-980 g in weight was taken into account for six months from August 2021-January 2022. Length-weight relationship exhibited as equation under log w= -2.61+2.67 log l (males) and log w= -2.71+2.72 log l (females) Values of (Kn) relative condition was intended for both the sexes separately. Mean condition data was deviated for both the sexes between 1.09 and 1.06 respectively. Values of ova diameter were found to be ranged between 0.55-1.0 mm, the GSI values were also from to be increasing from 0.71-6.5% and from 0.82-10.28% for both the sexes. Thru April to August both values were found to be high during July it indicated that the fish spawning once in a year during July. Outcomes of egg estimation during the examination were rely on 10 matured *Wallago attu* from River Indus. Fecundity was ranged between 260-554 eggs. Least egg estimation 260 was detected from fish of 41.8cm and 88.0 g in length and weight. The highest egg was 554 from 59.0 cm and 155 g in both length and weight. total body length exhibits better relationship with fecundity of experimental fish *Wallago attu* from Indus River than the other parameters.

FEWFM-3

STUDIES ON THE GUT CONTENT AND ITS VARIATION IN RELATION TO SIZE OF FRESHWATER CATFISH, *WALLAGO ATTU* FROM RIVER INDUS

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The studies on the gut content analysis of freshwater catfish, *Wallago attu* was carried out from November 2021 to January 2022 from the catch of local fishermen of River Indus. Total 65 fish of different size ranging from 20.0 to 45.5 cm and from 130 to 580 g in length and weight respectively were taken into account for the present investigations. The gut content analysis was revealed that the experimental fish mainly fed upon fish as most prefer food item (40%) in all three size groups (small, medium and large) followed by insects (25%) and third preference was worms with (15%) as recorded from the gut content of experimental fish. It was noted that the fish *Wallago attu* found to be carnivorous in feeding habit with piscivours preference.

FEWFM-4

INTER-RELATIONSHIP OF VARIOUS BODY MEASUREMENTS IN RELATION TO LENGTH IN *CLARIAS GARIEPINUS*, REARED IN CISTERNS

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The inter-relationship of various body measurements in relation to length in *Clarias gariepinus*, reared in cisterns was initiated from March –September 2021 by using 200 (110 and 90) male and female respectively. These specimens of experimental fish ranged in 14.4 to 37.0 cm in length and from 44.7 to 985 g in weight were obtained from the stock marinated in the cisterns of University of Sindh, Jamshoro. Fish samples were divided in to groups at the interval of 5cm each. Various body measurements were studied like fork, standard and head lengths, fin measuring like dorsal, pectoral, pelvic and anal the diameter of eye and gape of mouth. It was revealed that there was no significant difference was noticed among the male and female, slight variation was observed in the percentages of lengths like standard and anal fin found high in female (85.03% and 15.25%) then male (83.21% and 10.61%). While lengths head, fork length, girth, 1st dorsal fin, pectoral fin, pelvic fin were found to be high in case of male (90.76. 26.56, 70.31, 11.28, 11.97, 4.95, 4.51%) then female (90.68, 25.64, 62.71, 10.73, 8.8, 35 and 3.3%) respectively while eye diameter was found to be higher in female (3.88%) than male (2.08). Rays of five different fins were counted like 1st dorsal, pectoral, pelvic, anal and caudal of both sexes (male and female). It was noticed that there was no significant difference was observed in meristic counts in case of male and female of *Clarias gariepinus*, from cisterns. Finally, it was concluded from the measurements of various body measurements and meristic analysis that there was single homogenous population of *Clarias gariepinus*, available in cisterns.

FEWFM-5

IMPACT OF DIVERSE PROTEIN LEVELS ON GROWTH AND SURVIVAL OF MONOSEX *OREOCHROMIS NILOTICUS* REARED IN AQUARIA

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Experiment was done to evaluate the diverse protein levels on the growth and survival of monosex *Oreochromis niloticus* reared in aquaria in time of April- June 2020. Three test diets were prepared from locally available ingredients (rice bran, mustard oil cake, wheat flour and wheat bran) with 35%, 40% and 45% crude protein. The aeration supplied to aquaria 24 hours and fed was twice a day. The results revealed in terms of growth parameters a significantly ($p < 0.05$) highest performance in T-II followed by T-III while significantly ($p < 0.05$) decreased was recorded from T-I. Significant ($p > 0.05$) fluctuation in temperature appeared during the experimental trial. The high temperature was found in T-III (32 °C) in the June and lowest was recorded in T-I (25.5) in the month of April (Table 5). Higher DO was observed in T-II (5.65 mg/l) in the month of June and minimum was recorded in T-III (3.63 mg/) in the month of April. It was concluded that the feed containing 40% protein was detected to be appropriate for the growth and survival of *Oreochromis niloticus* reared in glass aquaria.

FEWFM-6

COMBINE EFFECT OF FENUGREEK SEED AND PROBIOTICS ON THE GROWTH PERFORMANCE OF *LABEO ROHITA*

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The present study was planned to evaluate the growth performance with the combined effects of probiotics and fenugreek by adding in the supplementary diet of *Labeo rohita.* Freshwater fish (*Labeo rohita*) was selected for the experiment due to market demand and consumer preference. Different studies were carried out to obtain maximum yield with low cost and easily locally available ingredients. Three test diets, T1 (fenugreek), T2 (probiotic) and T3 (fenugreek and probiotic) as a feed additive in commercial feed were formulated and fed with a ratio of 5% of fish body weight per day for sixty days. Weight gain, total length increase and other growth parameters were recorded fortnightly. Specific growth rate (SGR), feed conversion ratio (FCR), protein efficiency ratio (PER) and survival rate were determined and compared statistically. The combined effects of probiotics and fenugreek in fish diets significantly boosted the growth performance and parameters ($p<0.05$). In the end, it was noticed that fingerlings of *Labeo rohita* fed with test diet T3 performed a remarkable increase in final average weight and total length as (38.06+0.25) and (19.50+0.05) respectively followed by other treatments T2, TI and TO. The results showed that the best growth performance in different treatments was in T3 > T2 > T1. Water quality parameters were also monitored and maintained to their optimal range for fish culture, which proves the survival of 100% at the end of the experiment

FEWFM-7

KNOWLEDGE, PREFERENCES AND CONSUMER PERCEPTIONS FOR WILD CAUGHT AND FARMED FISH IN DIFFERENT RURAL AND URBAN AREAS OF DISTRICT KHUSHAB

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The study was aimed to investigate consumer perception, knowledge and preferences for wild versus farmed fish in rural and urban areas of district Khushab. The impact of sociodemographic factors on consumers preferences for wild and farmed fish were evaluated. A survey was done on a sample of 600 consumers. Results manifested that majority of respondents were females (52.5%), have attained university level education (84%), within the age group of 19-30 years (55%), have income of greater than 50,000 per month (33.8%), 4-6 average family sizes (57.5%) and belong to urban sites (50.8%). Most of them (75.7%) like to eat fish and (38.8%) consume fish for more than 7 times per annum. Mean score for taste (3.24) showed that it was a strong reason of fish consumption irrespective of wild or farmed fish, however, they could distinguish between both types. Respondents with higher income and moderate family size preferred both wild and farmed fish and could distinguish wild fish from farmed fish. Significant difference existed between consumers of rural and urban communities in terms of fresh fish-eating habits, most preferred fresh fish type and their ability to distinguish between wild and farmed fish from appearance. Results showed that female, higher income, and moderate family size give higher preference for both wild and farmed fish. These results could play a significant role in aquaculture particularly in developing marketing strategies for farmed fish industry.

FEWFM-8

CONSUMER KNOWLEDGE, PERCEPTIONS AND PREFERENCES FOR WILD CAUGHT AND FARMED FISH IN DIFFERENT RURAL AND URBAN COMMUNITIES OF DISTRICT SARGODHA

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Health awareness is becoming a vital constituent to drive the intentions of people for consumption of fish due to its beneficial and healthy qualities. Little is known about consumers' preference for wild and farmed fish which has become a basic factor for aquaculture promoters to develop proper marketing techniques for progress of farmed fish industry. So, a study was designed to explore consumer knowledge, perceptions, and preferences for wild caught and farmed fish in different rural and urban communities of district Sargodha and impact of socio-demographic factors on consumers' preference for wild caught and farmed fish through appropriate analysis techniques. A total of 600 sample size was collected by using properly predesigned questionnaire survey among consumers of different rural and urban communities of Sargodha. Results manifested that majority of respondents were females (54.2%), have attained university level education (80.8%), within the age group of 19-30 years (58%), have income of greater than 50,000 per month (31.8%), 4-6 average family sizes (58.5%) and belong to rural communities (51.5%). Most of them (74.8%) like to eat fish and utilize fish for 2-4 times per annum (38.2%). Significant difference existed between consumers of rural and urban communities in terms of most preferred fresh fish type, fresh fish-eating habits, and their ability to distinguish between wild caught and farmed fish. These results could play a significant role in aquaculture particularly in developing marketing strategies for farmed fish industry.

FEWFM-9

EFFECT OF ALOE VERA PLANT (*ALOE BARBADENSIS*) ON INTESTINAL MORPHOLOGY AND GROWTH PARAMETERS OF *LABEO ROHITA*

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Labeo rohita (Rohu) and *Catla catla* (Thaila) are commercial species of Pakistan and main food items of aquaculture. From Pakistan, carps examined as a main source of protein. The base of this study is to enhance the growth of *Labeo rohita* under special dietary condition. The aim of this study is to check the effect of traditional herb *Aloe barbadensis* on intestinal villi morphology. Initial stocks of fingerlings of *Labeo Rohita* having average weight 14.30g was bought from Government Fish Hatchery, Faisalabad. *Aloe barbadensis* leaf's powder was prepared and mixed with different concentration of feed. This feed was applied for 90 days to test the effect of *Aloe barbadensis* leaf's powder on the growth and histopathology of *Labeo rohita.* The fish feed was prepared by using person square method. At the end of feeding trial three fishes from each aquarium were selected randomly for analysis of pyloric caeca. According to the results, different levels of *Aloe barbadensis* leaf's powder had effect on survival rates and intestinal villi morphology of the fish in different groups.

FEWFM-10

MORPHOMETRIC RELATIONSHIPS, CONDITION FACTOR AND GONADOSOMATIC INDEX OF *ACANTHOPAGRUS ARABICUS* (PISCES: SPARIDAE) IN THE COASTAL WATERS OF PAKISTAN, NORTH ARABIAN SEA

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In Pakistan *Acanthopagrus arabicus* species has been progressively exploited for food, but scarce information is available on its morphometric relationship, condition factor, and reproductive biology. The present study aims to classify a morphological difference within the population of this species present in the coastal water of Pakistan by examining twenty different morphometric variables. Collections were obtained from two main fish harbors, situated in two provinces of Pakistan from September 2017 to August 2018. The results confirm that most morphometric characters are greatly correlated to the total length in all seasons. The total length ranges from 12.00 - 41.00 cm whereas the total weight ranges from 31.00 - 1236.00 g were recorded for *Acanthopagrus arabicus*. Condition factors ranged from 1.431 to 1.930 shows wellness or fine condition of the species. The gonadosomatic index (GSI) ranges from 0.51 to 11.28 with a mean value of 2.03±1.58. The present study in the future could be useful to students, fisheries biologists, and taxonomists for the correct identification and classification of *Acanthopagrus arabicus* found in different locations of Pakistan as well as the management and conservation of this species.

FEWFM-11

STUDIES ON THE PHOTOPERIOD ON GROWTH, BEHAVIOUR AND HAEMATOLOGICAL PARAMETERS IN *LABEO ROHITA*

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Fish is the most important animal in aquatic environment and major source of socio-economic and human nutrition. Different factors that effect on growth performance of fish, but one is the most important factor is photoperiod

among the environment. The experiment was conducted to find the growth, behavior and haematological parameters in juveniles *Labeo Rohita*. Juveniles were divided in three treatments and supplied food twice a day under different photoperiods. The light intensity was kept constant throughout their experiment. The data was collected weekly and fortnightly by randomly samples selected from all treatments. Data were analyzed by using two-way anova. Juveniles were reared having two replications in three treatments: (T1) treated with 12L:12D, (T2) with 6L:18D, (T3) with 18L:6D. Experiment revealed that the maximum Specific growth rat, percentage weight gain and absolute weight gain were observed under 12L:12D compared to others. The highest values of feed conversion ratio were observed under prolonged light condition. Red blood cells (RBC) values were observed maximum in dark condition, while the maximum white blood cells (WBC) were observed in (T1) 12L:12D. The highest values of blood glucose level were found in prolonged light condition while the maximum haemoglobin (Hb) were observed in (T1) 12L:12D. Maximum swimming activity and eating ratio were observed under prolonged light condition. Resting period of rohu were maximum under prolonged dark condition. The current experiments show negative effects on growth, behavior and haematological parameters under prolonged photoperiod.

FEWFM-12

MORPHOMETRIC AND QUANTITATIVE ASPECTS OF *CATLA CATLA* AND *CIRRHINUS MRIGALA* FROM RIVER BOLAN, BALOCHISTAN

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A study was conducted to assess morphometric and quantitative aspects of Two Indian major carps (*Catla catla* and *Cirrhinus mrigala*) were assessed in terms of growth, survival and suitability of aquatic environment and to check and exhibit differences in shape for characterizing growth trends. Although the values of condition factor did not show positive allometric growth (b>3.0) or isometric growth (b=3.0) for both species i.e. *C. mrigala* and *C. catla*, but the one-way analysis of variance (ANOVA) showed a strongly significant relationship (P = 0.000) of weight with month in both fishes (*C. mrigala* and *C. catla*). The values of 'b' observed by LWRs were 2.04 for *C. catla* and 2.44 for *C. mrigala.* All morphometric parameters of C. *catla* and *C. mrigala* were significantly correlated with total length (TL). The findings may help taxonomist to compare different parameters of Indian Major Carps and would be a baseline of major further research.

FEWFM-13

TEMPORAL ASSESSMENT OF FISH DIVERSITY IN TANDA DAM, AND ITS FEEDING KOHAT TOI RIVER

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Tanda dam is an off-channel zoned embankment dam located on Kohat Toi River extensively used for irrigation purposes. This dam was studied to forecast the ecological impacts of raising the water level on fish fauna. Earlier, 28 fish species of commercial and non-commercial value were reported from Tanda lake in 2007. Similarly, during the present

survey, 32 fish species (Summer; 28 species, and Spring 20) were sampled from Tanda dam and its feeding river. In both seasons, 20 fish species were recorded as common fish species. During the present survey, the highest number of fish species (15) were recorded in Kohat Toi during summer and 9 from D3 and D5 during the spring season, and the lowest number of fishes recorded from South West Side of Tanda dam. Among 32 fish species, only seven species viz; *Puntius conchonius Mastacembelus armatus Xenentodon cancila, Oreochromis niloticus, Crossocheilus latius,* and *Cyprinus carpio were* the dominant species. Every year, the Fisheries Department and Contractors stock the commercial fishes viz; *Cirrhinus mrigala, Labeo rohita, Hypophthalmichthys molitrix, Hypophthalmichthys nobilis,* and *Tor putitora*. Among the threatened species, *Tor putitor* and *Ompack bimaculatus*, which were present in Tanda Lake. *Tor putitora* is the inhabitants of Himalayan foothill streams. Due to the similar habitats, region, and off-channel type of this dam, *Tor putitora* was stocked for economic and conservation purposes, whereas, *Ompack bimaculatus* near threatened species, however, this species has a wide range of distribution in South Asia. *Schistura kohatensis* and *Glyptothorax naziri* are endemic to this region and distributed in the rivers and streams of Khyber Pakhtunkhwa. For the conservation of such neglected species, it is suggested that minimum ecological flow should be maintained downstream of Kohat Toi Barrage to sustain the healthy population. In Tanda reservoir, gradual water filling should be done without compromising ecological flow in the Kohat Toi River. Aquatic vegetation in Tanda reservoir is very limited, however, *Eucalyptus* vegetation was planted along the shoreline. The high density of *Eucalyptus* can lead to the degradation of water quality. *Eucalyptus* vegetation should be replaced by natural vegetation at the margins of Tanda lake. Natural aquatic vegetation will provide breeding grounds for fishes, amphibians, birds, and macroinvertebrates. To maintain the sustainable fish species community of special concern in the river and Tanda lake, there is a need for continuous monitoring of the stocking program.

FEWFM-14

ASSESSMENT OF MATURITY, FECUNDITY, AND HERMAPHRODITISM IN *ACANTHOPAGRUS ARABICUS* (IWATSUKI, 2013) FROM KARACHI COAST, PAKISTAN

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Yellowfin seabream *Acanthopagrus arabicus* was selected for this study because of its economic importance. Macroscopic and histological assessments of maturity are regularly used in fisheries research as an important source of size-at-maturity estimation. Samples were collected monthly from fresh landings at Karachi fish harbor for three years. The present study compared both macroscopic and histological observations in the protandrous hermaphrodite, *Acanthopagrus arabicus.* For the determination of fecundity, 50 ovaries in stages V and VI were used from fish belonging to sizes ranging from 216 mm to 345 mm total length during spawning season. Results categorized individuals as (i) females and males (specimen which showed only testicular zones in the male and ovarian zone in the female during macroscopic and histological analysis) (ii) transitional (both testicular and ovarian zones in the same individual) (iii) functional females (having developed ovarian zone with the inactive reduced testicular zone) (iv) functional males (having expanded testicular zone with the inactive ovarian zone) based on four distinguished gonad conditions observed. In the male, L50 (length at 50% maturation) was observed in the size range of 199 mm to 215 mm while in the female size range of 216 mm to 232 mm. Observation suggested female *Acanthopagrus arabicus* were larger when attained 50 % maturity. The spawning period lasts for four months and the Mean ± SD of the highest fecundity was observed in the size range 327 mm to 345 mm with a gonad mean weight of 29.50. Our findings showed low agreement between macroscopic and histological maturity classification as difficulties in the determination of sex and maturity may be most prominent for such species. This study provides detailed study on maturity and spawning which could be helpful to restrict size-selective fishing impact.

FEWFM-15

MONTH-WISE ASSESSMENT OF THE BLOOD PARAMETERS IN *OMPOK PABDA* FROM RIVER INDUS

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The month-wise assessment of blood parameters in *Ompok pabda* from River Indus was ascertain from 60 fish ranging between 12.9 to 30.0 cm and 14.8 to 147.0 g in length and weight respectively during summer from April to June 2016 and from December 2016 to February 2017. It was observed that the blood parameters like haemoglobin concentration (Hb = 9.0 and 7.9 g/100 ML) and count of erythrocytes (TEC = 2.15 and 1.80 $x10^6$ mm^3) in male and female respectively during summer months. In case of winter the values of erythrocyte sedimentation rate was noted to be slightly high (ESR = 2.50 and 2.10 mm/h) for female than the male. The other parameters did not show any significant variation in terms of sex and season.

FEWFM-16

A COMPARATIVE STUDY ON THE GROWTH PERFORMANCE OF SILVER, GRASS AND MIRGAL CARPS

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The present study was conducted to investigate the effect of supplementary feed on Grass carp (*Ctenopharyngodon idella*), Mirgal (*Cirrhinus mrigala*) and Silver carp (*Hypopthalmicthys molitrix*) from April to June 2013 at Carp Fish Hatchery, Char Banda, District Mardan, Khyber Pakhtunkhwa. The feed which was given to fish included brans, cakes and natural aquatic organisms. The initial average weight of Grass carp (*Ctenopharyngodon idella*) was 139.5 gm, Mirgal (*Cirrhinus mrigala*) 84 gm and Silver carp (*Hyphopthalmichthys molitrix*) was 167.5 gm. After 90 days feeding trials, fishes gained 36.60%, 69.90% and 19.91% respectively of their initial weight. The present study indicates that, Mirgal (*Cirrhinus mrigala*) showed the maximum average body weight and length gain followed by Grass carp (*Ctenopharyngodon idella*) and Silver carp (*Hyphopthalmichthys molitrix*). Highest growth performance of Mirgal (*Cirrhinus mrigala*) seems to be due to the higher growth potential than the other two specie reared under semi-intensive culture system. It can be predicted that the feed was more suitable for our native carps as compared to exotic carps.

FEWFM-17

FEEDING OF LETHRINUS NEBULOSUS: ECOMORPHOLOGICAL PATTERNS WITH CO-RELATION OF THEIR STOMACH CONTENT FROM PAKISTAN'S WATERS

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Emperor, Lethrinus nebulosus (Forsskal, 1775) is widely targeted in the demersal fishery and has a vital role in Pakistan's marine waters for its taste and nutritional values. In this regard analyses of stomach contents are helpful to

determine their range. Any modifications to the food supply may eventually have an impact on the quantity and quality of these economically important fish. Despite the significance of L. nebulosus, little is known about its eco-morphological pattern of feeding. Present study was conducted to understand the food and feeding habits of L. nebulous. Fishes were collected from Karachi fish harbour and the Korangi creek along Pakistan's waters during August '2021 to July 2022. Total 48 gut samples were analyzed. This one-year data showed the dominant food items in their guts included decapods followed by cephalopods and bivalves, respectively. The rest of the content shows small proportion of copepods, juvenile fishes, eggs and other unidentifiable and partially digested invertebrate organisms. In this study, it is very interesting to know about the dominant fauna and their role in ecological niche. For measuring diet composition different method were applied such as point method, index of preponderance which is the combination of volumetric and frequency of occurrence (%F). The present study offer base line data. Recognizing the connection between fish and food organisms is essential for the projection and exploitation of Lethrinus nebulosus population and research on ecology of feeding habits is crucial for understanding trophic interactions, population and community dynamics within an ecosystem.

FEWFM-18

EFFECTS OF IRON NANOPARTICLES SUPPLEMENTATION ON GROWTH, BODY COMPOSITION AND HEMATOLOGICAL ASPECTS OF *LABEO ROHITA*

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The study was planned to evaluate the effects of different levels of iron nanoparticles (Fe-NPs) on growth performance, muscle composition and hematology of *Labeo rohita*. The experiment with one control group and two treated groups was carried out for the period of 90 days, each group with one replicate. Control group supplemented with control diet without iron NPs while group-T_1 treated with Fe NPs@0.6mg/kg level and group-T_2 treated with Fe NPs@0.8mg/kg level. Fingerlings were fed at the rate of 4% live wet body weight daily. Morphometric characteristics i.e, wet body weight (g) and body length (cm) were recorded fortnightly. Results showed that group treated with Fe-NPs@0.6mg/Kg level showed significantly ($P<0.05$) highest weight gain, SGR and condition factor value. Protein and lipid nutrients retention in the body meat was recorded highest in group treated with Fe-NPs@0.6mg/Kg level while ash retention and gross energy recorded highest in group treated with Fe-NPs@0.8mg/Kg level. Hematology showed RBCs and WBCs increased in group treated with Fe-NPs@0.6mg/Kg level. Hb, HCT, MCV and MCH values increased in control group and MCHC value increased in group treated with Fe-NPs@0.8mg/Kg level. From the results, it was concluded that Fe-NPs@0.6mg/Kg level is more suitable for *Labeo rohita* with great growth potential, improved muscle composition and hematology as well as make its immunity strong as compared to high iron NPs level and control diet.

FEWFM-19

STUDY ON MICROFAUNA FOUND IN AQUAPONICS SYSTEM

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Fresh water is the most significant and immediately practical type of water for humans. While certain creatures can survive in salt water, most higher plants as well as the majority of mammals, birds, amphibians, and other reptiles require clean water for survival. Plants can also grow hydroponically (without soil) and aquaponically (raising fish and

other aquatic animals). This method involves keeping fish in a fish tank while growing plants in a grow bed. Millions of helpful bacteria in the grow bed naturally convert the ammonia in the waste water from the fish tank into nitrites and ultimately nitrates. Plants absorb these nitrates and other minerals to aid in growth. The plant's underlying foundations clean and channel the water in before it streams once more into the fish tank for the fish to live. The clean, oxygenated, and fresh water returns to the fish tank, where the cycle will resume. A live micro-algae solution can be used to supplement the diet of copepods in aquarium that does not have a lot of dissolved organic matter and does not receive daily heavy or multiple feedings. Present study was conducted at Fisheries and Aquaculture Lab at Jinnah University for Women from August, 2022 to October,2022. The study was carried out by collecting water sample under gravels from Aquaponics aquariums on daily basis for observation of microfauna present in aquariums system. Nile tilapia is also present in these aquariums. Sample were collected every week from aquarium, and observed under microscope 40x different types of species such as: Copepods, Crustaceans, Ostracods, Flagellates, ciliates were observed.. In this research, microfauna of freshwater aquaponics system having Nile tilapia sp. found these species such as, *Seed shrimp(ostracoda), Copepods sp, Paramecium caudatum, Chaetogaster sp, Aeolosoma hemprichi, Daphnia magna* (Water mite)*, Springtail, Oodinium sp, Trichodina sp*

FEWFM-20

STUDY ON MICRO-FAUNA PRESENT IN AQUARIUM WATER

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A container that holds one or more aquatic organisms for decorative, pet, or lookup purposes is known as aquarium. Presence of fauna in an aquarium is studied less that are accidentally introduced in aquarium like crustaceans, rotifers, snails and these are present in plants or the water column of the aquarium. Although these creatures have small size or few are microscopic, they have an important biological as well as economical effect on the aquatic system on which they attack. E.g: IUCN has declared zebra mussels (Dreissena spp.) and the ctenophore Mnemiopsis leidyi in the 100 of the world's most invasive species. The present study was conducted at Fisheries and Aquaculture Lab at Jinnah University for Women from August 1, 2022 to October 30, 2022. The study was carried out by collecting water sample from different fish aquarium having edible and ornamental fishes. Samples of water were collected with the h(elp of beaker from the base of the aquarium, with the help of dropper water taken from beaker to patri dish and observed under microscope. The samples were studied on weekly basis. Usually, the species which are observed are belonging to the phylum Ciliophora (*Tetrahymena pyriformis* and Trichodina specie) and Nematode (*Camallanus cotti* and *Hirschmanniella oryzae*). Other species which are found including Oscillatoria species (Cyanobacteria), *Daphnia pulex* (Arthropods), *Lecane tenuiseta* (Rotifer), *Chaetogaster diastrophus* (Annelida), and *Aedes* species (Arthropods) etc. The water sample is examined after particular time period.

FEWFM-21

THE EFFECTS ORGANIC OXY-AQUA AQUATIC PRODUCT ON GROWTH, FEED INTAKE AND SURVIVAL OF TILAPIA IN CAPTIVITY

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The commercial aquaculture is common in worldwide unlike Pakistan where production is still minute. The investigation was perform to decide the impact of dissolved oxygen (DO) by using organic Oxy Aqua item on tilapia

Pelmatolapia mariae because they are tough and can eat on assorted variety of substances. Mass determination for quick development were performed on tilapia mariae of 1.29-2.35 with isolated into 2 gathering; one with only simple aeration as treatment 1 and other with the Oxy Aqua aquatic product as treatment 2 and encouraged for 44 days response was tried after each multi week. With this dissolved oxygen is also measured with oxygen kit. According to result exposed that oxygen saturation level had optimistic impact on growth and FCR in treatment 2. At treatment 1 the growth was slightly lower and FCR was higher. The conclusion was that oxygen play most important role in growth, feed intake and survival rate of fish. The tilapia specie *Pelmatolapia mariae* i-n treatment 2, the development rate was higher due to high dissolved oxygen saturation. The feed conversion ratio was lower at treatment 2 with 100% survival rate.

FEWFM-22

SKIN DISEASES IN DIFFERENT FISH SPECIES OF INDUS RIVER AT TAUNSA BARRAGE, PAKISTAN

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Present study was conduct to investigate the skin infections in fishes of Indus River in District Muzaffar Garh, southern Punjab. Fish samples were randomly collected from seven sites at Taunsa Barrage area for the period of one year (September 2013 to August 2014). A total of 2249 specimens of fishes belonging to 70 different species were collected and analyzed for various skin diseases. 1595 (71%) specimens belonging to 35 species were found to be affected by various types of skin infections. The most alarming point is that 44% commercially important and 27% non-commercial fishes were found to be suffering in various skin infections. Among commercially important fishes *Systomus sarana* (41%), *Mastacembelus armatus* (37.5%) and *Wallago attu* (33%) were highly effected species, while *Oreochromis niloticus* (2.9%) was least effected species suffered in different skin infections. Less skin infection in exotic species *O.niloticus* is another potential danger for our local species of fish fauna. Similarly, *Colisa lalia* (25%), *Xenetodon cacila* (20%) and *Puntius chola* (10.5%) were more affected while *Gadusia chapra* (1.5%) were least effected among the non-commercial fishes. The highest prevalence of skin diseases among commercially important fishes were recorded in November (49%), October (27.9%) and February (21.3%), while highest infections in non-commercial fishes were more recorded in March (30%), January (20%) and December (19.3%). The effected fishes were having multiple infections like damaged eye, ulcer disease, fin rot and tail rot. These infections may be due to aquatic pollution, parasitic and microbial attack on fish in the water. The highest rate of skin infection in winter's month may be attributed to large sample size in these months and less water current in the river. The alarming situation of fish health status in the study area point urgent attention of the authorities to protect the diversified fish fauna very immediately from any future disaster.

2. MARINE BIOLOGY

FEWFM-23

THE STUDY OF PHYTOPLANKTON SPECIES DIVERSITY IN THE COASTAL WATERS OF LASBELA, BALUCHISTAN

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The investigation of the variety of phytoplankton species in the coastal waters of Lasbela, Baluchistan was conducted. Seasonal sampling was carried out from both inshore, Miani Hor Lagoon and offshore, the surrounding open sea between periods of September 2019 to August 2020. Over the course of three seasons (post monsoon, pre monsoon, and monsoon seasons), 119 phytoplankton species from inshore and offshore water were recognized as planktonic. Two types of phytoplankton were identified during the seasonal sample (Bacillariophyta, and Dinophyta). The relative abundance of division Bacillariophyta taxa across the post-monsoon, pre-monsoon, and monsoon seasons revealed significant variations in species composition. Group Bacillariophyta comprised 62% of the species in offshore water and 58% of the species in inshore water during the post-monsoon season. Division Bacillariophyta species made up 49% of inshore and 57% of offshore species in the pre-monsoon season. Division Bacillariophyta planktonic algae were estimated to make up 53% of species in inshore water and 55% of species in offshore water during the monsoon season. The Bacillariophyta division of planktonic algae, which consists of 25 taxa, 17 families, and 53 species, was present in inshore water. The group bacillariophyta, observed in inshore water consists of 25 genera, 17 families, and 53 species of planktonic algae.

FEWFM-24

SEASONAL DIVERSITY OF PLANKTONIC CILIATES IN RELATION TO ENVIRONMENTAL VARIABLES FROM COASTAL WATERS OF PAKISTAN (NORTHERN ARABIAN SEA).

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Ciliates are an important component of the microzooplankton and occupy major role in microbial food web. In the present study sea water samples were collected in four seasons from Gadani ship breaking area for the period of one year. The seasonal diversity of planktonic ciliates and physicochemical characteristics of sea water were determined from samples collected on board using Niskin bottles. The ciliates diversity and abundance display variations in different season and varied from station to station. In Gadani, maximum abundance and diversity of ciliates was recorded in South west monsoon. The total number of 128 species of ciliates classified into 56 genera from Gadani was recorded. Most dominant species of ciliates were *Salpingella acuminata, Tintinnopsis beroidea* and *Tintinnopsis gracilis.* The present research on the dynamics of ciliate species diversity, abundance and standing stocks would provide information on the functioning of marine ecosystem. Ciliate communities are vulnerable to change in their environment, the pollution in the coastal waters and changing climatic conditions triggers HAB forming species which is hazardous for fish and shell fish.

FEWFM-25

TINTINNIDS AS BIOINDICATORS FOR POLLUTION FROM COASTAL WATERS OF PAKISTAN (NORTHERN ARABIAN SEA)

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The present study aims to find out the occurrence of tintinnids species that are considered as bioindicators for marine pollution. Tintinnids are used to assess environmental stress and anthropogenic impacts in marine ecosystem and to monitor aquatic water quality. In the present study, triplicate water samples were collected for a period of one year from coastal sites of Pakistan. The abundance and biodiversity of Tintinnids are highly affected by excessive amount of pollution in coastal areas. The Tintinnids diversity and abundance shows variations in different seasons and varied from station to station. The research found that tintinnopsis species are most abundant and diversified twenty two species of *Tintinnopsis* are present in Sandspit. However, *Tintinnopsis parva, Tintinnopsis campanula, Tintinnopsis rotundata* were most dominant species. *Tintinnopsis* abundance may be related to their adaptive nature or sustaining in eurythermal and euryhaline aquatic environment.

FEWFM-26

ASSESSMENT OF ECOSYSTEM HEALTH AND MACROBENTHIC FAUNA OF CLIFTON BEACH, NORTHERN ARABIAN SEA. KARACHI

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Clifton beach, also known as Sea View, is one of the largest beaches in Karachi. It is located in district South, Karachi on the Arabian Sea of Sind, Pakistan. The overall objective of this study is to investigate invertebrate biodiversity and to assess ecological health and vulnerability of Clifton beach, Karachi. Sampling was done on the selected stations of Clifton during low tides, from June to August, 2021, by using a quadrate (30 x 30 cm) and taking out sediment by a spade up to 10 cm depth. Physical parameters of the sea water such as salinity, temperature and pH were also examined during the study to determine the environmental health of Clifton beach. The results show a number of diverse fauna of marine macrobenthos comprising 40 species of Gastropods, 16 species of Bivalves, 20 species of Crustaceans, 15 species of Polychaetes and, 7 species of other marine groups (poriferans & echinoderms). Statistical analyses were also performed to compute the biodiversity and to assess the ecological health of the beach. Key Words: Macrobenthic fauna, Biodiversity, Ecosystem, Clifton beach.

FEWFM-27

UNCOVERING THE MARINE FAUNAL BIODIVERSITY OF PAKISTAN- FIRST RECORD OF TWO CARIDEAN SHRIMPS

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Caught from pelagic trawl in offshore waters of Pakistan two carideans obtained by the second author and deposited with him are being reported from the Pakistani seas in this paper. Both of them are first time collected from

EEZ of Pakistan They belong to two different families-one is pelagic Pasiphaeidae and the second one is benthic Alpheidae.The families are not new for our marine fauna but the monospecific *Glyphus marsupialis* Filhol, 1884 and *Alpheus maindroni* Coutière, 1898 are new records . Colour photographs are provided for the two species given and are described in details.

FEWFM-28

UPDATED CHECKLIST OF MARINE MOLLUSCS OF THE PAKISTAN COAST (NORTHERN ARABIAN SEA)

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Mollusca is a diverse animal phylum with some 50,000 to 120,000 marine living species segregated into eight classes: Monoplacophora, Aplacophora, Caudofoveata, Polyplacophora, Bivalvia, Gastropoda, Cephalopoda, and Scaphopoda. Among molluscs, class gastropoda is the most dominant group consisting of almost 75 to 80% extant species. The northern Arabian Sea appears to have a significant diversity of molluscan species as evident from the literature. The present study on Malacofauna of Pakistan is reviewed based on appropriate published literature during 1850 to 2021. The literature was sourced from reviews, monographs, checklist, books, and websites published between 1850 to 2021. Nomenclature of all scientific taxa were validated, and the species recorded in Pakistani waters were revised through the original reference papers and, if found erroneous, were corrected in the present checklist. The compilation of the existing literature revealed a total of 1073 molluscan species belonging to 5 classes (Gastropoda Cuvier,1795; Bivalvia Linnaeus, 1758; Cephalopoda Cuvier, 1795; Polyplacophora Gray, 1821 and Scahopoda Bronn, 1862). The best represented group of molluscs species followed by Gastropoda with 714 species in 111 families and Bivalvia with 315 species in 44 families followed by Cephalopoda with 26 species in 8 families, respectively. The least diverse molluscs group included Scaphopoda with 10 species in 1 family and Polyplacophora with 8 species in 3 families. The list was compiled through 124 scientific published papers and the original locality data for the distribution of molluscs was included. This study list would be helpful to provide baseline data for the future studies as well as fill gaps to the knowledge of molluscan diversity and biogeography with respect to the conservation plans along the Pakistan Coast and hence improves the knowledge of biological diversity in this region.

FEWFM-29

SYSTEMATIC STUDY OF ARCIDAE (MOLLUSCA: BIVALVIA) FROM PAKISTAN: WITH DESCRIPTION OF SEVEN NEW RECORDS

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The bivalve family Arcidae order Arcoida are widely distributed in tropical, subtropical shallow waters and warm temperate seas. Inhibiting in intertidal and sub-tidal zone of rocks, stones, broken shells, calcareous algae, corals and sponges burrowed in sand and/or mud habitat and they are rarely occurring in estuarine and fresh waters. Family Arcidae

comprises of 12 living genera and approximately 250 to 350 extant species. Tagillarca granosa have been cultivated in South East Asia (China, Korea, Taiwan, Malaysia and Thailand) *and* Senilia senilis harvested in West Africa. Arcidae specimens were collected at the inter-tidal zone of rocky, sandy, and muddy beaches of Sindh and Balochistan Coasts. Shells were identified based on the morphological characters by given literatures. A total of 20 valid Arcidae species have been reported from Pakistani waters. The published records are generally provided in the form of a list with no taxonomic description. The present study reports seven new records of Arcidae species for the first time from Pakistan. This study also highlights taxonomic description of Arcidae species with original images and their distribution along the Pakistan coast is discussed briefly.

FEWFM-30

GONADO-SOMATIC INDEX, SEXUAL MATURITY AND FECUNDITY OF *PORTUNUS SEGNIS* (FORSKAL, 1775) IN COAST OF BALOCHISTAN, PAKISTAN

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This paper deals a study of sexual maturity, fecundity and GSI of *Portunus segnis* from Balochistan, Pakistan. Size at sexual maturity attained by the male and female crabs of *Portunus segnis* was determined by relative growth (functional) as well as by examining the condition of gonads (physiological). The size at which females attains full sexual maturity is 74-86 mm short carapace width (or 93 to 108 mm long carapace width). The 50% population of male and female crabs attains sexual maturity at 63.57 mm and 83.55 mm short carapace width, respectively. The minimum number of eggs was 1, 72, 963 in a crab of 84 mm short carapace width whereas maximum number of eggs was found to be 11, 27,796 in a crab of 135 mm short carapace width. The average fecundity was 523773 ± 279204 (S.D) for a berried crab with a mean short carapace width of 98.53± 18.05 mm. The GSI values of male crab ranged from 0.70 to 6.20 having a mean of 3.80 ± 1.08 S.D. In case of female, GSI values of samples were ranged from 0.71 to 13.33% having a mean of 5.46 ± 3.25 S.D.

FEWFM-31

ANTI-TUSSIVE EFFECT OF MEAT SAMPLED FROM TWO SPECIES OF CRABS *PORTUNUS PELAGICUS* AND *PORTUNUS SANGUINOLENTUS*

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Pakistan is the home of different species of crab among them dominant species belong to family Portunidae. Almost 200 species of crabs are reported form Pakistan coast. Crab meat is widely consumed because of taste and high nutritional values. Seven species are reported edible from Pakistan coast. Ethno-zoological survey (unpublished work) revealed that preparations from crab species are used in treating diseases like asthma, burns, bronchitis, dysentery, epilepsy, infertility, jaundice, liver disorders, rheumatism, and tuberculosis. Systematic work on the nutritional as well as biological potentials of the crab inhabitant of the Pakistan coast is lacking the literature. In the current study two species *Portunus pelagic* and *Portunus sanguinolentus* were used to find out the antitussive properties of their meat. Thus the meat broth of the two species were tested following method described by Miyagoshi (1986). Briefly, cough was induced in albino rat in a close chamber using sulfur dioxide. Four groups of animals were made with five animals each. Each

group I was control, group II standard while groups III and IV received 400 mg/kg aqueous extracts of meat obtained from *P. pelagic* and *P. sanguinolentus*, respectively. All extract and drugs were administered orally. The activity was compared with the standard antitussive agent. Antitussive effects were observed in the test groups. Conclusively, *P. pelagic* and *P. sanguinolentus* showed 1.69 % and 1.35 % inhibition, respectively, in coughing with respect to the 10.13% inhibition in standard (Antihistamine + Bronchodilator) at 90 minutes. *P. sanguinolentus* extract were better than *P. pelagic.* All these observations give a pharmacological understanding about use of crab as ancient remedy for cough.

FEWFM-32

UNCOVERING THE MARINE FAUNAL BIODIVERSITY OF PAKISTAN--INTERSTITIAL AND PHYTAL HARPACTICOIDS, ALONG WITH REPORTS ON THE OCCURRENCE OF A FEW PLANKTONIC HARPACTICOIDS (COPEPODA, HARPACTICOIDA) FAUNA --FIRST RECORDS

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In this study, interstitial, phytal and planktonic harpacticoid copepods distributed along the littoral zone of the Pakistan coast were investigated. The samplings were made from different stations. As a result, 9 species belonging to 9 genera within 7 families- Tegastidae, Tisbidae, Canuellidae, Ectinosomatidae, Miraciidae, Laophontidae and Canthocamptidae were identified. All are new records for the Pakistani marine fauna.They are illustrated and described in this paper.

FEWFM-33

DIVERSITY AND DISTRIBUTION OF DINOPHYCEAE IN GADANI (NORTHERN ARABIAN SEA) OF PAKISTAN

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Dinoflagellates mostly occur in marine habitats, however also found in freshwater and estuary environment. Dinoflagellates are ubiquitous in the ocean as plankton play substantial role in photosynthesis. Dinoflagellates have two modes of nutrition, heterotroph and autotroph. In terms of cell size, dinoflagellates are a far more varied and common category of microalgae species than diatoms. The research aims to analyze the annual variation in diversity, abundance and spatial distribution of the dinoflagellate species from the Gadani, coastal area of Pakistan. The samples of marine water were collected in amber bottle (200ml) on board by using Niskin bottles from Gadani ship breaking area, Pakistan coast. The peak abundance of dinoflagellates was observed in the month of March, April, May and December in all stations of Gadani. In the Gadani ship breaking area, 81 species of dinoflagellates were observed belonging to 22 genera. Four dominant species of Dinophyceae such as *Ceratium fusus, Ceratium lineatum*, *Noctiluca Scitillans and Prorocentrum micans* were observed in Gadani. The results showed quite variation in the species composition of phytoplankton in shore, middle shore and in open ocean. Dinoflagellates communities are susceptible to change in their environment due to their Harmful bloom activity that may cause fish mortality and shellfish poisoning.

FEWFM-34

COMMERCIAL CRAB (*SCYLLA SERRATA*) FARMING AND FATTENING IN CREEKS AND MUDFLATS OF SUJAWAL SINDH PAKISTAN

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Indus delta eco region of Sujawal is well productive in relation to fisheries potential. Large number of marine fauna and flora occurs in the natural ecosystem of creeks and mudflats. The region is rich with natural stocks of mud crabs population. An experiment on farming and fattening of mud crab Scylla serrata species was carried out in 1.5 acre pond at mudflats of taluka Shah Bandar Sujawal during October-November 2022. In this experiment very common and cheap materials were applied. The common practice and traditional methods of fattening and farming were used as practiced by coastal communities in the region. Small sized immature crab size about 150-250 gram was purchased from local fishermen at cost of Rs. 70 to 100/- depending on size. The fishermen were found collecting mud crab from creeks using various traps and handpicking. The individual crab reaching at mature and marketable size from 350 to 500 gram during period of 15-30 days. 3000-4000 individuals were stocked in 1.5acre pond followed by feeding small trash fish and the byproduct of mussels and visceral. A very handsome amount was earned from crab fattening and culturing in stocking pond. The idea of this experiment is to popularize the crab fattening and farming using traditional method of fish culture. The results of the experiment have been circulated among coastal community to start their cottage and supplementary business for better livelihood. A booklet has also been published in local languages for guidance of coastal communities.

FEWFM-35

INTEGRATED ASTPR MODEL OF LIFE SCIENCES RESEARCH IN PAKISTAN

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Academia in Pakistan has been under a criticism 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 an approach of impact factor rather than impact on the society. In order to harmonize the academia with the national needs and aspirations we propose a comprehensive integrated model of research in Pakistan. Our ASTPR model comprises of five prongs. Awareness raising of the target research issue among all stakeholders followed by advocacy among policy makers is the first prong of our model. Screening of the vulnerables is the second prong of the model. Treatment and relief of sufferers is the third prong while prevention implementation is the fourth prong of the model. Research on all of the dynamics of the issue is the fifth prong of our model. Implementation of this integrated model has resulted in a substantial achievement in control of infectious diseases particularly hepatitis B and C in Pakistan. This comprehensive model can easily be applied and customized on almost every field of life sciences research in Pakistan.

FEWFM-36

MORPHOMETRIC RELATIONSHIP AND ESTIMATION OF INTERNAL VOLUME OF *BABYLONIA SPIRATA* FOUND ALONG PAKISTAN COAST

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The *Babylonia spirata* is commercially significant, representative of the Phylum Mollusca distributed in Indo Pacific region. Physically characterized by broad ovate tapering and moderately small white shell with pinkish-orange to dark brown blotches arranged in spiral bands. *B. spirata* is utilized as seafood, caught by trawlers, and over-exploited in many countries. During the current study, *B. spirata* was collected from the coastal waters of Pakistan. A total of 200 specimens were selected, morphometric measurements including shell length, shell width, shell height, apex height, weight, and no of the body whorl. An empty shell of *B. spirata* has ecological importance and the representative of hermit crabs utilizing its empty shell as a home. Shell internal volume usually estimated by filling the shell cavity with water or sand. Morphometric measurements *measured to the nearest gram.* The result revealed that the shell length ranged between 16.6-60 m*m*, the width range between 12.01-40.31 mm, the shell height range between 4.31-40.61mm, the apex height range between 0.12-1.94 mm, and the weight range between 1.025-49.95 g. Significant correlation variation was observed in all variables. The highest correlation values were observed in the length-width. The analysis of variance (ANOVA) revealed that all variables showed significantly different (DF=1, $p<0.000$). Estimation of shell, internal volume revealed that each measure of sand and water provided similar results.

FEWFM-37

ZONAL DISTRIBUTION OF INTERSTITIAL FAUNA IN COASTAL SEDIMENTS OF GADANI BEACH BALUCHISTAN PAKISTAN

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Interstitial fauna are the animals that inhabit the spaces between the sediment grains. The term is often used synonymously with meiofauna, mesofauna, and microfauna. The study of the microfauna living in the interstitial water within marine or freshwater sand, the so-called interstitial or meso fauna that made important contributions to systematic zoology during the past decades. Gadani beach was the site selected for the sampling, and sediment was collected by using 20 cm size core, with different 10 cm depth, according to different tidal zone: low, mid and high tide. After collecting the sediment was transferred into zip lock bag, and then it was preserved with 5% formaline solution, then furthermore three replicates of 50 grams sediment was taken from each samples, sieved by using 60 mm mesh size, The retained sample in sieve was observed and studied under digital microscope and photographed, The different groups of interstitial fauna were observed. The species of foraminifera's following radiolarians, ostracod bryozoans and oligocheates were the most abundant in the sediments of Gadani beach. Some eggs and larvae of fish and echinoderms were also observed. Grain size analysis was also done by following Wentworth scale by using mechanical sieve shaker.

FEWFM-38

MORPHOMETRIC STUDY OF TWO COMMERCIALLY IMPORTANT SPECIES OF GENUS SARDINELLA (*S. ALBELLA, S. GIBBOSA*) FROM FAMILY CLUPEIDAE FOUND IN PAKISTANI WATERS NORTHERN ARABIAN SEA

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The morphometric characters of wide and medium range contribute in the indication of population of a species inhabiting the different water bodies or in different geographical regions. It is well known that ecological conditions of a water body have great impact on morphometric characters. Thirteen morphometric characters of 200 *Sardinella albella* (Total length 14-18 cm) and 204 specimens of *Sardinella gibbosa* (Total length 17-19 cm), the two important clupeids from the Karachi and Balochistan coast were studied during 2020-2021 to detect the phenotypic and genotypic characters. Data was observed in wide, medium and narrow range category and it is estimated that phenotypic characters are included in wide and medium range because it is controlled by environment, habits and habitat while genotype characters are included in narrow range and can be used for identification of stock and sub species. Wide range morphometric characters varied within the range of 21.47% to 140.62% in the case of *S. albella* and 24.04% to 87.19% in the case of *S. gibbosa* while the medium range characters varied within the range of 11.76% to 13.75% in the case of *S. albella* and 11.55% to 18.92% in the case of *S. gibbosa* and less than 10% range characters were designated as narrow range. The relationships between the different morphometric characters (both dependent and independent variables) were found to be linear and in all the cases the relationships were found to be highly significant ($P< 0.001$).

FEWFM-39

A COMPARATIVE STUDY ON THE DETERMINATION OF BIOCHEMICAL CHANGES IN MUSCLE OF LESSER TIGER TOOTH CROAKER: *OTOLITHES CUVIERI* TREWAVAS, 1974 DURING FROZEN STORAGE

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Marine fish are well-known for being a high-quality protein source having high concentration of essential amino acids that have an important nutritional component of human diet due to their rich nutritional value. Fish provide high quality proteins and wide variety of vitamins (Vitamin A and D), minerals like phosphorus, magnesium, selenium and iodine. Generally fat components in fishes are 18%, while protein contents is 44% and similarly, minerals contents is 20% but carbohydrate content is comparatively very low. Fish oils are rich in hexa-unsaturated fatty acids and are used as source of fats. Fish compositions in human health have positive effect due to lipid and protein composition. unfortunately declining in fish nutritional composition owing to processing and storage, as it does with other aquatic products respectively, so the study was designed to investigate the biochemical status of raw sea fish *Otolithes* ***cuvieri*** after four (4) months of frozen storage at -20^0C with 30-days interval and remarkable change was observed between a normal sample and frozen samples after each month of four months duration. The changes indicated that the biochemical

composition of fish muscles influenced by freezing temperature and time because during storage the oxidative stress increased in muscles which highly affect the metabolic function into human body by taking these frozen products as diet.

FEWFM-40

SOME PRELIMINARY EVALUATION OF CLIMATIC CHANGE IMPACT ON DIVERSITY AND DISTRIBUTION OF SHELLFISH SPECIES BASED ON TWO DECADES DATA FROM SONMIANI BAY BALOCHISTAN, PAKISTAN

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The Arabian Sea has warm waters close to Pakistan, which has a lot of marine fish resources potential. Coastal region of Pakistan on the western edge of the Indian Ocean extended 1,100 kilometers long and full of several marine resources and harboring enormous number of fisheries resources including shellfish species mainly crustaceans (lobsters, prawns, and crabs) and mollusk (clams, oysters, squids, and cuttle fish). The shellfish are important faunal component in tropical ecosystem and considered as backbone species for the export of fisheries. There are more than 85 different species of commercial shellfish found in coastal areas of Pakistan. Many efforts have been made in recent years to comprehend the global shellfish growth trend. The climate change, its impacts and outcomes on the future of biodiversity and ultimately on fisheries are the main challenging topics to investigate in recent years. Pakistan is exporting its fisheries product throughout the world and shellfish species exported to about 40 countries worldwide. The present study deals with the comparative account of two data sets (2001-2002 and 2020 to 2021) based on abundance and species distribution in Sonmiani bay waters. The study reveals the change in species distribution, composition and their abundance along with the mean size of most abundant species during the study years. The information related to distribution of juveniles also indicator of environmental impact on individual's life history. The shell fish species were collected regularly through commercial gill net (adult's shrimps) and beach seine (Juveniles) nets. This study provides to review the current understanding of the possible effects of climate change on biodiversity and fisheries resources to project the impacts and to estimate the future biodiversity at country wide scale.

FEWFM-41

RESOURCE PARTITION CAN DIRECTLY AFFECT THE DISTRIBUTION OF HERMIT CRABS ANOMURA: PAGUROIDEA) ALONG THE COAST OF PAKISTAN

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The creature- having fragile posterior abdomen reside within a shell of gastropod called 'Hermit crabs', belongs to Decapoda; infraclass Anomura. These intertidal hermit crabs are morphological and structurally vary into two main families: Diogenidae, and Paguridae. The left-handed Hermit crab (Diogenids) are more diversified than Right-handed (Pagurids). The current studies are based on the hermit crab and its host shell specific association, their distribution along with their morphometrics attributes. Collection was primarily done from the intertidal pools, cove and mangrove swamps

of three respective coasts i.e., Rocky, Muddy, and Sandy. The result shows the total individuals were (N=2149), of fourteen species of hermit crabs (N=14) in which Diogenidae family shares the 93% of composition of crabs while Paguridae shares only 6.9%. Twenty-six families of host shells- Muricidae, Turbinidae, and Cerithidae accompanied by the crabs. Consequently, intertidal populations, *Clibanarius signatus* (N=565) with a 26.3% of the frequent species with the host shell *Cerithium caeruleum* (N=153) from the rocky coast. Positive relationship was aligned with the variables of Hermit crab and Host Shell whereas the *Diogenes alias* shows the maximum size range (66.00±164.00mm) and the *Pagurus kulkarnii* retains the smallest size (6.00±47.00mm) of Crab Total Length (CTL). The most of the Hermit crab species showed the direct correlation with the availability, size and distribution of shell species

FEWFM-42

PRESENCE OF MICROPLASTIC IN BODY OF *TUBUCA URVILLEI* (H. MILNE EDWARDS, 1852) MANGROVE CRAB OF SANDSPIT KARACHI PAKISTAN

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It has been estimated that by 2025, 250 million tons of plastic waste will accumulate in the ocean. Microplastics are minute in size and cannot be seen with naked eyes and its presence in benthic chain is very harmful to animals as well as for secondary and tertiary consumers. Plastic is a durable, light weight and in expensive material, ideal for the production of a variety of products in daily life and since the 1950s, plastic production has increased significantly. Micro plastic is also present in food chain which is harmful for animals from primary consumers to tertiary consumers. Fiddler crab is also included in the food of secondary and tertiary consumers (edible crab and fishes) and essential component of marine food chain. For the recent study, the back waters of Sandspit were selected as a point of study along Sindh coast of Karachi and *Tubuca urvillei* (H. Milne Edwards, 1852) was the focus of interest in this study due to integral part of food chain through which microplastic can be transferred to lower animal to higher animal. Initially, the crab was washed with distilled water to remove debris and mud particles then the total wet weight of crab was determined. The crab was dissected at metal tray and the gut content and other muscle digested with KOH and incubated at 40 degrees centigrade for two days after the digestion the solution were filtered through glass microfiber and observed through stereo microscope for the abundance and diversity of microplastic was seen in body of crab. Different types of microplastic were observed in crab samples such as fibers, smallest microplastic which was found in different color such as red, black and pink micro beads were common.

FEWFM-43

GENETIC STRUCTURE AND POPULATION FREQUENCY DISTRIBUTION IN THE GENUS *METAPENAEUS* BASED ON ISOZYME ANALYSIS

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Shrimps are an incredibly exciting set of assets with complex life cycles extending from tropical estuarine ecosystems to shallow racks, continental slopes, and profound oceans. These are included in the worldwide fishery as an integral part of Sea food and provide thought-provoking relative opportunities. Electrophoresis (vertical and horizontal) functions through an extensively recognized set of techniques, that is used to separate and identify macromolecules such as protein and Allozyme/ Isozymes in research as considered significant markers. In present study, a total of 117

individual shrimps were collected from four locations. Amylase (AMY), Creatinine kinase (CK) isozymes and native Coomassie marker were used to investigate the genetic diversity of population structure of genus *Metapenaeus*. A total of 25 loci were observed in four populations. NATIVE PAGE Electrophoresis were used for protein dissolution 48% loci were found polymorphic such as in CA-1 allele were resolved at four loci (A=0.4444, B=0.1111, C= 0.2778 and D= 0.1667) while CAT-1 and CK-2 represented A and B equally. AMY-5and CK -5 showed frequency of allele A and C as 0.9722 and 0.0278. Observed number of alleles (Na), Effective number of alleles (Ne), and Shannon's information index (I) were found to be 1.6800 ± 0.8524, 1.3756 ± 0.5878, 0.2945 ± 0. 3925, respectively; the observed heterozygosity and expected heterozygosity experiential as 0.2644±0.3742 and 0.1843 ± 0.2450 which indicated that the populations of *Metapenaeus* possessed a rich genetic diversity. The species of Korangi, Keti bandr and Karachi fish harbor were found to be falling in the same cluster, while Somiani species were mostly acquiring different cluster.

FEWFM-44

STUDY ON SHAPES OF OSSICLES PRESENT IN THE MUSCULAR PART OF *ASTROPECTEN INDICUS* PERRIER, 1878FROM THE COASTAL WATERS OF PAKISTAN

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Sea stars represent the exclusively marine class Asteroidea and have high diversity of Echinoderms; can be evident for a variety of body forms and genus *Astropecten* are one amongst them as belongs to the family Astropectinidae. *Astropecten indicus* Perrier, 1878, fast moving sea star is commonly distributed on sandy or silty shores. The disc diameter with arms 4-8 cm, flat body with usually long, tapered to a sharp tips 5 arms. The margins of arms armored with flat long spines resemble the teeth of a comb and therefore, members of this family are sometimes called Comb sea stars. The current study focused on taxonomic characterization of the *Astropecten indicus* with the help of calcareous parts (Ossicles) present within the muscles. Sampling was randomly done by seasonal low tide from sandy shore of Clifton and Sea view. Initially, samples were counted, measured and identified for their spatial and temporal variability. For ossicles study 15% KOH solution was used to dissolve muscular parts of body, after digestion ossicles are visible. The structural characterization of ossicles from the central disc and arms of Sea star species was analyzed and found in multiple numbers, forms and arrangements. Ossicles were observed under the microscope and Photographs were taken. This study provides the role and significance of the ossicles, the endoskeleton in species identification, growth and regeneration studies as potentially applicable information for characteristics systematic, biological and phylogenetic studies.

FEWFM-45

DIVERSITY AND SIZE DISTRIBUTION OF MANTIS SHRIMP (CRUSTACEA: STOMATOPODA) COLLECTED FROM SONMIANI BAY WATERS BALOCHISTAN PAKISTAN

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The diversity of a biological community may be influenced by the dispersal of its component organisms, which may be permanent, temporary or transitional residents Stomatopods crustaceans are distributed over a wide area, their vast majority live in most of the world's shallow tropical reefs and tropical habitat. Mantis shrimps may be found at a

variety of depths, some species inhabit burrows in sand or mud, together with other stomatopods; or live commensally with other. The stomatopods are consumed by people as food in some countries like the Philippines and Japan in the Indo-Pacific region. In the south west coast of India stomatopods are landed in large quantities by the shrimp trawlers. During the current study, the sampling was performed from October 2020 till September 2022, in Sonmiani Bay waters Balochistan during low and high tides by using gill nets of 3.5 cm in mesh sizes. The collected specimens of Mantis shrimp were identified upto the species level through the available identification key. Seasonal variation was observed in the size distribution diversity of the species and the highest diversity was observed during North East monsoon. The four species of mantis shrimp were identified belongs to Genus *Oratosquilla.* The *Oratosquilla interrupta* was the largest species and found abundantly during the two years of study.

FEWFM-46

IDENTIFICATION OF BIOMARKER FOR PB POLLUTIONIN SELECTED TISSUES OF *EUPHLYCTIS CYANOPHLYCTIS* FROM TWO AREAS OF THATTA DISTRICT, SINDH

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Euphlyctis cyanophlyctis, also known as common skittering frog, belongs to family Dicroglossidae. This study was conducted in two areas of Thatta District, Sindh; agricultural (Babra village) and urban area (Makli). The concentration of Pb was determined in the kidney, liver and skin of *E. cyanophlyctis* by using atomic absorption spectrometer. The water samples were also analyzed from both study areas for the comparison of Pb concentration in the environment and tissues. The liver and skin of *E. cyanophlyctis* can be considered as a good biomarker for Pb pollution from both study areas; Babra village and Makli, while the kidney of *E. cyanophlyctis* can also be considered as a good biomarker for Pb pollution butonly from Babra village. The present study represents the vulnerability of anurans to heavy metal toxicity inhibiting the selected areas of Thatta District. This research will not only assist in developing conservation plans for amphibians but will also be helpful for other aquatic fauna.

FEWFM-47

SOME MORPHOLOGICAL STUDIES ON OTOLITH OF TWO TERAPONID SPECIES (FAMILY TERAPONIDAE) COLLECTED FROM KORANGI FISH HARBOUR, KARACHI

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Fishes of the family Teraponidae are also known as Grunters. They are small to medium sized fishes and included in good seafood items. The Otolith is made up of calcium carbonate and found in the head of bony fishes. Otolith is widely used in fisheries sciences to understand the structure of fish stock population and their migration patterns. Furthermore, the studies on otolith also facilitate to observe feeding habits of pelagic fishes because the prey of pelagic fishes has already been digested or semi digested and only hard parts (bones and otolith) are present in their gut. The shape and morphology of otolith helps to discriminate different fishes present in the gut content. Relationship between

fish length and otolith length has been used for age determination by several authors. The structure of otolith is three dimensional. The otolith does not grow equally in all these dimensions. It has been reported that each fish has a specific size and shape of their otolith. It has been observed that Otolith increase in length and width with increase in fish length. Therefore, in this study, the linear regression analysis was carried out to find the relationship between otolith length and width with the total and standard fish length. For this purpose, fish samples of two Teraponid fish species (i.e., *Terapon jarbua* and *T. puta*) were collected from Korangi Fish Harbour Karachi. In the laboratory, different morphological characters of fish were measured and then dissected out for the removal of otolith. Otolith were cleaned with KOH and dehydrated with 70% Alcohol. Otolith were measured to the nearest 0.1mm and photographed under the microscope. Furthermore, morphological characters of otolith for both species were also studied for comparative description. From the results of this study, it can be concluded that fish has specific structure of their otolith so, it can be used for fish identification.

3. PALAEONTOLOGY

FEWFM-48

NEW REMAINS OF ARTIODACTYLA (MAMMALIA) FROM MIDDLE SIWALIKS PUNJAB, PAKISTAN

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Late Miocene artiodactyls fauna are very rich in Middle Siwaliks of Pakistan as fossils documented from different Formations provides an evidence of their taxonomic diversity. Various specimens belonging to different taxa of Artiodactyls were collected from middle Siwaliks Formations and studied systematically. Studied material belongs to three families of Atiodactyls namely Bovidae, Tragulidae and Giraffidae. Three specimens belonging to species *Pachyportax latidens*, *Dorcatherium majus* and *Bramtherium grande* were collected from Dhok Pathan Formation. Specimens of *Miotragocerus large sp.* and *Dorcatherium majus* were recovered from Hasnot Formation while some specimens of *Miotragocerus large sp.* were also recorded from Lava Formation. All these Formations are included in Middle Siwaliks of Pakistan indicating that late Miocene to early Pliocene artiodactyls are highly distributed in Middle Siwaliks. The total eight specimens mainly include isolated teeth and mandibular fragments. The purpose of this study was mainly focused to explain systematic aspects of new material and to update the Siwaliks palaeontological record.

FEWFM-49

LISTRIODON PENTAPOTAMIAE FROM MIDDLE MIOCENE ROCKS OF LOWER SIWALIKS OF PAKISTAN

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The deposition of the Siwaliks in Pakistan is well documented in the Potwar Plateau. The fossil teeth of have been collected from the Lava locality; district Chakwal, Punjab, Pakistan. These sites belong to the Lower Siwaliks, Chinji Formation. The specimens include mandibular fragments of *Listriodon pentapotamiae,* which are at late stage of wear. These specimens provide new data and additional information on the distribution of the species *Listriodon pentapotamie* and contribute to the recent study of suids from the lower Siwalik Hills in Pakistan. The cusps of these teeth are not really sharp, representing lophodont type of dentition. Cheek teeth showing four conids named as protoconid, metaconid, hypoconid and entoconid. Moreover, comparative measurements of these samples have been taken, plotted on graphs, and labeled (teeth diagrams). The material described here enhances our knowledge about the diversification and evolution of suid fossil species in the Siwaliks of Pakistan.

FEWFM-50

BARBOUROFELINES FROM THE MIDDLE-LATE MIOCENE OF THE SIWALIKS, PAKISTAN

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The family Nimravidae is poorly known from the Siwalik Group that comprises freshwater deposits having an age that spans 18.0-0.6 Ma. The new material recovered from the Dhok Ban Amir Khatoon (Chinji Formation) and Sethi Nagri (type locality of the Nagri Formation) is assigned to *Sansanosmilus rhomboidalis* based on the morphology of canine. The recovered material is unique and rare in the Siwaliks of northern Pakistan. It also increases the stratigraphic range of this barbourofelines species from the Chinji Formation to the Nagri Formation.

FEWFM-51

GIRAFFIDS (GIRAFFIDAE: MAMMALIA) FROM MIDDLE MIOCENE OF KANHATTI, PUNJAB, PAKISTAN

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New giraffid remains were collected from the long-neglected fossiliferous site Kanhatti (Middle Miocene - Chinji Formation) in the Potwar Plateau of Pakistan. These outcrops are Middle Miocene in age. A detailed description of the newly discovered material is provided which consists of upper and lower dentitions. The Chinji samples collected from Kanhatti village add new information on the anatomical morphology of cf. *Progiraffa exigua* and *Giraffokeryx punjabiensis* and confirm an early distribution of these genera in the Middle Miocene of the Siwaliks.

FEWFM-52

MIDDLE MIOCENE PROBOSCIDEANS FROM THE CHABBAR SYEDAN CHINJI FORMATION OF SIWALIKS, PAKISTAN

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New proboscidean material from the middle Miocene of Chabbar Syedan have been described and discussed. The specimens comprise dentary, tusks, symphysial fragments and isolated teeth, naming to three genera and four proboscidean species: *Deinotherium pentapotamiae*, *Deinotherium* sp., *Protanancus chinjiensis* and *Gomphotherium*

browni. Significance of this material lies in the first description of *Protanancus chinjiensis* dp2, a dentary reported after a long time and a tusk fragment of fully adult *Gomphotherium browni* reported at the first time. We also provide a brief paleobiogeographic sketch of these taxa with the context to the subcontinental Siwaliks.

FEWFM-53

THE STUDIES OF FRONTAL BONY- HORN AND DENTAL MORPHOLOGY OF THE MIDDLE SIWALIK RUMINANTS FROM CHAKWAL DISTRICT, PUNJAB, PAKISTAN

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The Late Miocene and the Early Pliocene bovids of suborder ruminantia are described from the Dhok Pathan type locality of the Dhok Pathan Formation, district Chakwal in the Punjab Province, Pakistan. The fossil material consists of upper and lower molars, a right mandibular ramus with M1-3, a fragment of the horn core. These fossils are referred to three genera of the family Bovidae, *Pachyportax, Selenoportax,* and *Gazella.* Biogeographically the Late Miocene bovids reveal strong relationship with Eurasian and African Late Miocene sites. The palaeoclimate of both the African and Asian region were almost similar during the presence of these species where grasslands were expanding at the expanse of forest land as indicated by the increase in hypsodonty indices of the studied species.

FEWFM-54

SIVALHIPPUS REMAINS FROM THE DHOK PATHAN FORMATION, PUNJAB, PAKISTAN

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These specimens of *Sivalhippus* have been reported from the outcrops of Dhok Pathan Formation, Punjab, Pakistan and is represented by two extinct species: *Sivalhippus theobaldi* and *Sivalhippus perimensis.* Our described material comprises isolated teeth, maxilla, and mandible fragments which show some primitive features of the Middle Siwalik hipparionine. The *Sivalhippus theobaldi* has very large premolars and molars. The enamel lining of the fossette is comparatively complex. The protocone is flattened in shape. The anterostyle is elongated in P2. The plications are present on prefossettes and postfossettes. Pli Cabllins are bifid or trifid. Hypoglyph is deeply incised. *Sivalhippus perimensis* is a medium-sized horse. Pli cablins are double and protocones are rounded at the labial side but flattened at the lingual side. Hypoglyph is moderate to deeply incised. Since the late Miocene, a gradual change occurred from a wet and humid environment to the drier and colder conditions of the Pliocene. The studies revealed that arid paleoclimate was present in Dhok Pathan during the Late Miocene which supported the pockets of forest lands. The drier and changeable seasonal climate may be the reason for the extinction of this Middle Siwalik hipparionine, which preferred relatively more open and drier mosaics of woodland.

FEWFM-55

NEW REMAINS OF HIPPARIONINE FROM HASNOT, JHELUM, PAKISTAN

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The research work reports Hipparion (Perissodactyla) fossils from the Late Miocene- Early Pliocene Siwalik localities of northern Pakistan. The localities are located in three district of Jhelum, northern Pakistan. The outcrops range Dhok Pathan Formation of the Middle Siwalik Subgroup. Few perissodactyl samples were recovered belonging to two species of hipparionines (Equidae). The comparative morphometric features of the newly collected material indicate that they belong to *Sivalhippus theobaldi* and *Carmohpparion* sp. The recovered faunal is compared with the perissodactyls of the Siwalik Group as well as with the Eurasian localities of the same age.

FEWFM-56

NEW DENTAL REMAINS OF *TRAGOPORTAX SALMONTANUS* FROM MIDDLE SIWALIKS OF HASNOT REGION, JHELUM, PUNJAB, PAKISTAN

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New dental remnant of *Tragoportax Salmontanus* has been studied on the fundament of major taxonomic disposition which were gathered from the outcrops of Hasnot belongs to middle Siwaliks region from district Jhelum. These outcrops belong to Dhok Pathan Formation, Middle Siwaliks of Pakistan with 30% secondary ash grey fine to medium grained sandstone and 70% brilliantly red mud and siltstone with estimated age of 11.3-3.5Ma. The documented fossils from the family Bovidae comprise isolated premolars and molars in both the upper and lower dentition.

4. WILDLIFE

FEWFM-57

A NON-INVASIVE METHOD FOR EVALUATION OF CORTISOL METABOLITES IN CHINKARA (*GAZELLA BENETTI*) INFLUENCED BY VISITORS DENSITY FOR SUCCESSFUL CAPTIVE MANAGEMENT STRATEGIES

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This study investigated the faecal cortisol levels and behavioural activities of adult Chinkara deer (*Gazella bennettii*) male and female (n=10) during times with various visitor densities (low, high, extremely high), including moving, aggressive, social, and reproductive behaviour . The impact of visitor density on the captive management of non-human animals was also explained by this study. By examining faecal cortisol from samples of chinkara, this study reveals significant differences (p.05) in the duration of time the animals spent moving, resting, acting aggressively, reproducing, and presenting social behaviour on occasions with high and extremely high visitor numbers. According to the results of the ANOVA with Duncan's Multiple Range Test, the faecal cortisol concentration was higher (p.05) during the times when the number of visitors was extremely high (139.42±4.66 ng/g dry faeces) and high (115.43±4.65 ng/g dry faeces). The study's findings indicate that visitor density significantly influenced chinkara behaviour and adrenocortical secretion, which may refer to a problem with animal welfare in captivity.

FEWFM-58

HABITAT ECOLOGY OF STRIPPED HYENA IN DISTRICT DERA ISMAIL KHAN

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The striped hyena (*Hyaena hyaena*), even though a threatened species, frequently occurs in human-dominated landscapes of Pakistan. There have been no studies on the status of the striped hyena in Pakistan. Therefore, in current study, a detailed data was collected based on field observations (including camera traps) that add to the existing knowledge about this unique carnivorous mammal. Hyena density was estimated using photographic capture–recapture sampling and investigated the hyena abundances in 4 study sites in Dera Ismail Khan; Dabbar Sakhar Cona, Nishpa, Cheena Ser, Khar Ghoza, which had different topographies and levels of human disturbances. During my studies, I found skull and bones of animals on which hyena feed. Hyenas are found on those areas which are very far from human sites but sometime hyenas attack on livestock for their food then human-hyenas conflict occur. So Government should take serious steps for the awareness of preservation and conservation of hyenas. If local peoples found hyena then should inform to Government, except to kill them. Government should save this species because its population is going to decline rapidly.

FEWFM-59

HABITAT ECOLOGY OF WHITE FOOTED FOX (*VULPES VULPES PUSILLA*) IN DISTRICT BAHAWALPUR

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White footed fox (*Vulpes vulpes pusilla*) is meso-carnivore, found in different habitats. There is need to conserve this species. Our aims were to clarify the habitat, morphology, behavioral ecology, breeding ecology, distribution and diet of white footed fox (*Vulpes vulpes pusilla*) in district Bahawalpur. Habitat imposes challenging for survival of white footed fox because diet and resource availability varies season to season. Dens from each sites were marked, vegetation and fauna surrounding the dens of species, behavior and breeding ecology of white footed fox had been observed and recorded. Distribution map has been prepared. 35 line transects were used to estimate the relative density of species in Bahawalpur. 300 scats of white footed fox were collected and dried. All remains such as feathers, hairs and bones were collected from sample and identified. White footed fox has small body size, which covered with rust brown hairs. It is mostly seen in nights but diurnal activities were also observed. Dens were mostly covered with Karir (*Caparis decidua*) and Lai (*Tamarix dioca*). It was revealed that it make its den in *sandy* loam soil. Female shows aggressive behavior during breeding season. Breeding dens have more than one opening that helps to escape from danger. Density of white footed fox in Bahawalpur is 0.03 white footed fox per km^{-2}. Mammals, birds, plants, debris and insects were found in the diet of species. It also use alternative source of food and anthropogenic food. There is need to conduct detailed work on white footed fox for its conservation.

FEWFM-60

BEHAVIORAL ECOLOGY OF SPOTTED OWLET (*ATHENA BRAMA*) IN DISTRICT BAHAWALPUR

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Breeding, feeding and ecological factors of spotted owlet (*Athena brama*) have been studied in this research. The breeding season is between Februarys to March in the Bahawalpur region of Punjab. The breeding behavior depends on the availability of food and environment. Spotted owlet pair near the orchard or fields shows better clutch size, breeding and feeding behavior by eating rodents, beetles, mites, grasshopper and rats which is proved after the pellet analysis than the pair of spotted owlet lived in the urban area and near road. Spotted owlet feeds on insects majorly. However, there is no clear cut sexual dimorphism exists in this species and sexes were judged from the relative position of birds during mating. For the nest purpose, spotted owlet use dry leaves, grass, feather and debris. The spotted owlet largely prefers holes or cavities found in the tree of mango, banyan, tamarind and neem tree. Clutch size can be varied from 2-6 with average egg length of 31.06mm, average egg with of 26.33mm and the average egg weight of 12.66g. Size of the spotted owlet female is larger than the male. Pellet weight can be varied from 3.05 ± 3.5g, pellet length can be varied from 28 ± 33mm and the breadth of the pellet is between 14-17mm. This research shows the impact of diet and climate on the breeding and on the eggs of spotted owlet which elucidate the nesting and mating behavior.

FEWFM-61

HABITAT ECOLOGY OF INDIAN GREY HORNBILL (*OCYCEROS BIROSTRIS*) IN SOUTH PUNJAB, PAKISTAN

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The Indian Grey Hornbill (Ocyceros birostris*)* is the only species of hornbill observed in Pakistan. Indian Grey-hornbill rely on old tree cavities for nesting and also secondary nesting bird. The main reason to study the Indian Grey-hornbill is that it is a rare bird of Pakistan and I choose for this area of study because of the accessibility and presence of suitable habitat for this bird. With the passage of time its numbers are rapidly declining and only few pair pairs are observed in the study area. During study I observed these birds in study area sitting on a tree, they cover the distance of almost 50 meters during flight from one tree to other. I observed near the riverine side, rural farmlands, Schools, urban gardens and parks, especially in areas with many fig trees. The Indian Gray Hornbill was observed in and around Abdul Hakim area during the summer and early monsoon season but not observed with the start of winter. Indian Grey Hornbill is an arborous bird, which is mostly found in the habitat having Ficus religiosa (peepal) and Ficus benghalensis (banyan) Acacia nilotica (Kikar), Syzygium cumini (jamun) trees.

FEWFM-62

VERTEBRATE FAUNA DIVERSITY AND BIO-ECOLOGICAL THREATS FINDING IN MASLAKH STATE FOREST MOUNTAIN RANGE DISTRICT QUETTA, PAKISTAN

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The present study was conducted to count the vertebrate population and to examine the negative impact affect their distribution and abundance. The Maslakh State Forest Mountain Range (30° 03' to 30° 21' N and 66° 31' to 66° 49' E) Quetta extends over an area of 115,040 hectors with an altitude of 1406 meter to 4228 meter. The data was obtained during the phase from August 2020 to December 2021. To record the number of mammal species following techniques were applied: track counts, point surveys, line transects, road side counts, pellet counts, trapping, fresh holes and tracks counting, baited spotlight trick, normal spotlight respectively. For aves fauna survey strip census trick was used, and for reptiles, amphibian species direct counting (night observations, one-hour plot searching, stones, rocks and rotten trees turning) were processed, while indirect counting (informations) were obtained from field staff, game inspectors, game watchers, and local villagers. The main habitats and wildlife sites of Maslakh Mountain Range studied include Maslakh Range Forest (Kurram, Saidal kach, Sebat, Shinshobi, Kodali, Daru, Sultan and some part of Shella, Badwan), Maslakh Foothill Plains (Shella, Badwan), Scrub Grasslands (some part of Sultan and Daru), Steep Mountain Slopes (Maslakh Lamboor, Zhalga), Vertical Cliffs (Dooshan), Deep Ravines and Gorges (Bahadur, Saidal kach), Rocky Cliffs (Sarha Khezi, Spin gatai), Riperian Habitat (Sebat), Human Settlements (Basha, Aghbarg) and some nearby cultivated areas. Threatened species recorded were Striped hyaena (*Hyaena hyaena Linnaeus*, 1758), Indian wolf (*Canis lupus* Linnaeus, 1758), Balochistan urial (*Ovis vignei blanfordi* Blanford, 1894), Chinkara (*Gazella bennettii* Sykes, 1831), and the imperial eagles (*Aquila heliaca* Blanford,1894) found to be critically endangered. In total 153 vertebrate species including 28 mammals (18.30%), 100 birds (65.36%), 22 reptiles (13.92%) and 3 amphibians (2.06%) were recorded.

The area of study is poorly protected, hence indicate several threats like hunting and capturing of animals by the local residents and native live-stock grazing were known to be the main reasons of fauna and flora decline. Another important factor was noted to be droughts intensity due to climatic change of the area. It is concluded that prompt management plan of the Forestry Department Balochistan (Balochistan wildlife Protection, Preservation, Conservation and Management) Act 1974 may be implemented in its full spirit at the earliest to save the vertebrate fauna, vegetation and natural fresh water reservoirs of Maslakh Range Forest, Pakistan.

FEWFM-63

HABITAT SUITABILITY OF INDIAN PANGOLIN (*MANIS CRASSICAUDATA*) IN MARGALLA HILLS NATIONAL PARK, PAKISTAN

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The Indian pangolin (*Manis crassicaudata*) native to Indian subcontinent, is an "Endangered" species because of its illegal hunting and poaching throughout its range, and especially in Pakistan. In many areas of its range, the species has been found absent recently where it was present previously. Protected Areas are generally considered safe for hosting a species having a status concern. In the current study, we investigated the environmental and habitat factors influencing the existence of Indian pangolin in a protected area, the "Margalla Hills National Park" Islamabad. Species presence data were collected from the study area accompanied by environmental layers (comprising; land cover, slope, elevation, distance to nearest settlement) and bioclimatic layers (containing precipitation and annual mean temperature), which were then analyzed using MaxEnt software to produce habitat suitability maps. MaxEnt analysis indicated only 10% area of the park that falls under the "highly suitable habitat", whereas another 48% area is moderately suitable habitat to the species. However, 41% area of the park is "less suitable" habitat. The Jackknife test of variable contribution revealed "soil" as the most important variable among all for pangolin presence in park. Habitat Preference Index showed the "natural forest" (60%) being the most preferred one, followed by agricultural land (21%) and human settlement (19%).

FEWFM-64

AVIFAUNA DIVERSITY OF DARMALAK ALI KACH GAME RESERVE AT DISTRICT KOHAT, KHYBER PAKHTUNKHWA, PAKISTAN

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Darmalak Ali Kach Game Reserve (District Kohat, Khyber Pakhtunkhwa, Pakistan), has variety of habitats. Field survey was conducted using count method; block method etc. The total number of individuals counted during study was 528. Shannon-Wiener Diversity Index was 3.195 which indicate a high level of biodiversity. The highest number of each bird species observed and data was tabulated and statistical analysis was carried out using Microsoft Excel sheets. Relative Abundance of bird species was also calculated along with species evenness, richness and Shannon-Wiener

Diversity Index. During the present survey 27 bird species, belonging to 8 orders and 15 families, were recorded. Out of these, 15 bird species were resident, 5 winter visitors and 6 summer breeders. The present report represents a preliminary data on the avifauna diversity of this game reserve, with the hope that the information will be used in the development of a working plan for the reserve.

FEWFM-65

VULNERABILITY ASSESSMENT OF THREATENED SPECIES IN PAKISTAN USING SAVS CLIMATE CHANGE TOOL

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In order to prioritize conservation needs and set management activities, such as adaption methods, vulnerability assessments are important tools for identifying targets. The SAVS (System for Assessing Vulnerability of Species) is a straightforward and adaptable technique developed for managers to evaluate the relative risk of each species' population declining in response to anticipated climatic changes and associated events. The SAVS employs a simple questionnaire based on predictive criteria that converts scores indicating a species' reaction to climate change into scores indicating resilience or vulnerability. In Pakistan, a total of 1108 species may be found including birds, mammals, reptiles and amphibians in terrestrial, freshwater and marine environment broadly. Out of 1108, approximately eighty species are threatened according to the IUCN (International Union for Conservation of Nature and Natural Resources) red list of threatened species (https://www.iucnredlist.org/). Out of eighty, there are 43 birds, 24 mammals and 13 reptiles. There are three sub-categories under threatened, i.e., vulnerable (VU), endangered (EN) and critically endangered (CR). Among threatened species in Pakistan, 61% are VU, 25% are EN and 14% are CR. The SAVS questionnaire was used to assess the vulnerability of these eighty threatened species to initiate dialogue on climate change challenges and solutions for species' management and to identify the conservation targets. Climate projections for the target region were acquired from published studies, reports and expert opinion were utilised to identify suitable response options for each question. Each element or category (habitat, physiology, phenology, and biotic interaction) is scaled to a range of -5 to +5, and the total vulnerability score is scaled from -20 (most resilient) to +20 (most susceptible). According to the scores, Gharial (Gavialis gangeticus) (CR), Woolly-necked Stork (Ciconia episcopus) (VU) Indian Skimmer (Rynchops albicollis) (EN), Egyptian Vulture (Neophron percnopterus) (EN) and Tawny Eagle (Aquila rapax) (VU) are top priority terrestrial species for conservation with overall vulnerability value of 11.67, 11.67, 11.53, 10.77 and 10.77 respectively with 0, 5, 5, 5, 0 uncertainty scores. Moreover, the most resilient species included Cheetah (Acinonyx jubatus), Goitred Gazelle (Gazella subgutturosa), Indian Pangolin (Manis crassicaudata), European Turtle Dove (Streptopelia turtur), Wild Goat (Capra aegagrus) with vulnerability values of 2.3, 3.06, 3.49, 3.97 and 5.02 respectively having 9, 9, 5, 18 and 9 score of uncertainty.

FEWFM-66

AVIFAUNA DIVERSITY IN DIFFERENT HABITATS OF GUJRANWALA DISTRICT, PUNJAB, PAKISTAN

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Due to the important role that bird play in maintaining ecosystem and supporting biodiversity, scientists are thinking to protect and manage biological threat to avian diversity for the protection of environment. As birds fulfill

many ecological functions in their habitat. There is a dire need to study the dynamics and social economics of bird diversity outside protected areas specially in districts. The current research was designed to study the richness, diversity and abundance of avian species in different habitats of Gujranwala district (largest industrial area) situated in Punjab, Pakistan. The field surveys were conducted from December 2021 to June 2022. The Gujranwala District is located 32°09'60.00" N and 74°11'17.33" E. It is the heart between Chenab and Ravi River and covers an area of 3,622 km2 (1,398 sq. mi) approximately. Birds were recorded either directly through the point count method or indirectly by meeting with local communities. Surveys were done during the whole study period in the morning (5:00 am to 7:00 am) and evening (4:00 pm to 6:00 pm) due to the high activity time of birds. The five selected habitats were: Water bodies / Swamps, Temperate Forest, Tropical Thorn, Urban Area / Settlements, Agriculture Land. For this survey following equipment were used: Binocular, Digital camera, field guide "Birds of Pakistan". A total of 960 individuals of 184 species were observed in the study area belonging to 19 orders and 58 families during the whole study period. Among 19 orders, Passeriformes was the most dominant order with 69 species followed by Charadriiformes and Falconiformes with 24 and 18 species respectively. Most dominant famillES were Accipitridae and Anatidae (with 17 species each) followed by Muscicapidae (12 species) and Scolopacidae (11 species). Five dominant species of District Gujranwala were House Crow, House Sparrow, Common Myna, Red-Collard Dove and White Wagtail. Among all habitats, a maximum number of species were recorded in water bodies / swamps followed by agriculture land, temperate forest, tropical thorn, urban area / settlements. The results indicated that agriculture land had highest Shannon Wiener value (4.69) followed by Water Bodies / Swamps (4.57), Temperate Forest (4.31), Tropical Thorn (4.30) and Urban Area / Settlements (3.66). Tropical Thorn and Agriculture Land had highest value of Simpson Index (0.99) followed by Water Bodies / Swamps (0.987), Temperate Forest (0.9837) and Urban Area / Settlements (0.0234). Out of total 184 species in the study area, 54 species were carnivores, 5 species were frugivores, 9 species were granivores, 10 species were herbivores, 61 species were insectivores, 1 species was nectarivores, 34 species were omnivores and 10 species were piscivores. According to the IUCN Red list, maximum species 169 were least concern while only nine species were near threatened, while three species fell under vulnerable and endangered category each. The area supported 75 Winter Migrants (41%), 70 Year Round Resident (38%), 26 Passage Migrants (14%), 13 Summer Breeders (7%). There were 65 species with stable population trend, 31 species with increasing population trend, 65 species with decreasing population trend and 23 species with unknown population trend.

FEWFM-67

AVIFAUNA DIVERSITY IN DIFFERENT HABITATS OF OKARA DISTRICT, PUNJAB, PAKISTAN

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Due to the important role that birds play in maintaining ecosystem and supporting biodiversity, scientists are thinking to protect and manage biological threat to avian diversity for the protection of environment. As birds fulfill many ecological functions in their habitat. There is a dire need to study the dynamics and social economics of bird diversity outside protected areas specially in districts. The current research was designed to study the richness, diversity and abundance of avian species in different habitats of Okara. The surveys were conducted during December 2021 to June 2022 in Okara, District situated in eastern Pakistan, the province of Punjab Okara. Its geographical coordinates are 30° 48' 29" North, 73° 26' 45" East and covers an area of 199 km². Birds were recorded either directly through the point count method or indirectly by meeting with local communities. Surveys were done during the whole study period in the morning (5:00 am to 7:00 am) and evening (4:00 pm to 6:00 pm) due to the high activity time of birds. The three selected habitats were Water bodies / Swamps, Urban Area / Settlements and Agricultural Land. For this survey following equipment were use Binocular, Digital camera, field guide "Birds of Pakistan" by Grimmett et al. 2008. A total of 944 individuals of 170 species were observed in the Study Area belonging to 18 orders and 65 families in one year. Among 18 orders, Passeriformes was the most dominant order with 65 species followed by Charadriiformes and

Falconiformes with 20 and 19 species respectively. Most dominant family was Accipitridae (18 species) followed by Anatidae (13 species) and Ardeidae (10 species). Five dominant species of District Okara were House crow, House sparrow, Black kite, Red-wattled lapwing, Indian roller. Among all habitats a maximum no of species were recorded in water bodies /swamp followed by Agricultural land, Urban area / Settlements. The result indicated that water bodies/swamp has highest Shannon Wiener (4.46) followed by Agricultural land and urban area /settlements (3.759). Water bodies /swamps and Agricultural land has highest value of Simpson index (0.98) followed by Urban area/settlement (0.97). Out of total 170 species in the study area,55 species were carnivores while 51 species were insectivore followed by 33 species were omnivores .Only 10 species were *granivores* , 6 species were frugivores ,8 were piscivores and only one species was nectarivores. According to the IUCN Red list, 159 Species were were Least Concern, while only five species were Vulnerable, three species were Near threatened, and two species was endangered and one species was critically endangered in the Study Area. According to current study, the study area supports 70 species of Year Round Resident (46%),42 species of Winter Migrant (28%),25 species of Passage Migrant (17%), while only 13 species of Summer Breeder (9%). in the study area, 60 species were decreasing while 27 species were increasing, followed by 23 species were stable. Meanwhile population trend of 60 species was unknown.

FEWFM-68

STUDY OF VERTEBRATE DIVERSITY AT LAL SUHANRA NATIONAL PARK, BAHAWALPUR, PAKISTAN

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Pakistan is rich in diversity of vertebrates with very unique characters inhabiting in different habitats. National parks are the major habitats that play a vital contibution for the conservation of biodiversity. The Focus of the study was to collect information about the vertebrate diversity of Lal Suhanra National park. Data was collected by direct and indirect both methods. And a total of 154 species of vertebrate were observed at LSNP that belongs to 78 families and 31 orders. Among these 4 species of fishes were observed at Patisar Lake and Desert branch canal. Only one order of amphibians i.e. Anura was observed at LSNP. Five (05) species of turtles were observed belonging to order Testudine. Among reptile nine (09) lizard species and seventeen (17) snake species were observed. Ninety four (94) species of birds belonging to forty seven (47) families and Eighteen (18) orders were observed at LSNP. And twenty (20) mammal species that belongs to fourteen (14) families and six (06) orders were observed at Lal Suhanra National park. Based on above results, it can be inferred that there was a high vertebrate diversity on/at Desert branch canal being the longest in the national park passing throgh forest, agricultural land, Desert, and along the Patisar lake. This research highlighted some of the vulnerable and many nearly threatened species and also threats to different vertebrates at Lal Suhanra National park, which would be more significant with respect to the conservation of these species.

FEWFM-69

WILDLIFE PROFILING OF DISTRICT LAYYAH (AMPHIBIANS, REPTILES, MAMMALS, AND BIRDS)

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Wildlife are thought to be a good indicator of the ecological health of any habitat as they respond quickly to various climatic changes. In this study a profiling of District Layyah was made for mega wildlife species like, Birds,

mammals, Reptiles and Amphibians. The Layyah district, which has a size of 6394 square kilometers, is located between Chenab and the Sindh River. Surveying was done in the Layyah District's various ecosystems utilizing direct observation techniques including point, traverse, via burrows, and foot prints. Information gathered from locals and hunters is used to make indirect observations. Surveys were conducted in the morning (5:00 am to 7:00 am) and evening (4:00 pm to 6:00 pm), and a night survey was planned to collect observations of reptiles. The primary goal of the surveys was to evaluate the district of Layyah's vertebrate diversity. Nikula Binocular 10x50, D70 Nikon and field guides were used for surveys. A total of 103 species of vertebrates (birds, reptiles, mammals and amphibians) that belongs to 17 orders and 37 families and total 118303 individuals were noticed. Out of 103 species 55% species were common resident, 15% species were abundant resident, 15% winter visitors, passage migrants 6%, uncommon resident 4%, winter migrant species 3% and summer visitors were 2%. According to International Union for Conservation of Nature and Natural Resources (IUCN), there was only one species that was critically endangered, three species were near threatened and endangered species were also three in number, Vulnerable species was one and 95 species were least concern. 63% species were Carnivorous, Herbivorous species were 16%, and Omnivorous species were 21%. Out of 103 species 26 species were very abundant, 34 species were abundant, 16 species were common, fairly common species were 3 in number and 25 species were very common. Shannon Wiener diversity index 3.5122 and species evenness 0.757813 were recorded. Layyah district represent the moderate level of biodiversity. Various anthropogenic activities, must control to maintain and establish suitable environment for biodiversity conservation.

FEWFM-70

DIVERSITY OF BIRDS IN SHEIKHUPURA FOR HABITAT PREFERENCE AND GIS MAPPING

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The present study was conducted to report the diversity of bird fauna inhabiting Sheikhupura, Punjab, Pakistan. In total, 35 species, 32 families and 11 orders were observed. Among 16 orders, Passerine was most abundant by having 16 (31%) species, followed by Columbidae 6 (11%), the least number of bird species is present in order Podicipediformes, Piciformes and Caprimulgiformes 1 (3%) species. Biodiversity monitoring was based on breeding, habitat, migratory status, population trend and feeding habits of the birds. After the completion of surveys, it was recorded that seven species were year round breeders; 43 species breed during different months of the year with most of them breeding during monsoon while five species were non-breeders. Based on habitat, 24 (44%) terrestrial and 31 (56%) semi-aquatic habitat species were identified. According to IUCN category 1 (2%) near threatened and 54 (98%) least concern species were present. According to population trend 28 (52%) were stable, 14 (26%) were decreasing and 12 (22%) of avian species were increasing in their numbers. On the basis of migratory status 43 (78%) species were residents, 7 (13%) were winter visitor and 5 (9%) were summer visitors. Feeding guild is dominated by omnivores 14 (29%), followed by insectivores 12 (22%), carnivores 7 (13%), grainivores 7 (13%), pisciformes 6 (11%), Frugivores 5 (9%), herbivores 3 (5%) and nectarivores 1 (2%) birds. As per observation, 512 bird individuals were recorded during March, 498 in July, 380 in October and 396 individuals in September. Diversity was calculated by using different statistical formulae. Based on the current study, Shannon Weiner's index value is 2.71, Simpson's diversity index value is 0.43, species evenness value is 0.67, Margalef index value is 6.29, Menhnick index value is 0.75, and census index value is 8.20. Major threats to birds are filling of ponds, introduction of invasive species of plants, anthropogenic activities, and hunting and catching of wild bird for sports and cage bird selling. There is a dire need to halt major threats to birds.

FEWFM-71

DISTRIBUTION AND STATUS OF MAMMALS IN CHASHMA BARRAGE WILDLIFE SANCTUARY, DISTRICT MIANWALI, PUNJAB, PAKISTAN

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Chashma Barrage wildlife sanctuary has been largely unexplored regarding mammal's study. Hence there is a need to study the diversity, status, and ecology of mammals in the region. The current study has been designed to develop baseline data about the diversity and distribution of mammals, their state of habitat, and identify any threats to the existing mammals in the area. During the field survey (January 2022 to September 2022), various direct and indirect methods and techniques were used, such as interviews, the Howling Record Method, Tracks counts and Pellet counts, trails, fecal material, dead animal remains, Sherman traps, spotlights, mist nets. Five types of habitats were identified, including wetlands (river canals and lakes), Floodplains/Bela, Urban Areas with Associated Agricultural Lands, Stony Plains and Hilly Areas, Sand Dunes, and Semi Desert Areas. A total of 23 species of mammals were recorded during the present study. Out of these 23 species of mammals,7 were found to be large mammals belonging to two orders, 5 families, and 5 genera, and 16 species of small mammals belonging to 4 orders, 8 families, and 14 genera were recorded. In large mammals, the Asiatic Jackal was the most abundant because of the absence of other carnivores and in small mammals' order Rodentia was dominant. Indus Dolphin, previously reported in the study area, was not observed even after exhaustive surveys. Generally, no top consumers were recorded, which is alarming for the health of the existing community.

FEWFM-72

SPECIES DIVERSITY AND ABUNDANCE OF MID WINTER WATERFOWL IN DISTRICT MIANWALI, PUNJAB, PAKISTAN

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Waterfowl population was surveyed at three sites (Chashma barrage, Jinnah barrage, Namal lake) of District Mianwali to know the waterfowl diversity from July 2021- February 2022. During study period total 43,212 birds of 14 waterfowl species are recorded from three sites of District Mianwali. Dominant specie was Eurasian coot (*Fulica atra*) with the total number of 21,012 birds and White headed gull (*Larus marinus*) observed in minimum number. Other species recorded from the sites were Red wattled Lapwing (*Vanellus indicus*), Indian Pond Heron (*Ardeo lagrayii*), Neotropic Cormornat (*Nannopterun brasillianum),* Pied kingfisher (*Ceryle rudis*), Little Egret (*Egretta garzetta*), Cattle Egret (*Bubulcus ibi*s), White Breasted Waterhen (*Amaurorni sphoennicurus*), Common Red Shank (*Tringato tanus*), Crow Pheasant (*Centropus sinensis*), Little Grebe (*Tachybaptus ruficollis),* Mallard (*Anas platyrhynchos*), Gray Heron (*Ardea cinerea*).The population of waterfowl was found to be declining. These findings imply that the habitat must be protected in order to preserve the waterfowl population, which is a crucial biotic component of the ecosystem.

FEWFM-73

ARTIFICIAL NESTING IN BIRDS AT UVAS-RAVI CAMPUS, PUNJAB-PAKISTAN

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Spatial and anthropogenic factors influencing nest-site selection in birds need to be identified for effective conservative practices. Environmental attributes such as food availability, predator density, previous reproductive success, etc., provide site quality information. An artificial nest box experiment was carried out to evaluate the effect of various factors on nest-site selection, as it is hard to assess the natural cavities. The experiment was conducted whereby half of the boxes were filled with old nest material. Artificial nest boxes created with different materials, sizes, and colors were installed at different heights. A total of 14 out of 60 nest boxes were occupied, and four of them faced predation. The birds explored 32 out of 60 nests, whereas anthropogenic factors destroyed 25 out of 60 nests. Birds chose empty nest boxes at higher rates; however, there was no obvious avoidance of sites having high ectoparasites load due to old nest material. It is also possible that the preference towards the artificial nest boxes may differ yearly because of several climatic factors and the age of old nest material affecting the parasite survival. These variables may fluctuate from one season to another. Considering these factors, nest-site selection experiments concerning the effectiveness of artificial nest boxes should be carried out over several successive seasons. This topic may stimulate further studies, which could lead to a full understanding of the birds' evolutionary ecology. Precise information on these factors influencing nest-site selection can be essential from an economic point of view as well.

FEWFM-74

BODY COMPOSITION OF EDIBLE PORTION OF WILD (*LABEO GONIUS)* DURING SUMMER SEASON IN RELATION TO BODY SIZE FROM HEAD PANJNAD, ALIPUR, PAKISTAN

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Proximate body composition is the analysis of water, fats, proteins and ash contents of fish. Present study was conducted to determine the body composition of edible portion of wild (Labeo gonius) during summer season in relation to its body size. For this purpose 40 specimen ranging in weight from 95.64grams to 215.68 grams were collected from Head Punjnad, Alipur Pakistan. Each specimen was dried and powdered to determine, %age water, ash content, fat content, protein content and organic contents. Fish had higher percentage of water with mean and S.D value 76.06±3.26 as well as fish had a significant amount of proteins and fats. Ash, fat and protein contents in their (%wet weight) have mean and S.D values (3.69±0.75, 3.72±0.73, 7.26±1.34) respectively. While average (mean) plus S.D values of ash, fat and protein contents in fish (%dry weights) were recorded as (15.62±3.24, 15.64±2.73, 68.74±5.31).The aim of current study was to determine the concentration of various constituents in those parts of fish body which are consumed by human beings and play significant role in fulfilling their nutritional requirements.

FEWFM-75

ASSESSMENT OF HUMAN-ALTAI WEASEL CONFLICT IN RAWALAKOT AZAD JAMMU AND KASHMIR

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Altai Weasel is common name of *Mustela altaica* that belongs to genus *Mustela* and family mustelideae. It is carnivorous in nature, preying mostly on birds, rodents (voles, rats, and hamsters), lizard, and arthropods. The present study was designed to assess Altai Weasel population and Human-Altai Weasel conflict in Rawalakot Azad Jammu and Kashmir from December 2020 to December 2021. For population estimation field surveys were conducted to count burrows at regular intervals from each site of study area. A total of 32 km^2 area was surveyed. The results showed 2 individuals per km^2. Assessment of Human-Altai Weasel conflict in study sites were recorded by direct observations and questionnaire survey. A total of 78 individual (killed) and 97 (live) were observed during one year. It is a "Near Threatened" mammal as per IUCN records, hence, needs immediate conservation measures.

FEWFM-76

ASSESSMENT OF HUMAN WILDLIFE CONFLICT IN BORDER AREAS OF DISTRICT POONCH AZAD JAMMU AND KASHMIR

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The human-wildlife conflict (HWC) is currently one of the biggest problems in the world. It mainly involves wild animals consuming resources of humans; crops, poultry and livestock. In return, humans are continuously killing precious wildlife species. This conflict has not only led to the endangerment of wildlife but also cause uncountable human deaths and economic loss. Therefore, the present study was designed to focus the Human Wildlife Conflict (HWC) in the border area of District Poonch Azad Jammu and Kashmir. The line of control (LOC) is the area which separates the disputed state of Kashmir between India and Pakistan. As there was no existing data on wildlife and their associated threats (anthropogenic pressure) in that area. Therefore, the data regarding kill record of wild animals due to ongoing activities on border like firing, forest fire, shelling, land mines, and usage of heavy weapons was collected. Wildlife hunting by local community along with reasons of killing was also recorded. Dead animals were observed directly in selected sites. Whereas for indirect analysis, interviews were carried out by local people to maintain kill record of various species. Crop damage was observed by Quadrat method. Out of total 227 killed animals, 88.98% were killed due to hunting and killing while 11.01% were killed due to firing, shelling and hidden land mines. Statistical analysis (*P=0.000*) shows that there was a highly significant difference between the killing of different species. Crop damage analysis (I) also reveals that there was a slightly significant difference between the damage extent of different crop species. Two species *Panthera pardus* and *Capra aegagrus.* are listed as vulnerable according to international union

for conservation of nature IUCN. Therefore, immediate conservation measures should be taken to control hunting and killing of precious species.

FEWFM-77

ASSESSMENT OF HUMAN-MAGPIE CONFLICT IN HAJIRA, DISTRICT POONCH AZAD JAMMU AND KASHMIR

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Magpie belongs to order Passeriformes and family Corvidae. They are present in every continent expect Antarctica. Human-magpie conflict (HMC) arises due to feeding habits of the species. The current study has been conducted to observe the feeding behavior and kill record of magpie in selected areas of Hajira, Azad Jammu and Kashmir from December 2020 to December 2021. The feeding habits of magpie were analyzed by visual observation of the species while feeding upon different fruit trees. For this purpose, number of damage fruit trees by magpie was counted. Local people were also interviewed about the feeding behavior and kill record of magpie. The highest mean was recorded for Japanese fruit (82.61±5.405) followed by loquat (79.50±4.478), orange (79.20±9.784), plum (77.60±4.195), apple (75±7.866), Himalayan wild pear (73.40±4.179), pear (72.90±7.866), fig (72.30±6.913), guava (71.70±4.977), apricot (69.50±9.778), wild peach (68±7.717). Statistical analysis ($p=0.000$) reveals that there was a significant difference found between the damage fruit trees by magpie. It shows that fruit trees (Japanese fruit loquat, Orange, Plum, Apple, Himalayan wild pear, Pear, Fig, Guava, Apricot and Wild peach) were not equally damage between study sites. The maximum damage range was recorded for orange (60-93) and minimum damage range was recorded for loquat (50-81). The present study reveals that magpie caused severe damage to both cultivated and non-cultivated fruit trees in study sites. The urgent measure should be taken to control the fruit loss.

FEWFM-78

POPULATION STATUS OF HIMALAYAN GRIFFON AND AVAILABILITY OF NSAID DRUGS IN THE LOCAL MARKETS OF CHITRAL, PAKISTAN

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Many species of Gyps vultures declined due to NSAID drugs in Afria and Asia, the Himalayan Griffon (Gyps himalayensis) being a close relative also face multiple challenges including the drug. This study assessed the population of the species in different parts of Chitral and threats like use and availability of NSAID drugs in the veterinary store and local markets. Survey was conducted during December, 2020 to January, 2022 encompassing all four seasons of the year. The study found Himalayan Griffons all most all the survey locations. We found total 145 adult, 47sub-adults and 14 juvenile of Himalayan Griffon. During the study, Himalayan Griffon were observed while roosting, on rocks and cliffs. Most of the nests were located at the cliffs. Lowest number (n=12) of vultures were counted during winter season while the highest number of vultures (n= 62) was counted during the autumn season. It is difficult to say whether the vulture population decreased or increased because this has not been studied in the past, but according the elders the

population of vulture decreased in the area. A total of sixteen (16) veterinary facilities including government hospitals and private shops were surveyed during the study. The study showed that NSAID drugs such as Diclofenac Sodium, Phenylbutazone and others are available in different veterinary hospitals and veterinary medical stores and are used to treat livestock in the study area. Strict implementation of the ban by relevant authorities is required to control the use and availability of NSAIDs in the area. It is also suggested to plan long term monitoring of vulture population particularly breeding pairs to document a trend of their population in the study area.

FEWFM-79

DISAPPEARANCE OF BIRDS IN PAKISTAN: ALEXANDRINE PARAKEET AND HOUSE SPARROW

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Birds play a great role in controlling and balancing our environment and are an important part of our food chain. Over the past few decades, the population of Alexandrine Parakeet (*Palaeornis eupatria*) and House Sparrow (*Passer domesticus*) has been reported to be declining at an alarming rate due to many anthropogenic activities. This study focuses on assessing diversity on both citizen science (GBIF) and social media (Facebook) data shared from Pakistan. Independent sample t-test showed a significant difference between the number of occurrences recorded from both sources, where $p<.05$. A total of 160 and 3590 records of Alexandrine Parakeet (*Palaeornis eupatria*) and House Sparrow (*Passer domesticus*) were found respectively. With the onset of the Covid-19 pandemic, attention to wildlife and its conservation and allocation of resources towards wildlife conservation has decreased. Therefore, citizen science databases and social media platforms can be beneficial in cross-validating recorded data to minimize biases of bird diversity without any manual surveys, which are usually time-consuming and expensive. Pakistan has a wide range of diversity in bird species due to possession of many climatic and vegetation zones. Organizations and institutions in Pakistan should pay attention to avian diversity and their conservation. There is a need to publish more literature about avifauna biodiversity and its threats in Pakistan.

FEWFM-80

DIVERSITY AND COMMUNITY ASSEMBLAGE PATTERNS OF HERPETOFAUNA IN MUSK DEER NATIONAL PARK, DISTRICT NEELUM, AZAD JAMMU AND KASHMIR

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Herpetofauna play crucially important roles in ecosystem functioning and regulation in terms of food chains and food web. In Azad Jammu and Kashmir (AJK) most of biological diversity of herpetofauna is unexplored and their proper management cannot be prioritized due to lack of scientific information. This study was designed to explore the diversity of herpetofauna (amphibian and reptiles) along with focusing on their major ecological attributes in the Musk Deer National Park, AJK. Five major habitats in five different sites were surveyed to collect the field data during April-September 2020. The Visual Encounter Surveys were performed during day times and nights (for nocturnal species) in different potential habitats. A total of 381 specimens belonging to 10 families, 22 genera and 28 species of herpetofauna were recorded. This included five species of order Anura (Amphibia) and 23 species of order Squamata (Reptilia). Among these, 18 species were locally considered as rare, while remaining 08 and 02 species were common and abundant

respectively. However, according to IUCN (2019), 18 species were classified as Not Evaluated (NE), while other species were Least Concern (LC) globally. The highest species richness was recorded in Machil (n=23), followed by Jander Seri (n=21) and Sardari (n=20). Similarly, the highest abundance and relative abundance were recorded in Machil (n=109, 0.286), while the least in Taobut (n=52, 0.156). The highest species richness was observed in grasslands habitats (n=24) and the lowest in water bodies (n=10). However, the abundance and diversity indices were the highest near human settlements (n=135; H'=0.367) followed by grasslands (n=95; H'=0.346), and agricultural fields (n=73; H'=0.316). Seasonally, the species richness and abundance were higher in post-summer surveys (n=28, 220) than the pre-summer surveys (n=15, 161) with the diversity indices of 0.317 and 0.364 respectively. However, a non-significant difference was recorded in species richness among different habitats ($\chi2$=9.49, df=4, p=0.05). The species richness of herpetofauna among different elevation ranges was significantly different ($\chi2$=20.52.01, df=5, p=0.001). Several factors were found influencing the diversity of herpetofauna in different localities. Habitat loss, fire and killings by human were the most severe threats to the majority of herpetofauna species in the study area. Unawareness and lack of proper education is a serious issue in rural areas and most of the species killing were due to lack of awareness. This study provides baseline information about the herpetofauna and will help in formulating the future conservation strategies in the study area.

FEWFM-81

EVALUATION OF INDIGENOUS METHODS USED BY LOCAL COMMUNITY FOR MANAGEMENT OF HUMAN-WILDLIFE CONFLICT IN MACHIARA NATIONAL PARK, AZAD JAMMU AND KASHMIR

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Human-wildlife conflict is a common phenomenon around the edges of protected areas where human and wild animal interactions are high. These conflicts have extensively reported in and around the Machiara National Park. Many studies have suggested that these conflicts not only impose a severe threat to the conservation of endangered as well as keystone wildlife species but also insert a strong negative impact on the socioeconomic conditions of the local communities. The local communities try to manage the impact of these conflicts by using different traditional techniques, but these efforts are either not too effective to mitigate these conflicts properly or they are based on lethal ways to get rid of the conflicting species. Therefore, there was a dire need to understand the effectiveness of these indigenous methods to further strengthen their efficacy and effectiveness for mitigating the human-wildlife conflict. Accordingly, the purpose of the study was to investigate the effectiveness of using indigenous knowledge-based measures adopted by the local communities in managing the human-wildlife conflicts in Machiara National Park, Azad Jammu and Kashmir. For this purpose, data was collected by physical observation, focal group discussions and using semi-structured questionnaires during 2020-2021. Extensive review of literature was carried out to identify the appropriate global practices to curb the conflicts which might be helpful for implementation in the study area. The study revealed that various wild animals including Common leopard and Black bear, Rhesus monkey, Wild boar, Indian crested porcupine, Red fox, Kashmir flying squirrel, small rodents, bats (Indian flying fox) and birds were involved in livestock depredation and crop raiding in the study area. Livestock guarding (by human), using of watchdogs, fencing, making noise, and use of scarecrows and fire smoke were being used as traditional techniques by the locals as preventive measures against the livestock depredation, crop raiding and fruit damage by wild animals. Based on cumulative scores of effectiveness and satisfaction, guarding by human was graded as the most effective (Cumulative score=138) and satisfactory (Cumulative score=140) conflict mitigative method followed by fencing with cumulative score of 114 and 120 respectively. However, the mean estimated cost per season for guarding of livestock and crops by human being was the highest (69208±27788) followed by watchdogs (55200±2400). Fencing needed very low cost as compared to the aforesaid methods, but its satisfaction was rated moderately satisfying by the maximum respondents. Effectiveness of guarding (r=0.363, p=0.002) and fencing (r=0.318, p=0.004) methods were significantly correlated with their estimated costs. Noise, scarecrow, and fire smoke were reported as the least satisfying methods. There was a highly significant difference ($\chi2$ (1, N = 126) =

100.150, p<0.001) between the users' satisfaction levels of different methods being used for the protection of livestock and crops. The Red fox (n=13), Wild boar (n=19), Small Kashmir flying squirrel (n=7), Indian porcupine (n=11), Indian flying fox (n=>100), Small rodents (n=>100), Rhesus monkey (n=3), Black bear (n=2), Common leopard (n=5) were reportedly removed illegally through various lethal ways (using firearms or poisoning) for the last five years (2016-2021). Besides some awareness and capacity building activities by the government during protected areas management project (2003-2009), no referable activities have been reported for management of human-wildlife conflict in the national park. The study highlighted the need of an integrated approach of conflict management by involving the local communities and all other stakeholder organizations. It recommends further extensive research and regular monitoring programs for better understanding and management of the human-wildlife conflict in the study area.

FEWFM-82

DISTRIBUTION RANGES AND CURRENT POPULATION STATUS OF CHEER PHEASANT (*CATREUS WALLICHII*) IN AZAD KASHMIR (PAKISTAN).

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We studied the distribution and population status of the Cheer pheasant (*Catreus wallichii)* in Azad Jammu and Kashmir. Study was mainly conducted in four localities Jhelum Valley, Machiara National Park, Haveli and Nar Sher Ali Khan from 2016-2020, for five breeding seasons. Population status of Cheer pheasant was determined by the call counts method. In total 652 birds (326 breeding pairs) were estimated with the highest numbers recorded from Jhelum valley followed by Machiara National Park, Haveli and Nar Sher Ali Khan. Extensive surveys were carried out in an area of 19.23 square kilometers, whereas 59.4 square kilometers of habitat were found where species was likely to be present throughout its distribution ranges. Overall mean population density was estimated to be 5.22 ± 0.72 pairs/ km^2 (n= 68). Mean population density did not vary between the localities ($F_{(3, 64)} = 0.37$, p= 0.78, One-way ANOVA). Similarly mean population density did not vary between different sub-localities ($F_{(9, 58)} = 0.87$, P= 0.56, One-way ANOVA). Mean population density of Cheer was slightly higher (6.68 ± 0.80, n= 19) in the month of May. However, there was non-significant difference of Cheer density across the months (April, May, June and July) of breeding season ($F_{(3, 64)} = 2.16$, P= 0.10, One-way ANOVA). Moreover, our results indicate an expansion in distribution ranges of Cheer pheasant and population has established in several new sites. Highest Mean population density of 6.11 per sq. km. was recorded in Qazi Nag area of Jhelum Valley. Expansion in population and distribution ranges of Cheer might be due to the conservation measures and community awareness programs taken by the Department of Wildlife and Fisheries, AJK.

FEWFM-83

HABITAT USE AND SOCIAL ORGANIZATION OF CHEER PHEASANT *(CATREUS WALLICHII)* IN AZAD JAMMU AND KASHMIR. PAKISTAN

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Cheer pheasant (*Catreus wallichii*), belonging to order Galliformes and family Phasianidae, is globally enlisted as vulnerable in Pakistan. It is endemic to the Indian subcontinent with restricted distribution in Himalayas from Nepal to Northern Pakistan including Azad Jammu and Kashmir (AJ&K). Being threatened species, it is likely to go to extinction due to different factor including habitat degradation. To address this issue, this study was designed to explore habitat use

and social organization of this species throughout its range in AJ&K. On the basis of reconnaissance surveys, study area was divided into four localities; Jhelum Valley, Machiara National Park, Phalla Game Reserve and Nar Sher Ali Khan. Extensive surveys throughout its distribution range were carried to record its presence and habitat parameters. Habitat use by Cheer pheasant was determined by laying down quadrates at each survey point. Different quadrate sizes were used for the quantification of trees (10 m x 10 m), shrubs (5 m x 5 m), and herbs and grasses (1m x 1m). Importance value index (IVI) of flora was calculated. The highest IVI was recorded for Shrubs (IVI= 35.47 ± 11.70) followed by trees (IVI= 27.85±9.79), grasses (IVI= 25.68 ± 11.68) and Herbs (IVI= 9.92 ± 2.18). *Pinus wallichiana* was found to be the dominant tree species whereas *Aesculus indica, Prunus padus, Taxus wallichiana zucc., Picea smithiana* and *Eucalyptus globules* were recorded as the co-dominant tree species. *Indigofera heterantha*, *Berberis lyceum, Viburnum nervosum* and *Plectranthesr ugosus*were estimated as the dominant shrub species. Dominant herbs in Cheer habitat were *Persicaria nepalensis*, *Adiantum incisum* and *Geranium wallichianum* while *Aconitum heterophyllum* and *Dryopteris stewartii* were recorded as the co-dominant herb species. *Poa annua* was the most common and dominant grass of the habitat while *Cymbopogan martini* and *Heteropogon contortus* were recorded as the co-dominant grasses. Cheer pheasant sightings in different forest types were used to determine its habitat use pattern. Cheer pheasant was found to use dense pine forest, moderately dense pine forest, oak forest, scrub dominated forest, grassland and degraded / non-forested land. Pine forests (dense pine forest and moderately dense pine forest) covered 38.84% (6.7 km^2) of the total censed area followed by scrub dominated forest 26.73 %, 5.14 km^2). Cheer pheasant utilized only 4.58 % (0.88 km^2) of the Oak forest. To study social organization, data on flock size and flock composition were collected. Each observation of the Cheer was designated as a flock. The maximum sightings were made of flock size of two birds that accounted for 40.54 % of total observations while minimum sightings were made of flock size of five and above. The mean flock size of 2.03 ± 0.13 (n= 17) birds per flock was recorded during the breeding season, while the mean flock size of 2.84 ± 0.08 (n= 20) birds per flock was recorded during post breeding season. Mean flock size varied significantly across the group during different months of breeding season ($F_{(4, 20)}$ = 5.34483, P= 0.00429, One-way ANOVA). Overall mean flock composition of 4.00 ± 0.82 (n= 37) birds per flock was estimated. Mean number of male birds was recorded as 5.17± 0.79 and female birds recorded as 3.50 ± 0.50 with a maximum number of eight birds observed in a flock. Our study suggests that there is an immediate need to declare Cheer potential habitats as a protected area. Moreover, Qazi Nag Game Reserve and Phalla Game Reserve being two important habitats of Cheer pheasant should be upgraded to National Park to ensure conservation of this important species.

FEWFM-84

ASSESSMENT OF PUBLIC REACTIONS AND BELIEFS TOWARD REPTILES THROUGH THE SOCIAL MEDIA PLATFORM FACEBOOK

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Facebook is currently the world's most popular social networking site. Pakistan has over 4.92 billion Facebook users. Used to share and convey their ideas and feelings about any particular event or problem. In this study, reptile-related wildlife crime posts were collected. And explored human behavior toward reptile-related wildlife crimes in Pakistan. We explored the myths, interactions, and beliefs behind reptile killing. There were (n = 243) snake killing cases (common krait *Bungarus caeruleus* was the most dominant species) due to fear of danger and conflicts. Sentiment analysis was performed using the sentiment R package to categorize the comments on the reptile's posts. Anger (99), anticipation (97), disgust (91), fear (143), joy (96), sadness (107), surprise (48), trust (150), negative (231), and positive (251).

FEWFM-85

HUMAN- BLACK BEAR CONFLICT: LIVESTOCK DEPREDATION BY ASIATIC BLACK BEAR (*URSUS THIBETANUS*) IN AZAD JAMMU & KASHMIR, PAKISTAN

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Asiatic black bear has been illustrated lesser in research in Azad Jammu and Kashmir (AJ&K). This study aimed at investigating the conflict of Asiatic black bears with human beings in throughout their range in AJ&K between 2015 and 2020. The study area, based on the topographic features, was divided into 17 study localities. Major study parameters were demographic information of respondents, temporal and spatial aspects of livestock depredation and economic losses borne to the respondents. This conflict was investigated by using questionnaires (n=458) asked in Urdu and local languages. The Chi-square test revealed a highly significant difference ($p<0.01$) within the demographic features of respondents, livestock rearing types, herd size and depredation events. Average age, number of households, and earning members per family were recorded as 45.5 years, 8.36, and 1 individual respectively. Most (37.7%) of the respondents belonged to the low-income class (10000 or lesser PKRs/month). Herding and farming were the main professions in the study area. A total of 20478 livestock heads was recorded in the area, with the majority (58.36%) of goats while equine contributed the least (4.15%) to the livestock composition. A total of 1309 livestock heads, the majority of them being goats (55%) were killed by Asiatic black bears during the study period. Most of the depredations occurred during night (54.39%) at an elevation between 2501-3000 m (38.4%), preferably in summer pastures (grazing areas) (37.7%). Maximum (18.78%) livestock losses occurred during June while most (25.6%) of the total depredations were recorded in the year 2020. Linear regression model predicted that 47% of the livestock depredation was attributed to herd size, sites, watch and ward, and estimated population of Asiatic black bear in the area. Cumulatively, black bears inflicted 23.47 million PKRs (0.178 million US$) economic losses to the respondents due to livestock depredation as compared to crop raiding. It is recommended to start a compensation scheme for the farmers that is likely to turn their negative attitude about the wildlife, especially the black bear. Conservation of this species will pave the way to the long-lasting existence of natural habitats, sympatric species and ecosystems as a whole.

FEWFM-86

VERTEBRATE DIVERSITY AT MARGALLA HILLS NATIONAL PARK, PAKISTAN

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A high vertebrate diversity is found at Margalla Hills National Park, Pakistan. The Margalla Hills National Park (MHNP) is in Islamabad, Pakistan. This is an important site for the conservation of many plants and animals. The present study was aimed to determine the status of fauna diversity and richness, and environmental threats to the animals. A field study was conducted and the point count method was used to determine vertebrate diversity. The survey showed that the MHNP is home to 117 species of birds, 27 reptiles (including species such as the saw–scaled viper, Russell's viper and the Indian cobra) and 30 mammalian species, such as barking deer, wild boar, golden jackal, red fox, Asiatic leopards, monkeys, fruit bats, and pangolins. The results showed a maximum count of 9,076 birds of 117 species belonging to 48 families. According to the Islamabad wildlife management board, one of the unique species, the grey goral (*Nemorhaedus goral*), was found extinct at the MHNP as no single specimen has been recorded since 2018. It was

also been observed, that the numbers of the endangered species of common leopard (*Panthera pardus*) and pangolin (*Manis crassicaudata*) have increased, possibly due to the wildlife management board's strategy for conservation. Nevertheless, greater conservation and protection of wild fauna at the MHNP is still needed. It was concluded during the visits, threats such as habitat degradation, climate change, and over hunting were possible source of decrease in biodiversity. Moreover, it was noticed focus on the implementation of approved legislation and better managerial practices can protect the unique diversity however improvement can be observed.

FEWFM-87

TEMPORAL NICHE OVERLAP AMONG PREDATOR AND PREY SPECIES INHABITING THE POTHWAR PLATEAU

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Daily activity patterns are an important component of mammalian nature and behavior through which species respond to varieties in biotic, abiotic, and anthropogenic variables. Studies addressing the phenomenon of spatial and temporal activity patterns of mammalian predators and prey species are important to understand the strategies adapted by them for co-existence in the same area and habitat. Therefore, the current study investigated activity patterns and the temporal niche overlap among predators and prey species inhabiting Pothwar Plateau from August 2020 to July 2022. Field surveys were conducted fortnightly aided with installing motion-triggered cameras at selected sampling sites to capture field photographs of the predators and prey species. Date and time of activity of the mammalian species were recorded in captured photographs. Data on species identification, camera trap station, date of capture, and the numbers of photos captured were recorded systematically. The predator and prey species in the photographic data were identified and their activity patterns were plotted using "R Studio" software. The niche overlap among the temporal activity of the various species were computed using the same software. Results revealed that common leopard (*Panthera pardus*), red fox (*Vulpes vulpes*), Indian-crested porcupine (*Hystrix indica*), small Indian civet (*Viverricula indica*), and Indian desert hare were active at nighttime whereas barking deer (*Muntiacus muntjac*) and Punjab Urial (*Ovi vignei punjabiensis*) were found diurnal in their activity pattern. Highest overlap of temporal niche was computed for red fox and common leopard (1.0), followed by red fox and yellow-throated marten (0.70), red fox and barking deer, common leopard and Asiatic Jackal, and red fox and Asiatic Jackal 0.52 each. The comparatively high temporal niche overlap among various mammalian species indicates greater competition for habitat resources, threatening their survival.

FEWFM-88

SUSTAINABLE WELFARE OF CAGED ANIMALS OF PAKISTAN

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We the teachers of Biology department, Virtual University, Pakistan, worked on an idea "one lab, one research". We critically examine different research ideas and selected a research idea "sustainable welfare of caged animals of Pakistan"

for commencing it on one time in different cities of Pakistan. Our study is qualitative in nature presently. We selected four spots in two cities. Lahore Zoo, Lahore Safari Park, Peshawar Zoo and Bagh-e-Naraan Park, Peshawar. Five of our undergraduate students had collected the data. Personal observations, interviews with administration- visitors, comparative questionnaires (consists of 64 questions) and Zoo photography were used as research tools. Animals representing 50 different species, including many endangered and exotic species were studied. All the animals in present research were included without any discrimination of age and gender. Check lists were prepared regarding animal enclosure/ cage requirements, provision of food and water, Veterinary facilities, provision of required environment, difference in caged animal behavior, safety measures for caged animals, provision of trained personnel and visitors attitude towards caged animals was studied. In scaling of sustainable welfare standards of caged animals, we are on higher scales in comparison with other SAARC and developing countries while have differences with developed countries.

FEWFM-89

COMPARATIVE ANALYSIS OF DIVERSITY, ABUNDANCE AND FEEDING GUILDS FOR AVIAN SPECIES IN THREE NATIONAL PARKS OF PAKISTAN

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Pakistan has a very diverse and rich geographical history, resulting in two of the eight realms; Pale-arctic and Indo-Malayan realms. Four out of ten biomes present in Pakistan; tropical seasonal forest, mountain, desert and temperate grasslands. Due to these peculiar combinations of different ecosystems. Pakistan provides perfect breeding grounds for its native/endemic species but also the migratory species. International Union of Conservation of Nature (IUCN have categorized 35 protected areas as national park. The study has provided detailed insight of selected national parks with great emphasis on diversity and abundance of avian species in different national parks with respect to altitudinal variation and how habitat heterogeneity affects the feeding guilds of birds as well as guild richness. This study has helped us to estimate the number of bird species, their IUCN categories, spatial distribution, guild richness and possible threats to these national parks. The study has contributed to our existing understanding for conservation, preservation and management of national parks and protection of its natural biotic and abiotic components. It has also helped us to assess the over exploitation of the natural resources and has suggested the ways to control consequent loss of natural balance that risks biodiversity.

FEWFM-90

TAXONOMY, ECOLOGY AND CONSERVATION STATUS OF DUCKS (FAMILY ANATIDAE) INHABITING HAMAL LAKE, SINDH, PAKISTAN

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Hamal Lake is one of Pakistan's largest lakes, it is home to a variety of resident and migratory birds. The present study was proposed to determine the Taxonomy, Ecology and Conservation Status of Ducks (family Anatidae) of

Hamal Lake. The diversity of the family Anatidae was explored from July 2021 to April 2022 and altogether 3 species of the genus *Anas* were recorded from the lake including *A. acuta, A. carolinensis* and *A. platyrhynchos.* Their taxonomic and ecological status was determined by a deep study of environmental and morphological characteristics. Morphometric parameters such as body length, beak length, tail length, wingspan, primary feathers length, secondary feathers length, foot length, and body weight, were thoroughly examined by using scientific materials and methods. Species were identified via morphology and literature review, scientific taxonomic key. There was no major variation in morphometric parameters in males and females while minor variation was recorded. The morphometric of female specimens of *A. acuta* was recorded as Body weight (g) 752.4±119.7, Body length (cm) 49.3±7.73, Tail length (cm) 5.45±0.9, wingspan (cm) 50.4±3.8, while morphometry of male specimens of *A. acuta* was recorded as: body weight (g) 829.1±125.9, Body length (cm) 55.02±2.70, Tail length (cm) 6.92±1.56, wingspan (cm) 49.94±3.992. The morphometric of female specimens of *A. carolinensis* was recorded as body weight (g) 424.25±69.3, Body length (cm) 34.77±3.41, Tail length (cm) 5.72±1.13, wingspan (cm) 54.29±3.08, while morphometry of male specimens of *A. carolinensis* was recorded as body weight (g) 444.5±61.9, Body length (cm) 35.5±2.11, Tail length (cm) 5.77±0.77, wingspan (cm) 55.8±3.8. The morphometric of female specimens of *A. platyrhynchos* was recorded as Body weight (g)902.9±56.86, Body length (cm) 50.32±4.8, Tail length (cm) 6.30±1.54, wingspan (cm) 50.99±2.87, while morphometry of male specimens of *A. platyrhynchos* was recorded as body weight (cm) 1050.2±105.6, Body length (cm) 51.5±3.8, Tail length (cm) 6.76±1.32, wingspan (cm) 51.05±3.01. The availability of food in the form of fish and frogs was abundantly present in the study area. The ecological conditions of the duck species were unstable due to the presence of garbage. The conservation status was observed as poor in Hamal Lake as no conservation actions were put into practice to save the wildlife there. Anthropogenic activities such as hunting, habitat destruction, and pollution were recorded main reasons that affected the ducks of Hamal Lake. It was noticed that several ducks were captured from Hamal Lake for illegal trade in the markets of Qambar Shahdadkot. Conservation actions must be implemented to save the duck species, so the species in question may not decline in the future.

FEWFM-91

MORPHOLOGY AND ECOLOGY OF GREY FRANCOLINS (GENUS *ORTYGORNIS*) IN DISTRICT KHAIRPUR, SINDH, PAKISTAN

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The population of grey Francolins is declining fast in Asia due to various factors such as the loss of food, excessive predation, hunting and habitat destruction. In this perspective, a comprehensive study was conducted to explore District Khairpur to determine the distribution of grey Francolins of genus *Ortygornis*. District khairpur was surveyed from July 2021 to April 2022 for the morphological and ecological studies using parameters: body weight, body size, plumage coloration at face, plumage pattern of patches, occurrence of spurs on the legs. Altogether 32 specimens of grey francolins were collected that were identified as *Ortygornis pondicerianus*. This species is a medium-sized bird with pal face having a thin black border to the pale throat. The males have up to two spurs on the legs while females usually lacked them. Morphology of male was recorded as body weight (g): (237.4±18.6), beak length (cm) (1.8±0.05), body Length (cm) (30.9±0.8), tail Length (cm) (8.6±0.6), Wingspan Length(cm) (44.8±2.1), Wings Length (cm) (14.2±0.4), Shank Length (cm) (4.0±0.1), Length of Largest Toe (cm) (2.7±0.1).While female specimen recorded as: body weight (g) (30.9±0.8), beak length (cm) (1.8±0.03), body Length (cm) (29.2±0.9), tail Length(cm)(8.5±0.6), Wingspan Length(cm) (42.4±1.09), Wings Length (cm) (13.5±0.3), Shank Length(cm) (3.8±0.05), Length of Largest Toe (cm) (2.7±0.1). The status of *Ortygornis pondicerianus* was recorded as unstable, however hunting may contribute to massive destruction to their population in future. Nesting sites were also observed in agricultural lands, harvest crop, within small thorny bushes, growing grasses. banana cultivation lands, ploughed fields.

FEWFM-92

DIVERSITY, ECOLOGY AND CONSERVATION STATUS OF FAMILY COLUMBIDAE (ORDER: COLUMBIFORMES) IN DISTRICT MIRPURKHAS, SINDH, PAKISTAN

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Pigeons and doves have adaptive nature to variety of habitats and thus they are successful members of Family Columbidae. A comprehensive study was proposed to determine their diversity, ecology and conservation status in district Mirpurkhas as they are valued for food pollination, and maintenance of ecosystem. For the collection of data, field surveys were carried out from July 2021 to April, 2022 for the observation of species in question using binoculars and DSLR cameras. The morphological characteristics were examined and species were identified using identification keys and taxonomic literature. Five species including *Columba livia* (rock pigeon), *Treron phoenicopterus* (yellow footed green pigeon), *Streptopelia decaocto* (eurasian collared dove), *Streptopelia risoria* (barbary dove) and *Streptopelia senegalensis* (laughing dove) were recorded to exist in study area. Taluka Shujabaad embraced rich diversity of pigeons and doves while least diversity was recorded in Jhuddo. The distribution of *C. livia* was most abundant and recorded from all talukas while *Treron pheonicopterus* was rarely found only from taluka Shujabad. There were no morpho-taxonomic variations in members of distinct species, however minor variation was recorded. Preferred nesting sites of pigeons were found in human settlements and old buildings, whereas doves were recorded to prefer dense trees for nesting. Pigeons and doves feed mainly on seeds i.e corn, mustard, millet seeds as well as grains including barely, paddy grains, wheat and peas. *T. pheonicopterus* feed on fruits exclusively. Pigeon and doves were observed feeding on small invertebrates and insects. Conservation status of family Columbidae was recorded as stable, however hunting and habitat destruction was recorded in few sub-division.

FEWFM-93

MORPHOLOGY AND DISTRIBUTION OF *TRERON PHOENICOPTERA* (LATHAM, 1790) YELLOW FOOTED GREEN PIGEON IN SINDH, PAKISTAN

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The yellow-footed green pigeon (*Treron phoenicoptera*) is a member of order Columbiformes under family columbidae. It has an extremely limited distribution, and habitat fragmentation is blamed for that. This species is seen very rarely in different parts of Pakistan and therefore very little is known about its morphology and distribution. In this context, a study was proposed to delve into *T. phoenicoptera* in different areas of Sindh including Mir PurKhas, Badin, Hyderabad and Jamshoro districts from January to September, 2021. The extent of its distribution was confirmed along with ascertaining the status of bird as permanent resident or temporary visitor in particular areas. Present study recorded Yellow footed green pigeon through thorough observations carried out from early morning to late evening. The bird species was examined for morphological characteristics and all the possible variations in morphological parameters were recorded for the definite systematic arrangement of species in question. Present study recorded the distribution of *T.phoenicoptera* in district Badin and MirpurKhas, wherein district Hyderabad and Jamshoro there was no occurrence of this species throughout the study period of nine months. The body of *Treron phoenicopterus* was recorded as yellowish

olive-green, while the crown was blue grey. The outer ring of iris was pink-red and inner ring was observed pale blue. Their bill was silver grey with light green color, while legs were bright yellow. The morphometric of species was recorded as: body weight j(g) 251.8±9.3, body length (cm): 29.9±2.5, tail length (cm): 9.1 ±2.1, and wingspan length (cm): 19.2 ±2.0.

FEWFM-94

CHARACTERIZATION OF VOCALIZATION OF BLUE THROATED BARBET

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The definition of the vocal repertoire serves as a foundation for understanding the function of acoustic signals in an animal's social and sexual interactions. In Pakistan's Murree Plains and Marghla Hills, a little bird called the Blue-throated Barbet lives. Despite the bird's usual wariness and secrecy, it can be clearly heard when unseen because of its powerful and distinctive sounds. Like other wild bird species, it is conceivable that blue-throated barbets use their calls to promote social cohesiveness and the coordination of various actions. The vocal range of the blue-throated woodpecker hasn't been sufficiently described yet. The vocalizations of the adult blue-throated barbet, captured during two consecutive breeding seasons, were studied presently and are documented here for the first time in the world. We divided the vocalizations type into four separate categories using 10 call criteria based on spectrogram and statistical analysis. The "kutrook-kutrook type 1 call," "Kutrook-kutrook type 2 call," "touk call," and "kurrrrrrrrr call" are a few examples. These names were chosen without using a functional analysis, making them onomatopoeic. The vocalizations were accurately classified (with almost100% accuracy) into the expected vocal categories that we initially categorized on the basis of spectrographic investigation using stepwise cross-validated discriminant function analysis. Our research advances the biological understanding of the vocalizations of the adult Blue-throated Barbet and lays the groundwork for ongoing acoustic monitoring of the species as well as for research comparing the vocalizations of the Barbet to those of other bird species in the Megalaimadae family. To understand their roles in sexual selection and individual recognition, more research on the Blue-throated Barbet's vocalizations is necessary.

FEWFM-95

TAXONOMY, DISTRIBUTION AND FEEDING HABIT *OF TRERON PHOENICOPTERA* (YELLOW FOOTED GREEN PIGEON) FAMILY COLUMBIDAE, IN DISTRICT MIRPURKHAS, SINDH

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Treron phoenicoptera (yellow-footed green pigeon) is a member of order Columbiformes under family columbidae. It has an extremely limited distribution, and habitat fragmentation is blamed for that. This species is seen rarely in different parts of Pakistan and therefore very little is known about its morphology and distribution. In this context field surveys were carried out for the study of *T. phoenicoptera* in different areas of district MirPur-Khas, Sindh from July 2021 to April 2022. Altogether thirty specimens were collected from different sites including Mirpur-Khas, Shujabad, Sindhri, Digri, Tando Jan Muhammad, Hussain Bux Mari and Jhuddo. All the specimens were examined for morphological characteristics and morphometry using equipments: Electronics weight Machine (SF400), DSRL Camera (50MM Lens) Metric Ruler, Geometric Compass, Vernier Caliper, Trapping Net and Bird Cage *Treron* pheonicopterus

was identified through taxonomic literature. Their body parameters were measured as followed Body length (cm) 29.7±2.51, Beak length (cm) 2.55±0.16, Tail length (cm) 9.3±1.92, Wing span length (cm) 19.3±1.82 and Body weight (gm) 252.3±8.84. *Treron phoenicopterus* was recorded as yellowish olive-green, while the crown was blue grey The outer ring of Iris was pink-red and inner ring was observed pale blue. Their beak was silver grey with light green color, while legs bright yellow. The yellow footed green pigeon was observing as furgivorus (fruit eating bird) feeding on various fruits especially ficus berries and also feed on buds, shoots and various grains, nuts and seeds available in study area. The occurrence of *Treron phoenicopterus was* recorded from Shujabad, Sindhri, Digri, MirPur-Khas and Hussain Bux Mari talukas, while but there was no distribution of yellow footed green in Kot Ghulam Muhammad and Jhuddo talukas Present study recorded limited distribution and moderate population of *Treron phoenicoptera.*

FEWFM-96

AVIAN DIVERSITY AND ABUNDANCE DYNAMICS AT TEHSIL CHISHTIAN, PAKISTAN

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Birds are the indicators of environmental pollution and ecological deterioration in different ecosystems. It has been reported that avian fauna has been declining in various parts of the world as well as in Pakistan. The current study was conducted to analyze the diversity and abundance of avian fauna in selected areas of tehsil Chishtian of district Bahawalnagar, Pakistan. The study was conducted on monthly basis from December 2021 to May 2022. Line transect, direct method and point count method was used for sampling. Combined comparison of all habitats (canal, garden, rural and urban areas) revealed population fluctuation in various habitats. Rural areas average number of birds recorded 1616 (37.94%) was greater than other sites. Shannon Diversity index rural area was 2.83 which show more diversity of birds in rural area. Urban areas average abundance was 297 (6.97%) found and have 1.23 Shannon diversity index. Moreover, among canal and garden average number of birds was found greater in garden 1212 (28.45%) as compared to canal bank site 1134 (26.62%). There was more Shannon Diversity index of birds at canal site 2.66 while garden site has 2.65 Shannon diversity index. Total 2.763 Shannon diversity index recorded with 4259 species abundance and 43 species during six-month observation. Moreover, Garden area recorded 1212 and Canal site recorded 1133 numbers of birds respectively. Obtained data and results were analyzed statistically through one way ANOVA, p-esteem value of temporal diversity and abundance of six month is 0.21, indicated that there is no significant variation between six months, month wise data collection showed that the p-esteem value of December (0.045), January (0.028) and May (0.032) is lower than 0.05. All four habitats show variation in these months. February (0.068), March (0.058) and April (0.12) is greater than 0.05, it showed and there is no variation between the two or more habitats.

FEWFM-97

SPATIO-TEMPORAL DIVERSITY AND ABUNDANCE OF BIRDS AT DISTRICT D. G. KHAN

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Birds are significant element of biodiversity of our environment. They accomplish many biological roles in their habitats as, they are bio indicators of healthy biomes. Population of some species increases and some are decreasing with

the increase in urbanization. Urbanization affects the diversity and abundance of birds as well as other species. It is because most birds prefer cracks or cavities for nesting but advanced construction of houses lack cracks or cavities, prevent nesting and so avian population decreased. In rural and other areas, factors like pesticides and other chemicals not only affect the diversity of birds but also significantly affect other species. The present study was conducted to determine the diversity of birds in district D.G. KHAN. Sampling was done on monthly basis from December 2021 to May 2022. Each sampling area was almost 1 km^2 with four different types of habitats viz. high density populated area (urban area of D.G. KHAN), low density populated area (Notak mehmeed), rural agricultural area (Residential area) and canal road side area. Visual counting method, least count method and point count method were used during sampling. A total of 3749 specimens were observed and counted from four different sites. Out of the total specimens 819 birds were observed from urban area, 749 specimens were observed from Kot chutta canal side area, 781 from Notak mehmeed and 1400 birds were observed from rural residential area. There were total Order (10) families (24), Genus (34) and species (42) were identified. From all selected sites the total number or values of species was 104, Abundance (N) 3749, dominance (D) 0.05279, diversity (H`) 3.301 and eveness (E) 0.6459, respectively. From all the study sites, the most abundant recorded species was *Corvus splendens* belonging to the family Corvidae has 432 (11.52%) specimens, and least abundant species *M. apiaster* has 15 (0.40%) specimens belonging to the family Meropidae, respectively.

5. BIODIVERSITY

FEWFM-98

CREATION AND EVOLUTION COULD NOT BE DENIED, BOTH ARE FACTS AND SHOULD BE CONSIDERED IN ALL SCIENCES

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How the universe came into existence? or how do the 1st member of any living species came into existence? the answer through evolution is very, very difficult, but the answer of above question is possible through creation and then through evolution. Several scientists, workers and researchers believe in both the Creation & Evolution, such as Francisco Suarez (5 January 1548 – 25 September 1617), Reported "God Created all plants animals & humans Carl Linnaeus (May 23, 1707 - January 10, 1778) , Gregor Mendel (July 20, 1822 - January 6, 1884), Alfred Russel Wallace (January 8 1823 – 7 November 1913) and Tariq (June 8, 1966 – till now).They reported that that first the species were created and then evolution took place by the passage of time & the new species were evolved from the pre-existing species. The word science may be defined as" the study and copy of nature and natural phenomenons to understand the secrets of universe". The word science may be taken from the word Hikma in Arabic, Danai in Urdu and Sense in English, which means the internal wisdom, observed by the help of sense organs or additional instrument and apparatus or machine. Science always speak about truth, fact, actualness and perfectness. Science believes in 2+3 = 5 not in 4 or 6. The creation took place without pre-existing sample/ example/ species, whereas the evolution could not proceed/takes place without pre-existing sample/example/species. Creation is more primitive then evolution, as the things/ specimens/ organisms/ species were 1st created and then the evolution took place in them according to the need of the specimens/species or according to the requirement of the time and environment. The evolution takes place in gene, shape, size, color, height, age, function, need, ability, habitat, and fitness according to the need of species or environment by the passage of time in living things, whereas evolution also took place in nonliving things such as light, temperature, humidity, elements, minerals, gases, charges, ph, chemical composition, concentration, phase, equilibrium etc.
Comparative study method of Literature from books, Journals and Published data was used, especially the study of Evolution of living things including Plants, Animals and Humans, was taken into consideration.
In case of plants the potato has no seeds then how its first plant came into existence? Ultimately created. Similarly, the Hydra an animal of multicellular level reproduce through four methods, binary fission / bifurgation, budding/natural cloning and regeneration through asexual reproduction i.e no second individual is required means the only single individual gives rise to an other individual but how the 1st individual of Hydra came into existence? Ultimately it was created, As for as the 4th method of reproduction of Hydra is concern i.e the sexual reproduction of Hydra, in which the two individuals are needed but the Hydra is hermaphrodite which have ovary & testis in the same Hydra. Similarly 1st the egg of hen was came into existence or the pair of hen was created, who laid the egg. Similarly incase of humans how the 1st human came into existence only by creation, because the first member of humans i.e Aadam was created, then Eve evolved from the body of Aadam through NMP by budding/ natural cloning to make the pair level of humans, and when the pair of humans was maintained then sexual reproduction took place which is continued till today. The Eve (Bibi Hawwa Alaiha Assalam) evolved from the body of Aadam Alaihis Salam which is Creation+Evolution, whereas the starting of descendants through sexual reproduction is Evolution. Evolution could not takes place without the basic help of creation. Both creation and evolution are facts, both should be considered. Neither the creation nor the evolution could be denied, because both support to each other. All existing races of *Homo sapiens* arose from a single ancestor Aadam Alaihis Salam (Benton 2005) and Eve Hawwa Alaiha Assalam evolved from the body of Aadam Alaihis Salam, reported online in the recent years as well (Tariq 2011, 2014 & 2018). Therefore creation is not only the most primitive base of evolution but also the compulsory need of evolution. So both should be considered in the sciences of all subjects.

FEWFM-99

PROPOSED A NEW CLASSIFICATION OF HUMAN BEINGS (*HOMO SAPIENS*) AS THE KINGDOM: HUMANIA IN MODERN BIOLOGICAL SCIENCES.

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Humans and Animals are two separate species/ creatures, likewise the fungi and plants. The fungi were included in Kingdom Plantae till 1956, but later on in 1969 & 1982, the fungi were separated from Plants on the basis of being Heterotroph, as the plants are Autotrophs. Similarly, an animal in any way cannot be a Human and a Human in any way cannot be an animal, as both are two opposite things. Therefore, as the fungi was separated from the plants on a single point agenda. In the same way the Humans can be separated from animals not on a single point agenda but also on several differences based on the scientific ground. In the recent years the Bacteria have been divided into two Domains, the Archaea and the Bacteria on the basis of composition of their cell wall only. Thus, the Humans have been separated from Kingdom: Animalia, due to several differences on scientific hierarchy ground. Literature, Scientific books, Journals and published data about Anatomy, Morphology, Physiology, Paleontology, Embryology and Nutrition of the human was studied. The differences in between the animals especially the Apes and Humans were observed and recorded after comparative study. Human have Chin, Lips, Hips (Resting Pads / Siting Pads) and Reduced Hairs on body in Patches, but in the animals especially the above characters in animals especially in Apes are absent. Human have Laughing, Smiling, Speaking, Writing, Reading, and Inventing ability, but in animals especially in Apes the above things are absent. Another main difference in animals especially the Apes and Humans is the use of fire (Aage/ Naar). None of the animals especially the apes are totally un-able to use the fire. The humans use both un-cooked (food direct from plants) and cooked food, whereas the animals especially the apes use the food direct from plants and not cocked food at all. There are more than 25 differences recorded in animals especially in the apes and humans.The most important genetic difference in apes and humans is that of chromosomal no. that is 48 in apes, gorilas, and baboons, whereas 45,46 & 47 in Humans with agrigate 46 in all humans. Bucaille (2001) reported the origin of man, whereas Farooq and Shakoori (2002) reported the evidences for evolution of man, independent of other primates: Basis for a new classification of *Homo sapiens*. According to "Out of Africa Theory" DNA evidence suggested that "All modern races of humans are closely related and share a common ancestor, Aadam Alahis'Salam (Cann *etal* 1987). According to Stringer and Andrews (1988); Cavali Sfroza and Feldman (2003), they strongly support the single origin model of Human Evolution that "All existing. races of *Homo sapiens* arose from a single ancestor (Aadam Alahis'Salam). According to Benton (2005), "The single origin model (i.e from Aadam Alahis'Salam) of Human Evolution has been confirmed again & again and multiregional model for Modern Human Origin has been rejected the origin and evolution of 2nd Human "Eve / Hawwa" was reported in 2011, whereas the origin and evolution of female sex in Human indirectly from male sex was reported in 2014. "Theory of Aadam Hypothesis" Presented in 2011, proves to be true. In 2013, Aadam Alahis'Salam Creation Theory for Human Evolution States "The 1st Human Aadam (identical male) was created by nature for the 1st time as pre-existing human species, the 2nd human Eve/ Hawaa (identical female) was evolved/ originated by means of natural cloning / natural budding, asexually for the 1st time in the world, from pre-existing human species (Aadam), to maintain the 1st pair level of human species, to start the sexual reproduction for the 1st time and then all men & women were spread in the whole world, through this pair, which is continued till today". The New Kingdom, for human beings was reported for the 1st time in 2018 as the Kingdom: Humania and now the Phylum: Natiqaa (Speaker), Class: Ashrafia and Order Chinniata is reported.

FEWFM-100

PREVALENCE AND ASSOCIATED RISK FACTORS OF FRESH WATER SNAILS FROM SELECTED AREAS OF AZAD KASHMIR

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Gastropods including snails act as intermediate hosts for numerous infections therefore, zoologists and malacologists are showing their interest in identification of these hosts. Some snail species are important as intermediate host in spread of diseases including fascioliasis. The main purpose of this study was to identify snail's species and to find out their distribution patterns in different areas of Azad Kashmir. Freshwater snails were taken from two districts of Azad Kashmir during August 2019-October 2020. They were brought in general laboratory of Zoology, University of Gujrat Punjab, Pakistan. Total 267 snails were collected and preserved in air tied jars. The species identified in this collection were *Biomphalaria sudanica, Lymnaea natalensis, Biomphalaria pfeifferi, Ramshorn snails, Physa borbonica, Lymnaea stagnalis*, and *Bulinus nasutus*. Out of these 267 species, there were 53 *Lymanaea natalensis,* 3 *Biomphalaria pfeifferi* species, 28 *Biomphalaria sudanica* species, 4 *Physa borbonica*, 121 *Ramshorn snails*, 13 *Bulinus nasutus* and 45 *Lymnaea stagnalis* from 2 districts of Azad Kashmir. A significant correlation was present between different parameters such as shell length, width, and weight of snails. For the purpose of ecological studies, soil samples were also analyzed in laboratory. Analysis report tells us about electric conductivity, PH value, saturation percentage, organic matter, phosphorus, and potassium which affect the presence and absence of snails.

FEWFM-101

CHARACTERIZING THE EXPOSURE TO PARTICULATE POLLUTION UNDER VARYING CONGESTION SCENARIOS IN LAHORE

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Lahore being second largest city of Pakistan is facing highly deteriorated air quality during the last decade. Rapid urbanization, overpopulation coupled with motorization are the main deteriorating factors of air quality. Poor air quality management potentiality and lack of pollutant monitoring stations and devices led an increased pollutant concentrations in ambient air. But now, government of Pakistan has set several programs and establish air quality monitoring stations and standards to control air pollution. Pollutant concentrations in ambient air vary regionally and vary according to congestion scenarios in which Particulate Matter is dominating with severe health hazards that make it important to quantify its concentrations in ambient air with source and control strategies. Use of low-cost air quality monitoring devices are fruitful in monitoring pollutant concentration in real-time. To monitor particulate matter spatial trend across Lahore, eight Purple Air Sensors were installed in different administrative towns of Lahore. Ten administrative towns were segregated into congested and non-congested areas according to their population density. Data of PM (01, 2.5, 10) along with temperature and relative humidity was monitored for eight months for each sensor. Findings of this study conclude that monthly average PM concentrations in congested towns were in order: PM10> PM2.5> PM01, 367.21>309.79>167.53 µg/m3 while in non-congested areas conc. were in order: PM10> PM2.5> PM01, 324.45>279.75>150.17 µg/m3 which is many folds greater than National Ambient Air Quality Standards. The most

polluted administrative town with respect to PM concentration was Data Ganj Bakhsh town followed by Aziz Bhatti town and then Saman Abad town in Lahore and most polluted town among non-congested administrative towns with respect to PM concentration was Nishtar town followed by Cantonment town and then Allamah Iqbal town in Lahore. Vehicular emissions due to heavy traffic, lack of infrastructure and biomass burning were dominating anthropogenic factors to increase particle pollution in ambient air of Lahore. While meteorological factors like rainfall, wind velocity, temperature and relative humidity are responsible for elevated PM levels in non-congested towns. Current situation needs immediate actions to control air pollution which include establishment and implementation of air quality standards, enhance continuous monitoring stations and vehicular emission control regulations. In this sense, low-cost monitoring devices like Purple Air Sensors are fruitful in providing ambient air quality data in real-time.

FEWFM-102

DIET ANALYSIS OF MURREE HILLS FROG (*NANORANA VICINA*) AND HAZARA FROG (*ALLOPAA HAZARENSIS*) TADPOLES IN THE FORESTED WETLANDS

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Anuran larvae are an important component of the aquatic system. They serve as consumers as well as prey for a variety of other animal species. The quantification of diet of most anuran tadpole species needs documentation, and it is still recognized as one of the major research questions. We collected the tadpoles of Himalayan endemics: *Nanorana vicina* (33) and *Allopaa hazarensis* (33) from the seasonal and permanent freshwater streams located in Perhana, Murree Tehsil, Rawalpindi District, Punjab Province and Daggar Tehsil, Khyber Pakhtunkhwa Province, Pakistan. We identified developmental stages of the collected tadpoles using Gosner (1960) and selected tadpoles of Gosner stage 25-32. We weighed and measured total body length, snout vent length and mouth width of each tadpole. We dissected tadpoles along the ventral body wall and removed the digestive tract. We counted the numbers of gut coils and measured total intestine length. We used standard gut content analysis method. We identified food items as algae (diatoms, green algae and blue-green algae), detritus, fungi, animal parts and unidentified items. We calculated basic statistics (mean ± SE) of all the measurements. We used the program EstimateS 9.10. to generate species diversity indices and estimators which we used to compare the number of species (food item) observed in the samples and predicted by species estimators. We estimated frequency of occurrence (FO %) as the total number of stomachs with particular food items / total number of all the stomach contents multiplied by 100. A food was classified as constant when observed in (> 50%) of the stomachs, secondary when observed in (20-50%) stomachs and accidental when observed in (< 25%) of the stomachs. We applied Pearson's correlation between set of measurements and generated correlation plots. The total weight of tadpoles of *Nanorana vicina* was 1.69 ± 0.07g, snout vent length was 18.55 ± 0.21mm, total length was 48.94 ± 0.66mm, tail length was 29.83 ± 0.48mm, gut coils were 9.06 ± 0.31mm and gut length was 16.02 ± 0.31cm. The total weight of tadpoles of *Allopaa hazarensis* tadpoles was 6.97 ± 0.85g, total length was 76.73 ± 2.73mm, snout-vent length was 25.56 ± 1.17mm, tail length was 52.15 ± 1.90mm, gut coils was 12.69 ± 0.40mm and gut length was 34.79 ± 1.53cm. The gut weight of *Nanorana vicina* tadpoles was 0.29 ± 0.01g, volume of gut with contents was 0.31 ± 0.01mm and volume of gut with no contents was 0.13 ± 0.01ml. The gut weight of *Allopaa hazarensis* tadpoles was 0.82 ± 0.01g, volume of gut with contents was 0.64 ± 0.05ml and gut volume without contents was 0.17 ± 0.01ml. In *Nanorana vicina*, tadpoles, the correlation between the gut length and snout-vent length, gut weight and body weight and volume of gut with contents and mouth width were found to be positive, weak but statistically significant. The correlation between gut volume with

contents and gut length and between gut coils and gut length was positive, weak and statistically non-significant. The correlation between gut volume with no contents and gut length was negative, weak and statistically non-significant. In *Allopaa hazarensis* tadpoles, the correlation between gut length and snout-vent length, gut coils and gut length, gut weight and body weight, gut volume with no contents and gut length, gut volume with contents and mouth width and gut volume with contents and gut length were positive, strong and statistically significant. A total of 21 dietary items were recorded from the gut of *Nanorana vicina* tadpoles which are in agreement with the number of species predicted by the species estimators (23). The recorded food items were: diatoms (55%), green algae (22%), blue-green algae (7%), debris (12%), microorganism (2%) and fungi (2%). The most frequent item in the diet were represented by genera *Nitzschia* (63.63%), *Navicula* (72.72%), *Amphora* (84.84%) and debris (100%) while least the frequent items were *Eunotia* (3.30%), *Ulothrix* (12.12%), and *Oedogonium* (12.12%). Debris, *Amphora, Navicula* and *Nitzschia* were constant (> 50%) food items in the diet of *Nanorana vicina* tadpoles. *Spirogyra, Oscillatoria, Cosmarium, Chlorella, Cyclotella, Cymbella, Fragilaria, Pinnularia, and Gomphonema* were secondary (20–25%) food items while *Eunotia, Oedogonium, Ulothrix, Rhizoclonium,* and *Phormidium,* were accidental (< 50) food items. A total of 32 dietary items were recorded from the gut of *Allopaa hazarensis* tadpoles which are in agreement with the number of species predicted by the species estimators (34). The recorded food items were: diatoms (53%), green algae (24%), blue-green algae (11%), debris (9%), microorganism (2%) and fungi (1%). The most frequent items were represented by genera *Nitzschia* (63.63%), *Navicula* (69.69%), *Amphora* (72.72%), *Gomphonema* (75.75%), *Fragilaria* (96.96%) and debris (100%). The least frequent food items were *Nostoc* (3.03%), *Cocconeis* (3.03), *Ulnaria* (3.03%), *Synedra* (6.06%), *Frustulia* (6.06%), *Synechococcus* (6.06), *Mastogloia* (9.09%), *Aulacoseira* (9.09), and *Lyngbya* (9.09%). Debris, *Oscillatoria, Cosmarium, Rhizoclonium, Amphora, Fragilaria, Gomphonema, Nitzchia, Navicula* and *Pinnularia* were the constant food items in the diet of *Allopaa hazarensis* tadpoles. *Spirogyra, Phormidium, Oedogonium, Cyclotella* and *Cymbella* were the secondary food items while *Chroococcus, Lyngbya, Nostoc, Synechococcus, Aulacoseira, Chlorella, Oedogonium, Ulothrix, Aulacoseira, Cyclotella, Cocconies, Eunotia, Frustulia, Mastogloia*, *Synedra, Tabularia* and *Ulnaria,* were accidental food items. Our findings contribute to the existing knowledge on the diet of tadpoles. We have generated first empirical data on the diet of Himalayan endemics, and have provided more insight into relationship of other body and gut measurements. Our data support drift transport hypothesis which suggests that food selection is done after ingesting the suspended matter that contains both food as well non-food particles. These tadpoles also ingest debris from which they extract organic matter and which might also help in breaking down the food particles. This, however, might have serious conservation implications, since micro-plastic ingestion, along with the debris, has been reported as a major concern in a few vertebrates.

6. ENVIRONMENTAL BIOLOGY/ECOLOGY, ENVIRONMENTAL POLLUTION

FEWFM-103

ASSESSMENT OF WATER QUALITY AND HEAVY METALS CONTAMINATION OF NALA DEGH AND ITS SUBSEQUENT DRAINAGE INTO RIVER RAVI, PAKISTAN

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This research was executed to determine the water quality and heavy metals analysis of Nala Degh. Nala Degh passes through Kala Shah Kaku Sheikhupura into Upper Chenab Canal and subsequently falls in Ravi River. Nala Degh is of great importance as it acts as a wastewater carrier from different mainstream industries of District Sheikhupura that is evolving into an Industrial Hub with the passage of time. Water samples was collected during the late winter in the month of February 2022. Sampling sites were Hafeez Pvt, Taj Pvt and Epcot Pvt limited effluents and samples were collected in sterilized bottles of Polythene. Different physicochemical parameters were determined to derive the water quality. These Parameters comprising Electrical conductivity, Bicarbonate, Sodium ion concentration, SAR, Calcium and Magnesium ions as well as Arsenic concentration were determined and analyzed. The pH values of Samples were fluctuated from one site to the other. pH value of samples was determined on the spot with a pH meter. The pH values vary between 6.5 to 8.5. Epcot Pvt Showed high acidic pH value. Electrical conductivity values of the collected samples were fall around 3000 to 1000 mS/cm. Epcot Showed highest values. Sodium was found to be higher in same industry as sodium values were almost 2 to 275 (meq/l). Calcium and magnesium were also found and varies from 8 to 34 (meq/l). Epcot industry have the highest value for that as well. Bicarbonate values were found to be close to 19 to 6 (meq/l). Concentration of chloride was close to 2 to 11 (meq/l). Sodium Absorption Ratio (SAR) was also very high and almost greater than 60. The overall results showed level of increasing parameters which definitely had a bad impact on aquatic life as well as for agriculture and drinking. This was due to the sewage disposal and industrialization as the results show high pH values of water that is unfit for any human use. The findings conclude deteriorated water quality in the effluent water of the industry that threatened the life downstreams and suggests effluent water treatment and strict management of the industrial wastes.

FEWFM-104

THE ECOLOGICAL BASELINE STUDY OF THE TERRESTRIAL FLORA AND FAUNA OF DISTRICT THAR, SINDH PROVINCE OF PAKISTAN.

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This ecological baseline study covers the terrestrial flora and fauna of district Thar, in a variety of habitats, which are: sand-dune ranges; interdunal fertile flatland; some natural freshwater wetlands and some man-made

check dams to harvest rainwater. The study includes a narrow stretch of the mud and shallow salt water flatland that extends into the southern part of this district, from the Great Rann of Kutch, which is in Indian territory; Karoonjhar Hills at Nagarparkar and some rocky area near Nagarparkar. The human population of this district is more than 1.64 million, with only about 8% living in the urban areas. The desert people heavily rely upon livestock rearing and rainfed agriculture for their primary means of subsistence. With the increase in their populations, the number of livestock has also to be increased. During the prolonged dry spell years, these communities have to shift to some better areas, where some water and free grazing for their livestock is available. Generally, the desert habitats remain overgrazed, resulting in the dominance of the unpalatable plant species and as a result create imbalance of floral growth in all habitats. Also, the carrying capacity of the habitats reduces constantly. This has direct negative impact on the livestock, which brings reduction in the income of the communities. To face the food shortage for the livestock, the herders cut the branches of the available fodder trees, in the interdunal green areas and in the agricultural areas, to feed foliage and twigs to their livestock. This scenario is almost everywhere in the district. As a result, there is general shortage of night-roosting places for the birds. Most importantly, the tree-nesting birds of the area have already lost their nesting branches in the trees. Vulture nests were seen in the fabricated high tension power towers. The whole ecology of the living desert is fast degrading. During the vegetation surveys, palatable plant species were investigated and also the food plants were experimentally determined. The grazing and browsing behaviour of various livestock was studied. The relative abundance of the plant species in the habitats were calculated. Thus, the carrying capacity of the desert habitats was investigated. The floral species occurrence was enlisted, based on one survey in spring and two surveys in autumn in three consecutive years. Observations were made on the large and medium size mammals. One of the senior members of the team had already done trapping of the small mammals, during a few years back. His report was considered enough, so additional survey was not conducted. Large Mammals include Nilgai and Chinkara Gazelle, which are mostly found near Indo-Pak border fence, were recorded, but could not be counted due to security reasons. The birds' surveys were conducted in four trips in three consecutive years from October to March. Winter migrants, as well as spring breeding species could were watched. Great Indian Bustard, Houbara Bustard, Saras Crane, were reported from the area in addition to a list of all birds recorded from the area. Out of total 172 species observed during the study, 108 (63%) of all birds were resident, 52 species (30%) were migratory winter visitors, six species 3% were passage migrants, four species 2% were summer visitors, one species 1% was spring visitor and one species 1% was vagrant Reptiles and Amphibian Surveys were also conducted in four trips during three consecutive years. October and March were sufficiently warm for the reptiles to be active. During the first survey 16 species recorded from the study area, including three amphibians, eleven lizards and two snake species (one poisonous and one non-poisonous). During the second survey 20 species were recorded from study area, including three species of amphibian and thirteen species of lizard and four species of snake (two poisonous and two non-poisonous) were recorded from the study area. During the third survey, a total of 23 species were recorded, including three Amphibians, 15 lizards, and three snake species (one poisonous, two non- poisonous), and one chameleon was recorded. Invertebrate Surveys were conducted in all habitat, during day time to search nocturnal invertebrates from their diurnal hiding places, such as within the sand and soil and the diurnal creatures visually and also by sweep nets. Nocturnal surveys included light traps and pit traps. Butterflies were collected with butterfly nets. Common butterflies and common and familiar insects were identified visually, without efforts to collect them for identification. A total 11,106 specimens of 105 species were collected. It is concluded that the upgradation of this desert is steep difficult without reasonable funding resources. Further ecological applied research is required to study the feasibility of this desert's upgradation. After that the upgradation of the area needs management plan. Under the management plan there should be well reviewed projects, for which efforts are required to get financial resources. It is recommended that, week-end and holidays eco-tourism feasibility be conducted for big cities like Karachi and Hyderabad to visit desert and Nagarparkar for local communities' income generation through local huts night stays, local food restaurants and local handicrafts' sales.

FEWFM-105

MEGA-INFRASTRUCTURE PROJECTS' ENVIRONMENTAL AND ECOLOGICAL IMPACTS IN THE UPPER INDUS BASIN: AN ECOLOGICAL PERSPECTIVE FOR IMPORTANT SPECIES

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Effective and efficient environmental and ecological assessment over a larger area in limited timeframe and physical resources is a very big challenge. This research intended to identify, quantify, analyze and assess the environmental and ecological impacts with the help of advance GIS techniques and fuzzy logic. Study area for this research is Upper Indus Basin (UIB) comprising around 150,000 Km^2 area, lies within Pakistan. This research also considered the climate change which is usually referred as the most serious environmental challenge faced by earth inhabitants. Apart from that, this research also caters climate change mitigation and adaptation approaches. Different reliable published datasets, spreads over different domains particularly physical environment and ecology have been used to assess the impacts caused by extensive rapid development in the UIB. Datasets primarily included temperature, precipitation, solar radiation, soil cover, elevation, geology, seismicity, air quality, land cover, hydrology, slope, forest cover, floral habitats, fauna habitats, etc. Different interpretation techniques have been made primarily based on fuzzy logic. Not only severely impacted environmental and ecological hotspots has been identified but also pragmatic mitigation measures were also been devised. Research has also accounted for Notable Species and (direct, indirect, cumulative and residual) impacts on their respective habitats. Moreover, the simulated responses of the environmental and ecological impacts were also been modeled using available datasets on spatial and temporal scales. This research has indirectly helped to understand and estimate different ecological stresses which will arise from human interventions in natural environments. This estimation has been accustomed to devise appropriate corrective measures and actions to minimize the negative impacts, and will help to restore the natural ecology of the area. This research has not only mapped environmental and ecological hotspots, along with spatial extent of negative impacts and spatial scale of the development projects. Subsequently, results and findings of this research will be quite helpful in devising a sustainable and thorough environment and ecological policy for the region.

FEWFM-106

ANALYSIS OF PARTICULATE MATTER FRACTION IN RESIDENTIAL AREA OF LAHORE, PAKISTAN

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Air pollution levels have been increasing hazardously for the past few years in Pakistan, posing great threats to the lives of humans and animals. A distressing increase in particulate matter pollution in the metropolitan areas of the country has been observed which is the leading contributor to various toxic diseases including asthma, cardiovascular arrest, dysfunction of the lungs, high blood pressure, several eye diseases such as cataracts, and ultimately loss of vision. To evaluate the level of air quality at a residential site in an urban area, in Pakistan, particulate matter fractions $PM_{1.0,}$ $PM_{2.5,}$ and PM_{10} were analyzed throughout the period of 1st October 2021 to 31st March 2022 in Lahore by using a PurpleAir sensor installed at Gulberg Town by the Institute of Zoology, University of the Punjab, Lahore. The average mass concentration of $PM_{1.0}$ for six months was recorded at 86.19 μgm^{-3}± 51.50 μgm^{-3}. $PM_{1.0}$ concentration was recorded as maximum in the month of November at 252.42 μgm^{-3} ± 47.54 μgm^{-3} with an average value of 147.94 μgm^{-3} ± 47.54 μgm^{-3} while $PM_{1.0}$ was recorded as a minimum in the month of March 5.89 μgm^{-3} ± 5.15 μgm^{-3} with an average value 15.89 μgm^{-3}. The average mass concentration of $PM_{2.5}$ for six months was recorded as 164.59 μgm^{-3} ± 110.16 μgm^{-3}. $PM_{2.5}$ concentration was recorded as maximum in the month of December 622.28 μgm^{-3} ± 119.06 μgm^{-3} with an average

value of 229.93 μgm^{-3} while the minimum value recorded for March was 9.16 $\mu gm^{-3} \pm 7.94$ μgm^{-3} with an average value 25.24 μgm^{-3}. The average mass concentration of PM_{10} for six months remained at 200.96 $\mu gm^{-3} \pm 138.37$ μgm^{-3}. The maximum concentration of PM_{10} was recorded in the month of December at 851.64 $\mu gm^{-3} \pm 160.58$ μgm^{-3} with an average value of 287.96 μgm^{-3} while the minimum concentration of PM_{10} was recorded in the month of March at 10.12 $\mu gm^{-3} \pm 10.10$ μgm^{-3} with an average 30.56 μgm^{-3}. The localized factors responsible for elevated levels of PM in the months of November and December were burning activities, smog, use of gas heaters and vehicular emissions.

FEWFM-107

ASSESSMENT OF PUBLIC PERCEPTION ABOUT CLIMATE CHANGE IMPACTS ON BIODIVERSITY AND THE ADAPTIVE MEASURES BY COMMUNITY OF JAGRAN FOREST RANGE, DISTRICT NEELUM, AZAD JAMMU AND KASHMIR

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Climate change is a burning question now a days across the globe. Its impacts on biodiversity are obvious and biodiversity decline considerably attributed to climate change. The goal of the current study was to examine how the general population feels about climate change, its effects on biodiversity, and the adaptations made in the Jagran Forest Range, Neelum Valley, and AJK between 2021 and 2022 to mitigate such effects. At 15 research sites, monthly base frild surveys were carried out to collect data. Group talks and prescribed questionnaires were utilised to gather data on the respondents' demographics. Their perception to climate change, and adaptive my years they have taken to cope the climate change. A total of 300 respondents were interviewed, most of them (62%) were male. Most (90%) of the respondents were litrate, majority of respondents (10.8%) have 12 years of education. Most (n=241) of respondents were aware of climate change increase in temperature (88%) and global warming (84%). Surprisingly (56%) of respondents thought that climate change in the study area was not due to human activities. Climate change impacted mainly water resources scarcity (88%), crop production decline (89%) fruit production decreases (78%). Deforestation a deported by 35% of respondents. Adaptive techniques used to cope the climate change by local people were reforestation crop rotation, alternative energy resources. Climate change reduced biodiversity considerably respondent reported decrease in population of native animals (82%) pests' population is (32%). Study revealed that climate change is serious issue that puts a question mark on the survivability of biodiversity and mankind. A very nice regarding modern techniques in coping climate change, subsiding on energy and construction material are required to equip local community to adopt ongoing climate change.

FEWFM-108

EXPLORING AWARENESS ABOUT GLOBAL WARMING AMONG PROSPECTIVE TEACHERS

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Global warming is the recent and ongoing raise in earth surface temperature. This study was designed to explore the awareness about global warming among prospective teachers at University of Punjab. Total 500 hundred students

were examined using a questionnaire about global warming. The result showed that students have average awareness about global warming. We use chi square to find out the difference of awareness level of prospective teachers about global warming with respect to different demographic variable. It shows that there are significant differences with respect to demographic variable (age, gender, department, program, CGPA, shift, and residential status) among prospective teachers. Therefore, this study recommended integrated environmental concepts into the university curriculum for all students regardless of their academic specialization in order to increase the environmental awareness.

FEWFM-109

ASSESSMENT OF PARTICULATE POLLUTION ON ROADS IN LAHORE

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Particulate matter has been increased considerably in last two decades. The rise of particulate pollution is due to rapid urbanization, smoke from industries, increased cemented constructions and vehicular emissions. Lahore city has been ranked world most polluted city so monitoring of air on congested and non-congested roads was performed. The air assessment involved the use of low-cost purple air sensor for first time in Pakistan to monitor ultra-fine particles, fine particles and coarse particles on Ferozepur Road, Ring Road and Canal Road. two-day survey in mid-March 2022 showed that particulate pollution is above the recommended guidelines of WHO. The levels of pollution were more evident on peak hours when flow of traffic on roads is more. Pollution levels were found to be more on Ring Road and Ferozepur Road. The main reasons were less greenery and trees on road sideways, use of diesel- and petrol-powered vehicles releasing more smoke, irregular traffic and abundant blockage of automobiles, Similarly, working day had more mean concentration of pollutants than non-working day. Results showed that pollution on specific areas like on roads near Badami Bagh, Batti Chowk, Kalma Chowk, Quaid e Azam Interchange, Karim Park had high concentration of all particulate matter. It should also be mentioned that from these results it is indicated that areas where heavy traffic moves and regions where regularly bus stands are located, mean concentration levels are on the rise.

FEWFM-110

SPATIO-TEMPORAL TREND ANALYSIS OF PARTICULATE MATTER IN LAHORE

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Air pollution particularly high concentrations of particulate matter is a matter of concern in megacities of Pakistan such as Lahore. This study was conducted to analyze the spatial and temporal trends of particulate matter in Lahore using PurpleAir sensors. PurpleAir sensors are low-cost air monitoring sensors that can measure all types of particulate matter and provide real-time data. Eight PurpleAir sensors were installed at different locations in Lahore by the Institute of Zoology, University of the Punjab, Lahore. The data for 8 months ranging from October 2021 to May 2022 was recorded and analyzed using geo-temporal and geostatistical techniques. The results showed a high 24-hour concentration of $PM_{1.0}$, $PM_{2.5,}$ and PM_{10} (264.84, 541.89, and 689.18 $\mu g/m^3$ respectively) during the winter days while the concentration was low during summer recorded as 15.88, 25.23, and 29.10 $\mu g/m^3$ for $PM_{1.0}$, $PM_{2.5,}$ and PM_{10} respectively. There were

several localized reasons for these peaks during the winter season such as haze and smog, agricultural fires aerosol migration from Indian Punjab, low temperatures causing the slow movement of air particles, and slow wind speed. Whereas the spatial analysis indicated the maximum concentration of particulate matter at places with high population density and high traffic flow such as Data Ganj Bakhsh Town ($PM_{1.0}$, $PM_{2.5}$, and PM_{10} as 239.53, 514.68 and 650.21 $\mu g/m^3$ respectively) while the least was recorded at Cantonment Town and Allama Iqbal Town as 27.61, 41.53 and 49.42$\mu g/m^3$ for $PM_{1.0}$, $PM_{2.5,}$ and PM_{10} respectively. These results were strictly associated with localized factors such as high population density and high traffic flow in these areas. These values surpassed the WHO rules for the 24-hour maximum concentration of PM allowed.

FEWFM-111

CHARACTERIZATION OF HEAVY METALS CONTAMINATION IN WATER AND FISH COLLECTED FROM DIFFERENT SITES OF PAT FEEDER CANAL, JAFARABAD, PAKISTAN

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The aim of the study is to determine the accumulation of heavy metals in water and *Wallago attu* (edible fish) collected from Pat Feeder canal Jafarabad, Pakistan. Heavy metal concentration was determined by atomic absorption spectrophotometer. The pathogenic bacteria *Klebsiella pneumoniae* was isolated from gills and intestine of fish and water samples and determined for heavy metal tolerance and assessed for resistant genes against heavy metals by PCR. Results showed accumulation of Cd, Zn, Cr, Fe, Cu, Ni, Pb and Co in fish samples. Several fold elevated level of Cd, Zn, Fe, Cr, Cu, Pb with mild increase in Ni was measured in water samples, however, normal concentration was measured for Mn and Co in water samples. Elevated accumulation pattern of heavy metals was measured in intestine followed by gills and muscles. Metal tolerance in *K. pneumoniae* was realized against heavy metals of concentration ranging from 15.6 to 1000 µg/ml. Remarkably, the heavy metal resistant genes *czcA*, *ncc,* and *copA* were determined from the bacterial isolates in fish and water. Overall data showed 38.4% bacterial isolates were positive for *czcA,* 33.33% for *ncc* and 28.2% were positive for *copA* in fish samples. In water 27.27% bacterial isolates were positive for *czcA*, 36.36% for *ncc* and 18.18% for *copA*. The accumulation of heavy metals concentration was realized in fish (Gills and muscles) and water samples. Heavy metal resistance was measured in *K. pneumoniae* and the genes encoding cobalt, zinc, cadmium, nickel, and chromium were determined. An increase accumulation of heavy metals developed metal resistance, and showed association between heavy metal pollutants and occurrence of heavy metal resistance genes.

FEWFM-112

CLIMATE CHANGE AND MANGROVES: A POTENTIAL SOURCE OF CARBON SEQUESTRATION IN THE INDUS DELTAIC REGION

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The Port Qasim Authority (PQA) has administrative control over 4,900 ha of land above the high water line and 64,000 ha of mangrove forests, mud flats and creeks. Mangroves are among the most carbon rich forests in the tropical coastal regions. Mangroves have a great potential to sequester and store carbon. Mangrove forests ecosystem provide products and services, mangroves facilitate to mitigate and reduce greenhouse gas concentrations by absorbing carbon from the atmosphere through the process of photosynthesis. Degradation of mangrove would destabilize the economic potential and the livelihood of coastal communities which include services and benefits offered by the mangrove ecosystem of the Indus deltaic region. Loss of Mangroves in the PQA Indus Delta may threaten the survival of the natural resources and there by the livelihood of local communities. Above ground level of CO_2 sequestration by mangroves were calculated as carbon biomass. The results show that 1.0 cm diameter of mangroves tree leads to increase of approximately 0.84 kg carbon biomass and 1.0 meter mangroves height leads to increase 6.9 kg carbon biomass within the PQA study area of Indus delta. On an average the carbon biomass content of mangrove trees in PQA was estimated to be 33.79 tons/ha. The tree heights of the dominant mangrove species *Avicenna marina* in PQA at seven randomly selected locations ranged from small sapling to over 6 m. in heights. The mangroves density ranged from 4-9/10m^2. ANOVA results indicate significant difference ($p<0.05$), between mangrove (*Avicenna marina*) tree heights observed at seven locations in PQA. There is a positive correlation between mangrove tree heights and Carbon dioxide sequestered ($R^2 = 0.903$) and tree diameter ($R^2 = 0.848$) in well-established *Avicenna marina* trees. Clearing of mangroves from PQA can rapidly result in significant reduction of carbon stores.

FEWFM-113

ARSENIC CONTAMINATION AND ITS HEALTH RISK ASSESSMENT IN DRINKING WATER OF RURAL AREAS OF KASUR DISTRICT

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Arsenic is a toxic and carcinogenic element. It has attracted a lot of interest recently due to its extreme toxicity to people and high concentration in groundwater. Concerns concerning potential as contamination of Pakistan's groundwater systems have also been raised recently in the media and in academic studies. Data on arsenic levels in groundwater in different communities and parts of the nation are still lacking, though. The As concentration in groundwater used for drinking in six rural regions of Kasur Punjab, Pakistan, is the subject of the current study. A total of 35 samples were gathered, and they were each examined for their As content as well as for physical and chemical characteristics like electrical conductivity, pH, total soluble solids, chloride, carbonates, and bicarbonates as well as for elements like sodium, potassium, nitrate, calcium, and sulfates. The results indicated a number of characteristics in the groundwater samples that

made them inappropriate for consumption, most notably the worrisome concentrations of As up to 2045.5 lg/L in the samples, which categories them as absolutely unfit for drinking. It was discovered that the arsenic concentration in groundwater samples from villages in the Kasur district was 40% higher than the WHO's lower tolerable standard (10 lg/L). Based on the results, it is suggested that specific ground water monitoring and management be carried out, particularly in the locations mentioned, in order to address any potential health issues related to drinking water that has been contaminated. Proper cleanup and removal of As from groundwater is required to present the high danger to the health of the residents of the region under study in order to prevent As exposure and related risk exposure to the local community.

FEWFM-114

TO STUDY THE QUANTITY AND COMPOSITION OF SEASHORE DEBRIS ALONG SANDSPIT BEACH, KARACHI

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Seashore debris in large quantity and composition were investigated along Sandspit Beach of Karachi, Pakistan. The surveys were conducted in April-August 2022 to estimate the number of more than 10 programmed types of trash along the beach of Karachi. The 3-month average amount of the garbage collected from the selected quadrate of Sandspit Beach was approximately near 500 counts in number. The amount of beach garbage was estimated was more than 10 items. In terms of number, plastic was the most plentiful garbage along the beach which was followed by paper and food while, in terms of weight, processed wood was the most abundant garbage on the beach, which was followed by metal and plastic items were considerably high than any other type of garbage on the seashore during all 3 months. The fixed types of garbage were also characterized on the basis of their sizes. Rubber, metal, paper, glass, plastic, clothes, fishing net and rubber items were mainly smaller in size while process clothes and wood items were larger in size. The main sources of garbage were from cafes and restaurants, which served beverages, food and mild stimulates in plastic, and aluminum foil to the seashore visitors. Furthermore, the major parts of floating garbage from Sandspit were ultimately deposited along the shoreline of beach.

SECTION – V I

POSTER SESSION

POSTER-1

DIVERSITY OF TWO MOTH FAMILIES (SPHINGIDAE, GEOMETRIDAE), FROM LOWER SINDH PAKISTAN

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Moths are primarily nocturnal, phytophagous, pests of agriculture, night pollinators, and potential bioindicators. The current study is the first to provide information on the diversity, richness, abundance of moth species, in central Sindh, Pakistan. Moths were collected by variety of techniques light traps alight sheets and insect net. Simpson's Diversity Index (D0), Shannon Diversity Index (H0), calculated for specie richness, evenness and abundance of moth fauna. Total 517 specimens were collected in 8 months. The collected specimens represented 10 species, *Scopula pulchella, Scopula minorata*, *Isturgia disputaria, Isturgia pulinda, Microloxia herbaria, Psilogramma increate, Hyles livornica, Hipposon scrofa, Acheronta styx,* and *Dephnis neri* 8 genera, 6 subfamilies and 02 families. Five genera of family Sphingidae and three genera of family Geometridae were found. Family Geometridae found most prevalent, with (305) specimens followed by Sphingidae with low abundance (212) specimens.

POSTER-2

COMPATIBLE AND NON-COMPATIBLE INTERACTION OF RICE GERMPLASMS AGAINST RICE LEAF FOLDER *CNAPHALOCROCIS MEDINALIS* (GUENEE) (LEPIDOPTERA: PYRALIDAE)

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The Rice Leaf Folder, *Cnaphalocrocis medinalis* Gueee (Lepidoptera: Pyralidae), is major leaf feeding pest of rice, *Oryza sativa* L. (Poaceae), and is widely distributed throughout the rice producing countries in Asian, causing considerable yield losses. Cultivation of susceptible rice varieties is among the major reasons of insect pest outbreak. Contrary, growing resistant rice varieties plays a key role in keeping the insect pest population below economic threshold level. Growing resistant varieties is considered as safe and cost-effective method for the control of Rice Leaf Folder. Keeping in view the importance of the pest and economic value of the crop this experiment is designed to screen thirty-five genotypes for resistance against Rice Leaf Folder. These genotypes were evaluated for resistance against rice leaf folder in Green house in the Department of Plant Breeding and Genetics, Agriculture University Peshawar, by following the method of Heinrichs et al. (1985). In our findings the screened genotypes falls in to different categories as 16 genotypes are highly susceptible, 6 are susceptible, 5 are moderately susceptible, 5 are moderately resistant, and only 3 tested genotypes proved resistance against the *Cnaphalocrocis medinalis* while none of the screened genotype falls in the category of highly resistance against Rice Leaf Folder. These resistant genotypes can be used in future IPM program for the management of Rice Leaf Folder. Furthermore, these resistant germplasms can be used in breeding programs for the development of high yielding resistant varieties against Rice Leaf Folder.

POSTER-3

EXPRESSIONAL ANALYSIS OF MIR-146B AND 181B IN PAPILLARY THYROID CARCINOMA

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Papillary thyroid carcinoma (PTC) is the most frequent subtype of thyroid cancer and it contributes to more than 80% of all thyroid malignancies. PTC diagnosis rates in women are reported to range from 50% to 90%, depending on the geography and healthcare environment. MicroRNAs (miRNAs) are endogenous non-coding RNAs that operate as post-transcriptional regulators of gene expression. MiRNAs are utilized to identify different types of cancer and are regarded as a new biomarker for cancer diagnosis, prognosis analysis, and the development of biochemically targeted drugs. Deregulation of various miRNA expression promotes thyroid tumor initiation, growth, and cell death and have been shown to have a strong correlation with the development and progression of PTC. Due to improvements in detection methods, it becomes necessary to balance treatment methods such that individuals with a reduced risk of thyroid cancer should not be overtreated. It is important to identify patients who have progressed disease or are at high risk and need a more aggressive treatment strategy. It is critical to find novel biomarkers that may more correctly detect thyroid cancer and measure disease progression before surgery to avoid overtreatment of nonfatal thyroid tumors. Present study was designated to evaluate the miRNA expression in PTC, multinodular goiter (MNGs), and healthy tissue samples using RT PCR. Mir-146b and mir-181b were selected for this purpose. A total of 130 tissue samples were collected from patients having problems with the thyroid and neck from the Pakistan Institute of Medical Sciences (PIMS) and Holy Family Hospital (HFH) Rawalpindi. Sixty-five patients were confirmed with thyroid cancer and forty patients were diagnosed as MNGs. While remaining twenty-five patients who were having other neck and thyroid diseases were excluded from the study. Clinical and demographical data such as age, gender, stage of cancer, hormonal levels, metastasis, and type of thyroid cancer were recorded on a structured questionnaire. RNA was extracted by TRIzol reagent method. Extracted RNA was analyzed on 1% TAE gel and quantified with the help of a UV spectrophotometer. cDNA was synthesized by Revert Aid First-Strand cDNA Synthesis kit (Thermo Scientific). Amplification was performed with specific primers of studied miRNAs and housekeeping genes by RT-PCR. SPSS 16.0 software was used for the statistical analysis of data. Student T-test and fold expression method were used to assess the expression of miRNA-146b and miRNA-181b in PTC, MNGs, and normal control tissue samples. The expression of miRNA-146b and 181 was significantly high in PTC as compared to MNG tissue samples and normal controls. Expression of mir-146b was noted as a 5-20-fold increase and expression of mir-181b varied from 4-60-fold in PTC samples. Studied miRNA was found to be highly overexpressed in thyroid cancer tissue samples which reveals the important role of these miRNAs in the development and progression of thyroid cancer in the studied population. Moreover, it can be predicted that these miRNAs are playing a crucial role as a risk factor for thyroid carcinogenesis. Based on the present findings, it can be suggested that overexpressed levels of these miRNAs can be used as a biomarker of thyroid cancer diagnosis in the studied population.

POSTER-4

HAEMATOLOGY AND PROXIMATE COMPOSITION OF WILD AND CULTURED BROWN TROUT

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Brown trout is a cold-water fish introduced in water bodies of northern areas from Europe. Due to its high-quality protein, fats, vitamins and minerals brown trout has excellent nutritional value. Fish plays a vital role in monitoring water

quality by functioning as bio-indicator species because it responds to aquatic environment with great sensitivity. Present study was designed in order to establish baseline data regarding the haematological profiles and meat quality of Brown Trout. A total of 40 fish individuals were harvested: 20 from Satpara Lake Skardu as wild and 20 individuals from nearby fish farm as farmed fish. The blood and meat samples were obtained to compare haematology and body composition of each group. Neubauer hemocytometer measurements were made for WBCs, RBCs, and platelets, The hemoglobin was analyzed by using cyanmethmoglobin technique which involves the usage of Drabkin's reagent. Packed cell volume was counted or calculated by using capillary tube micro hematocrit method. Crude proteins and crude fats were measured by using the Kjeldahl and Soxhlet technique, respectively. Hematological parameters included WBCs, RBCs, Hb, Platelets, Hct, MCV, MCHC, and MCH whereas body composition was determined by percentage of Moisture (M), Crude Proteins (CP), Crude Fat (CF), and Ash (A) in meat. Significant higher values of blood parameters and body composition were observed in wild trout (WBCs; 2.56/µl, RBCs; 2.0/µl, Hb; 5.87g/dl, Platelets; 6.35/ml, Hct; 2.52%, MCV; 15.95pg, MCHC; 372.73g/dl, MCH; 46.36fl, CP; 63.97%, and A; 6.03%) as compared to cultured fish (WBCs; 1.55/µl, RBCs; 1.0/µl, Hb; 4.65g/dl, Platelets; 4.74/ml, Hct; 1.26%, MCV; 12.59pg, MCHC; 235.30g/dl, MCH; 29.34fl, CP; 55.65%, and A; 5.19%) except moisture and crude fat percentage that were found significantly higher in cultured trout (M; 76.59%, CF; 20.6%) as compared to wild (M; 72.27%, CF; 17.99%). Overall results of haematology and body composition in present study indicated better health condition of wild Brown Trout compared to cultured species.

POSTER-5

FIRST REPORT OF A NEMATODE GENUS *ANCYRACANTHOPSIS* DIESING, 1861 WITH A NEW SPECIES PARASITIZING THE RED-WATTLED LAPWING IN SINDH, PAKISTAN.

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For the study of helminthic fauna of aquatic birds, the helminths of red-wattled lapwing, *Vanellus indicus* (Boddaert, 1783) (Charadriiformes: Charadriidae) were investigated in Sindh, Pakistan. For this purpose, birds were captured from different localities of Sindh during November 2021 to March 2022. Total 15 birds were dissected for their helminthes parasitic examination, in which four birds were found infected with 38 specimens of nematodes of the genus *Ancyracanthopsis* Diesing, 1861; infecting severely the gizzard and esophagus of the infected hosts. The nematodes were recovered alive from hosts, provided with warm ethanol (70%) to withstand in straight position, and preserved in the same. For identification, the temporary mount in glycerin was prepared. The specimens were compared with all species of the genus, reported in the world through literature, and with the taxonomic features, it was identified as a new species, *A. vanelluae* sp.n., with the new host associations.

POSTER-6

PREVALENCE OF SUCKING LOUSE, *HAEMATOPINUS TUBERCULATUS* (PHTHIRAPTERA: ANOPLURA) ON BUFFALO IN DIFFERENT CATTLE YARD TYPES AT HYDERABAD DISTRICT, SINDH, PAKISTAN.

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The present study was carried out to understand the effects of different types of cattle yards existed in district Hyderabad, Sindh, on the population dynamics of sucking louse, *Haematopinus tuberculatus* on Buffalos. During the

study, lice were collected from 5 to 6 buffaloes of all ages and few lice samples were collected and preserved in 80% ethanol to identify them. The specimens and the data were collected from four localities, the Hyderabad city, Hyderabad rural, Qasimabad and Latifabad, during July 2021 to January 2022 at fortnightly interval basis from two types of yards, the Cemented yards and the muddy yards. The overall mean intensity of lice on all animals was also calculated that was 88.2±8.45 for Hyderabad city, 90.5±6.30 for Hyderabad rural, 92±6.18 for Qasimabad and 96±10.5 for Latifabad. The lice frequency was calculated in buffaloes Yard Type-wise, where maximum frequency was found higher (68.88%) in muddy yards as compared to Cemented yards (31.11%). The burden of lice was also checked in individual host on head region (34.67±1.7 and 57.36±2.18), on belly region (20.92±1.25 and 36.97±1.97) and on hind region (10.49±0.77 and 17.21±0.92) in Cemented and Muddy types of yards respectively. This is the first study of its kind in Pakistan. The findings of the present study will help the yard keepers in improving the yards types and hygienic conditions to eradicate the lice on buffaloes.

POSTER-7

STUDIES ON PHTHIRAPTERAN ECTOPARASITES INFESTING QUAILS OF GENUS *COTURNIX* (GALLIFORMES: PHASIANIDAE: PERDICINAE) FROM SINDH, PAKISTAN

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Chewing lice are the wingless, more or less active insects, and have been categorized in the order Psocodea, under the suborder Phthiraptera. They also play an important role in transmitting the various fungal, bacterial and viral pathogens to humans and other animals. During the present study, an economically important game bird, quail (*Batair*) was collected from wild areas of Sindh region, to explore the chewing lice fauna of quails. Three species of quails were examined, including Common Quail, *Coturnix coturnix,* Japanese quail, *C. japonicas* and Rain Quail, *C. coramandelica.* These birds were found infested with 7 species of chewing lice, including *Menopon abdominalis, Menacanthus pallidulus, Cuclotogaster heterographus, C. cinereus, Goniocotes gallinae* and *Goniodes astrocephalus;* all with new locality records and one new species, *Colpocephalum barbus* sp.n. was also proposed.

POSTER-8

FAUNA OF CHEWING LICE (PSOCODEA: PHTHIRAPTERA) AND THEIR SPATIAL DISTRIBUTION ON BIRDS OF THE FAMILY ANATIDAE (ANSERIFORMES) IN SINDH, PAKISTAN

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The present study is based on the fauna and the distribution of chewing lice on various body parts of different species of ducks and geese (order Anseriformes) from the Sindh province of Pakistan. The present study was carried out between July 2019 and June 2021. A total of 162 ducks and geese were examined including *Anas acuta* (Linnaeus), *Anas crecca* (Linnaeus), *Anas platyrhynchos* (Linnaeus), *Anas penelope* (Linnaeus), *Aythya ferina* (Linnaeus), *Aythya fuligula* (Linnaeus), *Aythya nyroca* (Guldenstadt), *Anser anser* (Linnaeus), *Anser albifrons* (Scopoli), *Anser indicus* (Linnaeus), *Marmaronetta angustirostris* (Reichenbach), *Spatula clypeata* Linnaeus) and *Spatula querquedula* (Linnaeus), out of which 97 birds were found infested with chewing lice. Among the chewing lice, a total of 972 specimens were collected with eight species belonging to family Menoponidae i-e. *Holomenopon fatemae* Naz and Rizvi, 2012, *H. leucoxanthum*

(Burmiester, 1838), *Trinoton anserinum* (Fabricius, 1805) and *T. querqudulae* (Linnaeus, 1758); and family Philopteridae i.e. *Anaticola crassicornis* (Scopoli, 1763), *A. mergiserrati* (de Geer, 1778), *Anatoecus dentatus* (Scopoli, 1763) and *A. icterodes* (Nitzsch, 1818).The spatial distribution of chewing lice species was also studied, with higher number of *Anaticola crassicornis* (290) in wings and tail counter feathers, whereas higher number of *Holomenopon leucoxanthum* (90) in flank in down feathers however, *Anatoecus dentatus* is higher in head and neck region (88). Among the gender ratio, female lice were found higher in abundance than the male lice, whereas age wise, adults were found higher than nymphs. This study was carried out for the first time from Sindh, Pakistan.

POSTER-9

NEW RECORDS OF PARASITIC MITES (ACARI: ACARIFORMES) AND THEIR ASSOCIATION WITH BIRDS

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During the current study of parasitic feather mites from Sindh region, the host bird species of family Columbidae were collected. A total of 4500 specimens of parasitic feather mites were collected from four species of pigeons and doves in various districts of Sindh. These mites comprising of *Felculifer rostratus* recovered from *Treron phoenicopterus, Columba livia, Streptopelia decaocta* and *S. senegalensis; Hyperaspidacarus tridentatus* from *Columba livia; Hypodectes propus* from *Streptopelia senegalensis.* Furthermore, there has not been a significant work done on the feather mites in Sindh, Pakistan, hence all the reports of mites from pigeons and doves were found new to science for their host associations as well as a new locality record in the fauna of mites.

POSTER-10

TREMATODES INFECTING GASTROINTESTINAL TRACT OF WATERFOWLS (ANSERIFORMES) IN SINDH, PAKISTAN

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Interaction between parasites and hosts is common in nature. In this study, we assess the trematodes diversity in the gastrointestinal (GI) tracts of waterfowl species. During present work of endoparasitic studies, total of 25 birds were collected from different districts including Sanghar, Larkana, Jamshoro and Badin between September 2021 and January 2022. Out of 25 birds of three species *Spatula clypeata* (L.)*, Anas crecca* (L.) and *Anas acuta* (L.), 18 individuals were found infected with trematodes with 72% of prevalence. Total 46 specimens of trematodes were recovered including *Paramonostomum aythyae* Thebo, 2019, *Echinoparyphium recurvatum* (Linstow, 1873), *Psilochasmus acutae* sp.n, and *Paramonostomum creccae* sp.n. The host species-wise prevalence of birds was calculated 87.5% in *Anas acuta*, 75% in *Spatula clypeata* and 55.5% in *Anas crecca*. Parasitic mean intensity was also calculated specie wise, was 2.75±0.41 in *Echinoparyphium recurvatum,* 2.66±0.30 in *Paramonostomum Aythya e,* 2.4±0.35 in *Paramonostomum creccae* sp.n. and 2.33±0.71 in *Psilochasmus fuligulae* sp.n. was recorded in the present study.

POSTER-11

DECIPHERING THE EFFECT OF LOCALLY CIRCULATING SARS_COV-2 VARIANT ON THE HEMATOLOGICAL PROFILE OF A COVID-19 INFECTED PATIENTS

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The Coronavirus Disease 2019 (COVID-19) is a global pandemic, which is caused by "Severe Acute Respiratory Syndrome coronavirus (SARS-COV-2). Previously the effect of COVID-19 on different systemic organs has been determined. However, in this study we determined the effect of COVID-19 on hematological profile. A pre-designed questionnaire which was consist of hematological profile such as WBC, Hb, RBC, platelets and indices were analysed in this study. Blood sample were taken after COVID-19 confirmed positive cases by RT-PCR. The samples were proceeded on hematology analyzer at the hematology section of DHQ Hospital Turbat. Significant difference was realized in the blood physiology of COVID-19 positive patients. Variations were realized in the total leucocytes count, lymphocyte, neutrophils, haemoglobin and erythrocytes in older age >50years. Results showed an increased $12x10^9$/l white blood cells and decrease count of lymphocyte 18%. However, in contrast increased PMN leucocytes count 77.69% was realized. It was further noted that the value of erythrocytes ($3.48\ x10^{12}$/l) and hemoglobin 8.0 g/dl was significantly decreased, which ultimately lead to affect hematocrit (HCT) and MCV by decreasing up to 25.73% and 77.3fl, respectively. Whereas no significant effect was observed on MCH and MCHC. Depletion ($128x10^9$/l) in platelets count was also observed specifically in older age. Impairment in hematological parameter such as leucocytes, neutrophil, erythrocytes, hemoglobin, and platelets were observed in patients with SARS-CoV-2 infection specifically in the older age (>50years). These parameters function as indicators in the prognosis and severity of COVID-19 disease.

POSTER-12

DETERMINATION OF LARVICIDAL ACTIVITY OF DIFFERENT PLANT OILS

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Controlling mosquitoes at larval stage is an effective method to control mosquitoes which are major source of transmission of life-threatening diseases. Synthetic larvicides are easily available and perform action in a short time and prevent spread of diseases effectively but they are non-biodegradable and toxic to both the animal species and humans. Also, their excessive use can develop resistance among mosquito species. In the last three decades, controlling mosquitoes by using compounds of plant region has gained interest as they can control the growth of mosquito at their larval stage but are less harmful to human beings and environment. In this study, the larvicidal activity of different plant oils was tested against larvae of Aedes aegypti. The larvicidal activity of plant oils (Nigella sativa, Brassica nigra, Coriandrum sativum, Raphanus sativus and Sesamum indicum) was conducted according to WHO guidelines. N. sativa oil showed maximum mortality rate of 100% at 600ppm after 24h incubation and B. nigra oil showed maximum mortality rate of 90% at 1000ppm after 48 h incubation period. The LC50 for N. sativa were 365.6ppm and 283.9ppm after 24 and 48 hours respectively. The LC50 for B. nigra oil were 618.2ppm and 538.1ppm after 24 and 48 hours of exposure of Ae. aegypti larvae to the oil. Other oils did not show noticeable larvicidal activity at tested concentrations. There is need to explore more plant oils and their active compounds to evaluate their larvicidal potential as they are cheap, effective, and biodegradable as compared to their synthetic counter parts.

POSTER-13

DIVERSITY OF JUNGLE FOWL CHICKENS (GENUS *GALLUS*) OF DISTRICT MATIARI DISTRICTS, SINDH PAKISTAN

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Chicken production is valuable economically through meat, eggs, manure, source of income and contribute to ecosystem. Chickens are omnivorous by nature and enjoy chasing down Plant-destroying insects like grasshoppers, grubs, beetles, and larvae, ridding an area of potential pests in a very short time. Many organic farmers rely on their chickens as a natural insecticide for their flower and vegetable gardens. Considering the economic importance of chickens, District Matiari was explored from January to August, 2022. Surveys were carried out in different study sites: Bhanoth, Bhit shah Karam Khan Nizamani, Gaib peer, (Taluka Hala); Odero Lal Village, .Sekhat, .Pano,.Saeedpur,.Tajpur (Taluka Matiari); Fateh pur,. Jamail, Zairpur, Rahoo, .Suhrabpur, (Taluka Saeedabad) of districts Matiari for the determination of diverse domestic chickens under genus Gallus. Altogether five breeds of Gallus gallus include Black Aseel, Beard kulang Aseel. Sindhi Aseel, Lakha Aseel and Bihangam Aseel were identified and located randomly from 14 study sites of Matiari districts. Morphology of all breeds exhibited no major variation, while the Distribution of Black Aseel and Kulang chickens was recorded as most abundant as well as highly distributed, whereas Bihangam chicken was rarely found only in a few sites of Taluka Saeedabad. All Aseel breeds are used as a source of food for their eggs and meat as well as for cockfighting in Matiari district.

POSTER-14

SURVEYED *RHYZOPERTHA DOMINICA* (COLEOPTERA: BOSTRICHIDAE) BY THE USAGE OF STICKY GLUE TRAPS IN WAREHOUSED WHEAT OF DISTRICT DADU, SINDH, PAKISTAN

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Inquests for monitoring the lesser grain borer using sticky glue traps were carried out in various areas of the taluks K.N Shah and Mehar of the district Dadu. Between the months of April and July of 2021. The observations were made at various grain storage sites using sticky glue traps, which are also used as attractants and contain a blend of extracted wheat, oat, and cold-pressed pumpkin seed oils. During June 2021, the greatest number of *Rhyzopertha dominica* were drawn to traps in Government Warehouses, followed by Private Godowns and Grain Stocking Shops. Whereas, the lowest number of the same species was recorded from Home Silos of Bali Shah at the third interval of 10 days during April 2021. It would be useful to recognise the effectiveness of stored grain pests of wheat under various storage conditions, as well as the efficacy of sticked glue traps in tempting stored pests of wheat, in order to design an effective pest management plan against stored pests of wheat.

POSTER-15

EPIDEMIOLOGY, SOCIODEMOGRAPHIC STATUS AND ASSOCIATED RISK FACTORS OF CORONA VIRUS DISEASE (COVID-19) IN KECH DISTRICT, BALOCHISTAN

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Coronavirus disease-19 (COVID-19) brought a major outbreak worldwide including Pakistan and was declared pandemic in march 2020 by world health organization. The aim of this study was to determine the epidemiological status and associated risk factors in COVID-19 patients in district Kech, Balochistan. A pre-structure questionnaire was designed containing sociodemographic data, risk factors, clinical presentation and comorbidities. Total of 573 COVID-19 suspects were screened from different areas of Dasht, Tijaban, Sharak and Ginnah of district Kech. There was no gender or age limitation. The nasopharyngeal samples were collected after obtaining consents. The samples were proceeded at virology lab of DHQ Hospital Turbat. Data showed 238 (41.5%) patients from Ginnah, 83(14.5%) from Tijaban, Sharak 36 (6.3%) and 216 (37.7%) from Dasht. Among total suspects, 64 were COVID-19 positive. Remarkably, the higher percentage 34(53.1%) of infected patients were from Ginnah, followed by Dasht 15 (23.4%), and Tijaban 12 (18.8%) and the lowest positivity rate was observed in Sharak 3 (4.7%). Among positive patients 38 (59.4%) were female, and 26 (40.6%) were males. The highest 37(57.8%) infected patients were from age group 15-35years followed by 27(42.2%) individuals infected with COVID-19 disease from age group 36-80Years. 44(68.8%) were married and the unmarried percentage was 19 (29.7%). Data showed majority 61(95.3%) of the suspects were screen for the first time for the disease and there were only 3(4.7%) positive patients were in contact with positive patients. 43(67.2%) of patients were non-educated, and the education ratio was calculated as 21(32.8%). Regarding employment status 53(82.8%) were unemployed, 1(1.6%) were on daily wages, and 10(15.6%) were self-employed. On average patients belong to the low socioeconomic status. The vaccination against corona virus was 30(56.9%) and 34(53.1%) were non-vaccinated, and among vaccinated individuals 3(4.7%) were vaccinated for single dose. The risk factors involve in spreading the COVID-19 infection were include lack of social distancing, living in close contact settings, improper ventilation, visit to crowded places, trend of not using face masks. Other factors include frequent hand shaking and not washing hands after shaking or touching with contaminated person or objects. There was lack of concept of quarantine after getting infection with COVID-19. High prevalence of COVID-19 was observed in the age group 15-35 year. Female were more affected than men and low literacy rate and unemployment status were realized among the COVID-19 positive patients. Socioeconomic status was low. Risk factors such as lack of social distancing, close contact setting, not using face mask while coughing and sneezing were the risk factors involve in causing or spreading the COVID-19 infection from person to person.

POSTER-16

CLINICAL MANIFESTATION, COMORBIDITIES AND PSYCHOLOGICAL TRAUMA IN CORONA VIRUS DISEASE (COVID-19) PATIENTS

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COVID-19 is a respiratory disease in human and other mammals caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The aim of this study was to determine the clinical presentation, associated disease and

psychological trauma in COVID-19 infected patients in district Kech, Balochistan. Data was collected on a pre-structured proforma containing patient clinical presentation, comorbidities and psychological trauma. There was no gender or age limitation and the study population consists of participants voluntarily took part in study. Data analysis showed that 57(89.1%) patients had fever and a temperature between 37.5oC to 38oC. Furthermore, out of total 64 positive patients, 43(67.2%) had cough. The chest distress with chest pain were present in 31(48.4%) and 28(43.8%), respectively. Patients with shortness of breath were 18(46%). Nausea, vomiting was reported in 33(51.6%) and 30(46.9%), respectively. Muscle pain, sore throat including body ach was realized in 36(56.2%), 18(28.1%), 36 (56.2%), respectively. Patients with clinical symptoms of fatigue were 50(78.1%) and the runny nose was observed in 16(25%). Patients with history of smoking were about 10%. Loss of smell 11 (17.2%) and taste 15 (23.4%) was noticed only in few cases. Results further showed 12 (18.75%) COVID-19 positive patients had associated disease. Patients with history of diabetes were 2(3.1%), Cardiovascular disease were 1 (1.6%), Asthma 5 (7.8%), Obesity 7(10.9%), chronic lung diseases 1(1.6%). 01(1.5%) patients had Diabetes, cardiac disease, obesity and chronic lung disease. 01(1.56%) patients had asthma with obesity. While there is no immunosuppressed, cancer and renal infected patients were found. The psychological trauma such as stress, anxiety and depression was found in 25 (39.1%) of COVID positive patients. The psychological trauma was 13 (20.31%) in male, and female 12 (18.75%). Clinical presentation of fever, cough, fatigue, body pain including chest distress and chest pain were more prominent in COVID-19 positive patients. COVID associated diseases such as Asthama, obesity, diabetes and CVD were realized. Multiple disease. Data also showed that COVID infected patients had associated disease. Psychological trauma was realized in both male and female.

POSTER-17

FIELD EVALUATION OF PLANT EXTRACTS AGAINST LEAF HOPPER *(AMRASCA SPP.)* AT OKRA CROP IN LAHORE DIVISION

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Okra is one of the popular vegetables in Pakistan. A lot of insect pests affect the yield of okra but the jassid is one of the dangerous pests among all. Jassid has ability to reduce yield up to high level and cause a significant economic loss. The experiment was conducted at Faculty of Agricultural Sciences, University of the Punjab Lahore. The aim of study was to evaluate properties six various plants extracts viz garlic, neem, tobacco, Dhatura leaf, red chilli and leaves of Aak plant. The experiment was laid out with the Randomized Complete Block Design (RCBD) having three replications of each treatment. The results were analyzed on the basis of data noted after 24 hrs, 48 hrs, 72hrs and 168 hrs, after treatment application. The effect of neem Extracts showed the significant results and lowest population of jassid were recorded after the 168 hours, same as other biopesticde also showed good results. According to the results, highest populations were found at the garlic treatment which showed the less effect as compared to others. The aim of this study is another step to make stronger the concept that bio-pesticides can be effective and eco-friendly management tool and can be an alternative to conventional pesticides. Recorded data was analyzed using statistics 8.1 Software.

POSTER-18

CLONING AND MEDICINAL USE OF RECOMBINANT STEM BROMELAIN

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Despite the considerable advancements in modern medicine, particularly for treatment of various inflammatory diseases, there are substantial issues with the selectivity of the molecules utilized as therapeutic agent. The primary issue is toxicity of the novel medications to healthy cells. Therefore, one of the core aims of current pharmacology is the quest for novel physiologically active substances that can exert a variety of effects with little toxicity. There has been a noticeable interest for employing natural chemicals derived from plants as medicines. The medicinal properties of pineapple plant are due to the presence of bromelain, which can be extracted from all parts of the plant. The goal of the current study was to express soluble and active form of recombinant stem bromelain from 'kona sugarloaf a type of smooth cayenne' pineapple variety by utilizing *E coli* expression system. Our present work put great emphasis on utilization of recombinant bromelain to exploit its anti-inflammatory properties in carrageenan induced mice edema models. Our findings demonstrate that after treating with 500 mg/kg rBRM (effective dose), edema or swelling was reduced to considerable level as compared to control. Effective dose shows 94.8% inhibition in developing edema which is comparable to indomethacin effects (96.7 %). It was also observed that inflammatory biomarkers PGE2 and CRP level rises during edema in mice models. rBRM suppresses the level of inflammatory biomarkers to a considerable extent. This study will assist the rational design of future clinical testing of this promising phyto-therapeutic drug by providing an insight to standardize the dosage of recombinant bromelain.

POSTER-19

NEW RECORD OF *ASPICULURIS ACKERTI* KRUIDENIER *ET* MEHRA, 1959 (NEMATODA: OXYURIDAE) FROM THE *RATTUS NORVEGICUS* OF PAKISTAN

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In continuation of the ongoing NRPU research project No. 9412 funded by HEC, Islamabad on the Helminth parasite of Rat and Mice, a nematode belonging to genus *Aspiculuris* (author & year) was reported from the intestine of the *Rattus norvegicus*. Present specimens can be differentiated from other species of the genus in having cylindrical and long body, mouth opening simple with three lips, esophagus long and club shaped also with bulbous esophagus blub, presence of nerve ring, lateral epaulette present on both sides, lateral alae present at the end of anterior portion of esophagus, Vulva in mid portion of the body with protruded lips, eggs are ellipsoidal and tail long with pointed end. On the basis of these characteristics, present nematode is identified as *Aspiculuris ackerti* Kruidenier *et* Mehra, 1959 making it a new record from Sindh province. However, this genus is previously recorded from Lahore, Punjab province of Pakistan. Previously this species was reported from *Neotoma albigtda (White-throated wood rat) from* Arizona states of USA. *Rattus norvegicus* is new host record for *Aspiculuris ackerti* Kruidenier *et* Mehra, 1959 from Pakistan.

POSTER-20

MICROPLASTICS (MPS) ANALYSIS IN *PERNA VIRIDIS* (GREEN MUSSEL) FOUND IN MANORA CHANNEL KARACHI, PAKISTAN

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Microplastics (MPs) smashed micro-size partials <5 mm converted into debris at the bottom of the ocean and distributed into the water columns and available to numerous species i.e. plankton, crustacean, and mussels. MPs have a toxic effect on marine life, including reducing food intake, delaying growth, causing oxidative damage, and abnormal behavior. *P. viridis* sessile and filter-feeding traits accumulate disease, toxins. Fewer emphases on the *P. viridis* residing in the coastal waters of Pakistan, the current study highlights the excessive growth of *P. viridis* on the buoys in the Manora channel polluted by domestic and industrial discharge and oil by ship transportation. *P. viridis* as a potential to aqua culture species and bio-indicator of MPs. The presence of MPs in green mussels explains the environmental condition of the site and can be helpful to assess the levels of pollution. MPs analysis was determined in twenty replicates of *P. viridis*, and the results revealed that Microplastic was classified into three groups: pellet, fibers, and fragments. The obtained finding expected to contribute to the planning, management, and conservation practices of sustainable aquaculture.

POSTER-21

DISTRIBUTION AND DIVERSITY OF PARASITIC ISOPODS OF FINFISH FOUND IN SONMIANI BAY WATERS, BALUCHISTAN, PAKISTAN

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Isopods are Arthropods; with various shapes and sizes, is one of the most morphologically diverse group of crustaceans with more than 10,300 species. Some are burrowing forms while others are parasites, the current study is about the isopod species of Pakistan, as collected from the Sonmiani waters. The infected fish specimens were collected through gill net (September 2020-October 2021) belong to the Mugilidae and Clupeidae family. A total of 105 individuals of isopods were collected, belonging to 6 genera (*Agarna, Anilocra, Elthusa, Mothocya, Nerocila, Plotor*) and 1 family (Cymothoidae). *Nerocila* (with 78 individuals) was the most abundant genera found during the study period and *Nerocila kisra* was the most abundant species (comprising about 68 individuals). The second most abundant genus was *Anilocra* (comprising 17 individuals). The largest individual found was about 36.5 mm in length; belong to the genera *Anilocra*, whereas the smallest individual was of about 7.5 mm in length belong to the genera *Nerocila.*

POSTER-22

SHELL MORPHOMETRY OF BARNACLES AMPHIBALANUS SUBALBIDUS (HENRY 1973) COLLECTED FROM MANORA BEACH OF THE KARACHI

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Amphibalanus subalbidus (Henry, 1973) is found in the estuarine areas and common in intertidal fouling communities on a variety of intertidal substrata as adhered to hard surfaces, including rocks, pier pilings, ship hulls, molluscs shells, and aquatic plants as well. *A. subalbidus* is a small barnacle; whitish in colour with hyaline longitudinal lines, with a conical to nearly cylindrical shell that grows to approximately 12 mm height. During current study, *Amphibalanus subalbidus* species of barnacles collected from intertidal zone of Manora rocky shore during October to November 2021. The species were identified on the basis of shell structure and opercular plates. The orifice is slightly toothed, and its width is usually more than 1/2 its height. The epi-cuticle is thick, typically permanent, but it can also be simply superficial. Scutal growth lines are usually crenulate and have delicate longitudinal striae. The present study was designed to identify morphometric relationship of species. The following measurements of the shell were taken on each individual: the length of the basis along the carinorostral axis (LBA), the width of the basis (WBA), the length of the orifice along the carinorostral axis (LOR), the width of the orifice (WOR), the height of the carina (HTC), the height of the rostrum (HTR), the basal diameter of shell and the average thickness of the shell wall (TKC). These parameters have continued to be used as an estimate of size. The derived morphometric measurements revealed the significant differentiation and accurate measurements between species by using allometric and statistical data.

POSTER-23

POTENTIAL OF PROBIOTICS IN AQUACULTURE

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Probiotics are being applied widely with promising outcomes. They have been documented to improve growth and health of the host and to combat infectious diseases as well. Probiotics are considered as novel functional agents that have potential implications in influencing the gut microbiota of any aquatic organism. Researchers have already documented that probiotics play a wide spectrum function such as controlling diseases and stress, enhancing immunity, modulating gut microbiota, helping in nutrition and improving water quality. Regarding the water quality in intensive/ semi-intensive culturing systems probiotics can play vital role in alleviating growth inhibiting substances. In prevailing situations of water scarcity, environmental pollution and outbreaks of infectious diseases, target oriented search of specific probiotics will lead sustainable development in fish and aquaculture systems. Furthermore, the beneficial effects of probiotics contribute to increase feed value and growth of the animal and improve spawning and hatching rate in aquaculture systems.

POSTER-24

DEVELOPMENT OF ELISA FOR DETECTION OF ANTI-NDV ANTIBODIES IN CHICKENS

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Newcastle disease is a highly contagious disease of poultry that is caused by the Newcastle disease virus (NDV). The matrix (M) protein is the most abundant structural protein in NDV. Owing to its crucial role in the viral life cycle and highly conserved nature among NDV strains, the M protein can be employed as a promising diagnostic antigen for the reliable detection of NDV infection in chickens. In the present study, we have devised a strategy for extraction and solubilization of the NDV M protein from *Escherichia coli* in a single step using a non-ionic detergent, lauryl-dimethylamine oxide (LDAO), enabling the purification of the detergent-solubilized M protein in a soluble form through affinity chromatography without compromising the structural integrity of the protein. Using the purified M protein as a diagnostic antigen, an indirect enzyme-linked immunosorbent assay (ELISA) has been developed for the detection of anti-NDV antibodies in multiple serum samples collected from different poultry farms of district Faisalabad, Pakistan. The data presented here reveal that the recombinant detergent-solubilized M protein is an active promising diagnostic antigen and can be exploited in an indirect ELISA for rapid and reliable detection of anti-NDV antibodies in chickens. The developed ELISA can be scaled up for rapid and reliable detection of NDV infection in a large number of serum samples from chickens.

POSTER-25

INTESTINAL OBSTRUCTION BY *ASCARIS LUMBRICOIDES* IN A 12-YEAR-OLD BOY: A CASE REPORT IN PAKISTA

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Ascariasis is a severe parasitic disease widely prevalent in remote parts of Pakistan due to poor sanitation, and improper water supply system. The aim of this study is to describe an unusual clinical course of severe intestinal ascariasis in a boy of 12 years old in Khyber Pakhtunkhwa, Pakistan. Multi-disciplinary clinical and laboratory examinations, including physiological and immunodiagnostic techniques, socioeconomic status and imaging, have been performed during hospitalization. A case of severe intestinal ascariasis was diagnosed at an age of 12 years old. The patient felt headache, abdominal pain and vomiting. Pre operation diagnosis was included: erythrocytes below and leucocytes were above the normal range. Blood, pressure, temperature and serum amylase were normal. Three days after his admission to the hospital, 03 kilograms roundworms were evidenced from the small intestine in a surgical trauma of the patient. Based on their morphological characterization the parasites were identified as *Ascaris lumbricoides*. Ascariasis should always be taken into consideration in a differential diagnosis of irregular space occupying lesions located in the intestine, especially in patients who live in endemic areas and their epidemiological history indicates potential risk factors for the infection. In children appendicitis is more frequently recognized than in old age, and a clinical prognosis can be no less severe than in young patients. Early diagnosis of *A. lumbricoides* infection in human provides the choice of proper and optimal treatment for saving or significantly extending a patient's life.

POSTER-26

EPIDEMIOLOGICAL DETERMINANTS OF CUTANEOUS LEISHMANIASIS DURING THE COVID-19 PANDEMIC IN DISTRICT BAJAUR: A HOT SPOT IN PAKISTAN

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Cutaneous leishmaniasis is one of the neglected tropical diseases of zoonotic importance caused by *Leishmania tropica* infecting humans for millions of years throughout the world. In this study, epidemiological parameters for 3250 people in the area of Bajaur who were suspected of having cutaneous leishmaniasis were studied. Males were found to be more infected 53.1% as compared to 46.8% of the females ($P<0.05$). Highest rate of infection was observed 42.7% in the age group 5 to 14 years followed by 29.9% in the age group 15 to 49 years and 21.4% in the age group 1 to 4 years respectively. The infection was shown to be more prevalent in the head regions (66.3%), pectoral regions (17.4%), pelvic regions (10%), and multiple lesions in 5.1% of the infected population respectively. Because the disease of oriental sore caused by cutaneous leishmaniasis has become a major health concern in the district of Bajaur, it was necessary to provide current information to the region's health officials.

POSTER-27

ENVIRONMENTAL ENRICHMENTS PROMOTE AGILITY IN CAPTIVITY FOR ASIATIC BLACK BEARS (*URSUS THIBETANUS LANIGER*)

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Siatic black bears (Ursus thibetanus laniger) are natural inhabitants of deciduous forests. They live solitary in their natural habitat. Their captive behavior was studied by taking two Asiatic black bear pairs as study subjects in Lahore Zoo, Pakistan. The study was based on the provision of environmental enrichments to the bear pairs. Each pair's pre-enrichment activity budget data was collected by scan sampling method of 70 h, documenting the cage area and behavioural ethogram. The observed behaviours were resting, eating, drinking, locomotion, aggression, urination, defecation, fighting, pacing, playing, foaming, cage exploration, and being out of view. Two different enrichments were installed for two pairs. The first pair was provided with a feeding enrichment consisting of a large wood log applied with small wooden branches on it, upon which food-filled plastic tires were hung. The second enrichment was installed in the second bear pair's cage, consisting of two wooden platforms attached to the ground with iron rods. A 20-h post-enrichment activity budget of both bear pairs was recorded and compared with their pre-enrichment activity budget. The results showed that there was a significant increase ($p=0.003$) in cage exploration by the installation of feeding enrichment while a significant increase was observed in cage exploration ($p=0.04$), drinking ($p=0.04$), and resting ($p=0.001$) behaviours by the installation of wooden platforms. All the other activities had no significant impact of both enrichments. This study revealed the significance of environmental enrichments on the activity budget of black bears in captivity and can be proved as footprints for future studies.

POSTER-28

SURVEILLANCE OF DENGUE FEVER MOSQUITO (*AEDES AGYPTI*) LARVAE IN HYDERABAD, SINDH, PAKISTAN

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The *Aedes agypti* is mosquito which belongs to class Insecta, order Diptera, family Culicidae and Genus *Aedes.* The *Aedes agypti* mosquito is generally found near or surrounding the human habitation that's why it is called domestic mosquito. It prefers to live in indoor and outdoor, fresh and pure water containers. The *Aedes agypti* is tropical and subtropical species present around the world. It is vssector of many viral diseases such as dengue fever, chickengunya, yellow fever and Zika. The surveillance of larvae was conducted in the month of August to November 2022 in talukas Qasimabad and Latifabad, Hyderabad District. The aim of present study was planned to search the indoor and outdoor breeding habitats for knowing the prevalence of *Aedes agypti* larvae and to mention the most highly affected breeding sites of indoor and outdoor habitats as the ecological modeling may be designed to control the density of *Aedes agypti* mosquitoes. House Index (HI), Container Index (CI) and Breteau Index (BI) was a method that was used for only indoor data collection and analysis the data of *Aedes agypti* larvae. The 545 houses were inspected in which 149 houses were found positive. Total 1635 indoor water containers were inspected in which 224 indoor water containers were found positive with *Aedes agypti* larvae. The indoor and outdoor water containers were inspected in which 38 outdoor water containers and 262 indoor outdoor water containers were positive. AC water containers were found positive standing with highest positivity rate as compared to clay water pots, discarded, containers, Roof Tanks, and water canes. However, this study is suggested that all the breeding sites should be managed before the monsoon to prevent the risk of dengue fever. Domestic and peri-domestic visits should be conducted to know the density of Vector and it's larvae.

CBGP-158 Microbiology

PREVALENCE OF *STAPHYLOCOCCUS AUREUS* IN DIFFERENT SAMPLES OF STREET FOOD FROM LAHORE

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Street food is quite tempting ready-to-eat food but can lead to severe pathogenic diseases. Poor hygiene and compromised safety measures consequently lead to microbial contamination of food. Humans are major reservoirs of *S. aureus* so; bacteria can be transferred to food during handling. *S. aureus* is one of the most common causes of food-borne diseases and is considered as causative agents of multiple human infections, including bacteremia, infective endocarditis, skin and soft tissue infections. This research aimed to determine the presence of *S.aureus* in food samples obtained from different street food vendors in Lahore. The respective bacteria for the current research were isolated from five distinctive food samples using spread plate method while different biochemical tests were done for tentative identification of isolates. Disk diffusion method was utilized to analyze antibiotic susceptibility of bacterial isolates against different concentrations of antibiotics. The results showed that all samples were contaminated with *S. aureus* with a high colonial count of 1.77 X 10^7 CFU/ml and 5.7 X 10^8 CFU/ml, 5.2 X 10^4 CFU/ml, 5.8 X 10^8 CFU/ml, 8.4 X 10^4 CFU/ml and 3.8 X 10^6 CFU/ml observed in samples of Pani Puri, Shawarma, Dahi Baray, Alo Chanay and Fruit Chaat respectively. The bacterial isolates exhibited multidrug resistance to different antibiotic drugs. The highest resistance (9/10) was observed against 15µg concentration of Clomipramine and 30µg of Cefoperazone. Considering the high number of resistant isolates, it is the need of hour to take appropriate measures to ensure hygienic street food conducive to avert the spread of pathogenic diseases.

CBGP-159 Cell and Molecular Biology

THE TRANSCRIPTOME OF A CILIATE *PARAMECIUM FOKINI:* A CRYPTIC SISTER SPECIES OF *PARAMECIUM MULTIMICRONUCLEATUM* GROWN UNDER COPPER ION STRESS REVEALS ITS POSSIBLE ROLE IN BIOREMEDIATION

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Ciliates are mostly present in the heavy metal contaminated environments and have developed mechanisms to survive in it. Due to this ability, they secure prominent position among organisms used for bioremediation of heavy metals. Nowadays, *Paramecium* is largely used for the bioremediation studies. To investigate the response of *Paramecium* at gene level, transcriptome sequencing was done under copper exposure. RNA sequences from *P. fokini* were assembled with Trinity program. Transcript abundance and differential expression of genes was analyzed by RSEM and edgeR. Species was verified using Blastx with NCBI data and diamond with MEGAN. Genomic data revealed 18, 401 sequences from *Paramecium fokini.* Of the 2,478 differentially expressed genes, 537 were downregulated and 1,941 were upregulated during copper exposure, and many had high identity (>70%) amino acid matches to the *P. tetraurelia* genome, but only selected categories were readily annotated. Annotations obtained from three protein databases UniProt, Pfam and InterPro. Most of the genes were trichocyst matrix proteins and 70% identical to amino acid sequences from *P. tetrraurelia.* Other stress dealing genes including Glutathione S transferase, thioredoxins and heat shock proteins were

upregulated under copper exposure as compared to control. This shows that stress related genes and pathways are upregulated to deal with the heavy metal stress for the survival of cell and reveals its copper bioremediation ability.

CBGP-160 Physiology

PROTECTIVE EFFECTS OF *NIGELLA SATIVA* OIL AGAINST INFLAMMATION AND OXIDATIVE STRESS IN HYPERLIPIDEMIC MICE

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The use of *Nigella sativa* has been going on for ages in traditional systems of medicine to treat a variety of health disorders with some referring to it as "Prophetic medicine" and "universal healer" and modern evidence also suggests that it possess anti-inflammatory, anti-oxidant, hypolipemic and numerous other medicinal potentials separately because of its exceptional phytochemical composition. The current study aimed to evaluate the protective efficacy of *Nigella sativa* oil (NSO) against dyslipidemia and dysfunction in protein, inflammatory and redox homeostasis in mice model of experimentally induced hyperlipidemia in combination. Mice were fed on a high cholesterol and high fat diet for 12 weeks with or without NSO administration (2 ml/kg body weight) and changes in lipid profile, serum protein fractions (total protein, albumin and globulin), markers of oxidative stress (malonaldehyde, catalase activity and total antioxidant capacity), inflammation (IL-6) and histology of heart muscles were compared against the mice in control group fed on a standard chow. High fat diet successfully induced hyperlipidemia in mice and disrupted the levels of IL-6, components of lipid profile, serum protein fractions, and oxidative stress markers in the blood. The treatment with NSO resulted in significant improvements in these aforementioned markers of cardiovascular risk and levels of all the parameters evaluated returned towards normal healthy range. These results suggest that NSO is beneficial in terms of modulating cardiovascular risk markers and the implication of these findings put together with its other therapeutic properties in a clinical setting, NSO could be used as an alternative or in combination with modern prescription drugs for treating various conditions after exploring its mode of action at cellular level in vitro.

FEWFM-116 Fisheries

OVERVIEW OF AQUACULTURE IN PAKISTAN

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Fishes are best significant species that have great role in developing country economy. In subsidiary industry, Pakistan fisheries department provide job to 4 lac people directly and 6 lac people indirectly, that is about 1% of national labor force. Global fish production is estimated at 179 mil8lion in 2018 whereas 156 million tones have fulfilled the food provision demand. The rise in global capture fisheries production from 1990 to 2018 is 14%. Total world capture

fisheries production is 96.4 million tones with an increase of 5.4% from the last three days. In the globe, it is estimated that more than 120 million people are based on fish for income. In different Asian countries, 75% of poor people rely on fish for daily protein intake. With overall seafood export of 4.16 million metric tons (mmt), China prospers at the top among other exporting countries. Parameter which effect on fish production is disease outbreak having significant effect on the safety, quality and volume of fish produced globally infectious disease caused by pathogens like viruses, bacteria and parasites. The effective control of infectious control is one of the most critical features for fish population. The occurrence, spread and severity of the diseases within the fish population is same as in humans and terrestrial animal's population. To overcome losses of the diseases it is essential to act upon health constraints. As "prevention is better than treatment" it's essential to prevent the animals from the occurrence of disease rather than treat. The usage of the good husbandry practices, genetically resistant stack, antimicrobial compounds, dietary supplements, disinfected water and vaccine are the bet approaches to control the disease.

AUTHOR INDEX

This index enlists only the names of the oral presenter, who is also the first author in the Abstract