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ABSTRACTS

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SECTION - I

CELL BIOLOGY, MOLECULAR BIOLOGY, GENETICS, PHYSIOLOGY AND TOXICOLOGY

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

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1. HERBAL MEDICINE, BIOCHEMISTRY, BIOTECHNOLOGY AND BIOINFORMATICS

CBGP-1

Effect of *Solanum nigrum* on Blood Biochemistry, Cholesterol, Glucose and Urea Level of Rotenone Induced Parkinson's Rat Model

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Parkinson disease (PD) is a most chronic and most progressive disease of the central nervous system. On a daily basis more than 100 people are diagnosed with Parkinson's disease. Rotenone is an active compound of pesticide which is main cause of Parkinson's disease in modern age. To study the effect of Solanum nigrum polyphenols on Parkinson's disease rotenone induced Parkinson's model was prepared. *Solanum nigrum* fruit extract contents were identified by Gas chromatograph mass spectrometry (GCMS) analysis. Rotenone was administrated on a daily basis systemically by intraperitoneal injection of dose: 1.5 mg/kg, over a period of 28 days. Rats were divided into four groups. First group as control group given sun flower oil, second group was given rotenone third group was given rotenone + *Solanum nigrum* fruit extract and the fourth group was treated with *Solanum nigrum* fruit extract. The second group showed Parkinson disease which was confirmed by different behavioral and chemical analysis. The third and fourth group showed therapeutic effect as compared to rotenone treated group. Data analysis indicated that rotenone treated rats are capable of causing degeneration of dopaminergic neurons and induction of parkinsonian symptoms. Hemoglobin, platelets count, red blood cells in whole blood and in serum analysis blood glucose level, cholesterol level, triglycerides urea and creatinine were analyzed by all groups. The level of cholesterol and glucose in *solanum nigrum* treated group decreased as compared to control and rotenone treated groups.

CBGP-2

Assessment of Synergistic Antibacterial Activity and Anticancer Effect of Five Indigenous Plants

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Insufficiency of novel antimicrobial and anticancer compounds and increased resistance of cancer cells against drugs has compelled the researchers to find and develop the new therapeutic agents that could be used efficiently as alternatives to synthetic drugs or may help these drugs in combating the infections. The present study was conducted to assess the anti-cancer and antibacterial synergistic effect of five medicinal plants *Jacaranda mimosifolia, Bismarkanobilis*, *Cupheahookeriana*, *Aphelandra simplex*and *Choiysaternate.* Methanolic extracts of these plants were checked for the synergism against isolates of *Styphylococcusaureus* (2) and *Salmonella typhi* (1)through well diffusion assay.Cytotoxicity of the plant extracts was determined through MTT assay against HepG2 and HeLa cell lines.Phytochemicals of *J. mimosifolia*were also docked against Bcl-2 (anti-apoptotic protein) in order to find the appropriate inhibitor of this anti-apoptotic protein. Only one plant, *C.hookeriana* showed the most significant cytotoxicity against HepG2 cell line. While three plants *A. simplex, J. mimosifolia* and *C. hookeriana* showed significant cytotoxicity against HeLa cell lines. Out of fifteen compounds only two compounds 2,4-bis(1,1-dimethylethyl) phenol and 1-β-D-Ribofuranosyl-3[5-tetraazolyl]-1,2,4-triazole were identified as potential phytochemicals with strong binding capabilitesand efficient drug-like properties. After further research on these newly identified cytotoxic plants, these plants and their bioactive compounds may be used for the preparation of efficient, safe and cost effective anti-cancer and antibacterial drugs.

CBGP-3

Bio-pharmaceutical Evaluation of *Trigonella foenum-graecum* L., *Nigella sativa* L. and *Zingiber officinale* Against Bovine Mastitogens

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Livestock sector plays an important role in any nation's economy. Mastitis is one of the diseases that effects the livestock economy very badly. Bacterial mastitogens cause sensitivity that leads toward inflammation and tenderness of the mammary glands. Mastitis is usually cured by antibiotics, but due to development of resistance against antibiotic agents and these drugs are becoming ineffective against bovine mastitogens. Therefore, medicinal plants are being considered as an alternative source of cure. In present study three medicinal plants namely, *Trigonella foenum-graecum* (Fenugreek and methidane), *Nigella sativa* (Kalonji) and *Zingiber officinale* (Ginger) were selected for extract formation in n-Hexane, Acetone and Ethanol solvents. Milk samples from infected cows were collected from veterinary hospital and three strains of bacteria (*Staphylococcus aureus, Escherichia coli* and *Klebsiella pneumonia*) were identified and isolated. 24 different extract preparation were made (individual as well as combination) and applied against isolated bacterial strains. By using Disc Diffusion method zones of inhibition were measured. Results were compared with the standard antibiotic; Ciprofloxacin. Efficacy of extracts and combinations were also compared with each other. One way Anova test was used to determine the level of significance of our results. From all single extract, *N. sat* (n-hexane) showed maximum inhibitory effect (IZ=14.5 mm) with colonial growth inside the zone. Among the combination of two extracts *N. sat : Z. off* 1:1 (n-hexane) showed highest inhibitory effect (IZ=21 mm) against *Klebsiella pneumonia*. With combination of three extracts *Z. off : N. sativa : T. foe* (1:1:1) (n-hexane) showed highest potency against *Staphylococcus aureus* (IZ=14.5 mm). However, when all three extracts of single plant were mixed, *N. sat* (Ethanol: n-hexane: Acetone) 1:1:1 gave best results against *Staphylococcus aureus* (IZ=20 mm) Ciprofloxacin showed potential only towards *S. aureus.* Results proved that from all three plants *Nigella sativa* and from all three extracts n- hexane is most effective agent to control growth of strains. Also, the combination of two or three extracts give better results as compared to single extract. Therefore, by formulation of various combinations of extracts multidrug resistant bacteria could be controlled. IZ = Inhibition zone.

CBGP-4

Insects as Source of Protein in Poultry Feed; A Review

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The demand of Poultry meat and eggs is increasing day by day and will increase in future. Poultry Feed is an essential component of poultry farm in poultry business. It is much expensive for small grower as well as at Commercial level. Protein source is costly that makes poultry feed expensive. About 20% to 23% protein is recommended in poultry feed depends upon energy required. Insects are the cheap and alternative source of protein with amino acids. By dry weight he averages insects contain 50% protein but some insects also contain about 75% protein. Silkworms, Locust, Black soldier Fly, Maggots, crickets, and grasshoppers can be safely fed to chickens without affecting the quality and taste of the meat. Insect based feed increases the nutritional value of poultry meat. The method of feeding insects to poultry will facilitate the development of agriculture-based recycling systems, reduce waste, and can also help to reduce environmental pollution. Production of Chicken meat is 1245 million kg annually in Pakistan and per capita consumption of Chicken meat is 6.22 kg and 56 eggs annually. Developed countries consume around 40 kg of Chicken meat and more than 300 eggs per capita every year. It is possible to increase per capita of both poultry meat and eggs per year in Pakistan. Different methods are used in insects

rearing depends upon the life stage. At larval stage, they are rear in boxes. The box contains several shelves to minimize the production space of each insect. In some cases, stackable boxes are used and placed on trucks or pallets to allow free movement in the rearing area. These methods are used to prevent any toxic material that can cause economical loss. The aim of this paper is to provide cheap and easy source of protein with amino acids for Poultry feed and increase production.

CBGP-5

Characterization of Free Living Amoebae from drinking water distribution system and its control using disinfectants

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Free-living amoebae (FLA) are ubiquitous unicellular protozoans that are pathogenic or reservoirs of pathogenic bacteria and viruses, causing serious human and animal infection. The present study revealed occurrence, isolation, morphological characterization, and disinfection treatment of FLA from drinking water resources of Lahore, Pakistan. A total 150 drinking water samples were taken from different areas of Lahore. *Acanthamoeba* with acanthopodial morphotype was observed in three samples, four samples were positive for monopodial morphotype of *Hartmannella* while *Allovhalkampfia* was observed in two samples. *Acanthamoeba* was characterized by flat-shaped trophozoites (25-30 µm) having acanthopodia and they form double-walled cysts of 10-20µm. *Hartmannella* was characterized by uninucleated cylindrical trophozoites and rounded, single-walled cysts (11-16 µm). The trophozoites of *Allovahlkampfia* had eruptive elongated monopodia. The maximum number of trophozoites were observed after the 5^{th} of inoculation while highest number of cysts was observed after 12 days. Excyctment was observed after 48 hours while encystment started after 8 days. Maximum growth of FLA was observed at 27±2°C. However, both *Acanthamoeba* and *Hartmannella* were viable at 50^{o}C for 30 minutes. Trophocidal and cysticidal temperature for *Acanthamoeba* and *Hartmannella* was 70°C for 1 min. Disinfection treatment of FLA showed that cysts of *Acanthamoeba* are more resistant than *Hartmannella.* The minimum cysticidal concentration (MCC) of chlorine for *Acanthamoeba, Hartmannella,* and *Allovhalkampfia* was 2 0 ml/L and 10ml/L, and 4mg/L, respectively, with an exposure time of 30 min. MCC of H_2O_2 was 7.5% and 10% for *Acanthamoeba* and *Hartmannella*, respectively. Comparison of disinfection treatment showed that chlorine is more efficient against cysts of FLA. The present pioneer study in Pakistan will help in water treatment to target FLA.

CBGP-6

Economical Production of Citric Acid from Vegetable Waste

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Pertaining to essential industry wide usage citric acid is produced through several methods. This paper led to investigate the production of citric acid by using dehydrated and non-dehydrated vegetative waste as a substrate by *Aspergillus niger* through submerged fermentation. During several stages of the production, it was witnessed that maximum production of citric acid was attained by the sweat potato with glucose 50g/L and potato with fructose 42.24g/L in fermented broth at 30 ^{o}C for 11 days. The partial recovery of the citric acid was accomplished by the crystallization and estimated by High Performance Liquid Chromatography.

CBGP-7

Sesame Oil Mitigates Aspartame Caused Oxidative Stress, Biochemical Changes and Histopathological Lesions in Kidneys and Liver of Albino Mice

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Aspartame is an artificial sweetener used by more than two hundred million people worldwide and is one of the most disputatious food additive, having contradictory evidences regarding its safety. Ongoing research will highlight possible cytotoxic effects of aspartame and protective potential of sesame oil in rodent model. Forty male albino mice weighing 26±2g were randomly and equally categorized into four groups. Mice were exposed to 40µg/g/day of aspartame with and without sesame oil in various groups. Doses were administered through oral gavage for 60 days routinely. At the end of experiment dissections were carried out to collect blood samples for serum biochemistry, liver and kidney tissues for histopathology and to evaluate some anti-oxidative and oxidative stress markers from liver and kidney homogenates. There was no mortality or moribund mice recorded during the whole experiment. Mice body as well as organ weight increased in aspartame group as compared to control. Elevated level of AST, ALT, ALP, Urea and Creatinine were significantly observed in blood plasma of aspartame group against control. Histopathological defects showed ballooning hepatocytes, vacuolations, congested central vein and proliferation of kuffer cells in liver tissues and renal hemorrhage, increased capsular space and glomerulosclerosis in kidneys of aspartame treated mice. Aspartame exposure resulted as oxidative stress by decreasing GSH, SOD, catalase and increasing MDA levels in kidney and liver tissues. Besides, co-administration of sesame oil with aspartame led to significant protection against aspartame induced toxicities. Hence aspartame can instigate biochemical and histopathological alterations in albino mice, while sesame oil has potential to forfend these.

CBGP-8

Study on Morphometric Features of Different regions of Epididymis in Damani Goat Buck

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Epididymis play vital role in reproduction of livestock. In order to documents the exploration of the potential reproductive capabilities of the local animal resources, the current study was carried out on dammani bucks in the subtropical environment of Peshawar. The current research comprised of the detail exploration of the three segment of epididymis in relation with appraisal the gross morphometry along with the histological characteristics of each segment. Local slaughter houses in Peshawar was used for collection of the specimen. Standard protocol was adopted in the collection and transportation of the specimen to the laboratory of vet. Anatomy, CVS. The gross morphteric examinations included length, width, weight of each segment were carried out through standard procedure via Vernier caliper and measuring tape and electric weighing machine respectively. Likewise, for histological investigation of the three segment of the epididymis, routine standard histopathological procedure were used. Furthermore, Protein expression in the three segment of the epididymis were carried out in the proteomic section in Histopathology laboratory using recently developed protocol. During current, the gross morphometric investigation demonstrated the mean length of head of right and left epididymis was 6.72±0.20, 6.26±0.20 cm likewise the length of the body of right and left epididymis was 6.18±0.14, 6.41±0.14 cm and that tail of the right and left epididymis 1.76±0.09, 1.56±0.10 cm of right The histological assessment of this vital organ demonstrated that epididymal duct is lined by epithelium and the duct contains tubular regions wherein diverse biological cells having important reproductive role are abundantly expressed such as the principal cells, narrow cells, basal cells and apical cells.

CBGP-9

GC-MS Analysis of Lipid Extract in Museum Bone of Blue Whale

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Pakistan has a diversity of cetacean population in its offshore seas; these animals comprises of enormous quantity of lipids in their body especially below the epidermis of skin, intact in bones and in liver. Lipids are naturally occurring biological compounds, which are hydrophobic in nature. Museum skeleton of blue whale present in CEMB, were examined to identify the fats found within the bones. Maceration technique was adapted for extraction of lipids. Fatty acid composition of lipids was analyzed through saponification followed by methylation of the fatty acids. Gas chromatography Mass spectrum (GC-MS) was employed to investigate the extract. Digital mass library NIST and MS search 2.0 was used for the matching of spectra. MUFAs, PUFAs and some pesticides have been identified along with major concentration of free fatty acids. The main fatty acids are, C13:0, C15:0, C16:0, C16:1, C14:0, C18:0, C18:1, C20:1 and permethrin. These extracts possess essential fatty acids were also govern numerous biological activities i.e. anti-oxidant activity.

2. CELL AND MOLECULAR BIOLOGY, CELL BIOLOGY, GENETICS

CBGP-10

Molecular Basis of Heat Stress on Growth of *Paramecium* Species

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The preferential induction of Hsp90 in response to heat shock has been shown to vary in *Paramecium* species. Hsps is a kind of heat shock response in organisms to occupy variable thermal niches. The present study reveals the role of Hsp90 as a molecular diagnostic tool to assess environmental stress, thermal tolerance limits and survival of three species of *Paramecium* (*P. multimicronucleatum*, *P. jenningsi*, and *P. primaurelia*). All these species were exposed to constant (34ºC for two weeks) and temporally variable temperatures (30ºC, 34ºC and 38ºC overnight). *Paramecium* species have shown their resistance towards the fluctuating temperatures, which was well explained with the help of the present study by showing the presence of heat shock proteins through SDS-PAGE. At 30ºC, all species showed expression except *P. jenningsi*. At 38ºC, only *P. primaurelia* did not show expression of Hsp90. This suggests that *P. jenningsi* has a higher thermal tolerance limit, great survival, and more resistant species than the *P. primaurelia*. *P. multimicronucleatum* showed expression at all temperatures, which represent a wider thermal range. *P. multimicronucleatum* and *P. jeningsi* showed increased expression of Hsp90 when exposed to heat stress at 34ºC for two weeks, unlikely to *P. primaurelia*. This decreased expression of Hsp90 at higher temperatures is due to the increased sensitivity of *Paramecium* species to heat shock and vice versa. These cultured *Paramecium* species can be used in large scale experiments in lab as well as in stagnant wastewater ponds that will be a novel approach in bioremediation.

CBGP-11

Growth Patterns of Ciliates In the Presence and Absence of Azo Dyes

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The release of azo dyes through textile effluents serves as the primary source of water pollution. Therefore, it has become necessary to degrade dyes using microorganisms. Ciliates can effectively employ industrial effluents in bioremediation because they can survive longer in contaminated water, indicating their ability to detoxify pollutants and improve effluent quality. The present study was conducted to examine the effect of an azo dye, Brilliant Yellow, on the growth patterns of *Paramecium caudatum* named AS, at different pH and temperatures and to evaluate the decolorization potential ciliate. *P. caudatum* was cultured in Bold Basal Salt Medium and exposed to varying pH (6, 6.5, 7, 7.5, 8) and temperature (20°C, 25°C, 30°C, 35°C), respectively. The growth pattern was examined daily for 30 days. All experiments were performed in triplicates. AS dye-treated samples showed maximum growth of 6400 cells/ml at pH 7 and AS control samples showed the best growth of 8400 cells/ml at pH 7.5, whereas AS control and dye-treated samples each showed maximum growth of 5400 cells/ml at 25°C. The results indicated that *P. caudatum* showed 86.66% decolorization. Products formed after dye degradation was analyzed by Fourier-Transform Infrared Spectroscopy (FTIR), which confirmed the biotransformation of this dye. Therefore, ciliates can be used for the decolorization of industrial wastewater containing azo dyes.

CBGP-12

Toxic Effect of Azo Dyes on the Activity of Various Enzymes and Metabolites in Ciliates

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The contamination of water bodies by numerous anthropogenic activities has highlighted the need to identify new bioassays to assess water pollution. The freshwater ciliate *Paramecium* has been shown to play a key role in the biodegradation of dye-containing wastewater. The present study was conducted to evaluate the toxic effects of an azo dye (Brilliant Yellow) on the activity of various antioxidant enzymes and other metabolites in two species of ciliates *i.e*. *Paramecium multimicronucleatum* (IZ) and *Paramecium caudatum* (AS). Both the species were cultured in bold basal salt medium, and the treated species were exposed to the Brilliant Yellow azo dye when optimum growth for each species was attained. Total protein content in both IZ and AS treated species was considerably increased compared to their control. Elevated levels of GSH were reported in both treated species of IZ and AS. After treatment with BY dye, GST activity was also increased in both species, but it was greater in IZ (50%) than AS (33.33%). Likewise, catalase activity was also relatively higher in IZ (137.76%) than in AS species (91.48%). In contrast, superoxide dismutase and glutathione peroxidase activity were recorded to be higher for AS treated species (56.52% and 36.76%) than IZ treated species (35.71% and 22.22%), respectively. Thus, a strong induction in the activity of antioxidant enzymes after exposure to azo dye suggests that ciliates can be extensively employed as potential bioremediators for treating dye-containing wastewater.

CBGP-13

Effect of Azo Dyes on the Growth Pattern of Ciliates by Changing Various Ph Values

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Environmental health has been greatly affected in recent decades by the discharge of azo dyes and their metabolized products from various industries. Textile effluents containing azo dye can be treated by bioremediation, offering many advantages over standard treatment methods. Ciliated protozoans have been used as bioremediation tools due to their easy maintenance under laboratory conditions, faster growth rates, and lack of cell walls. The current study investigated the growth phase, the effect of azo dyes on growth of *Paramecium jeninjsi* at varying pH (6, 6.5, 7, 7.5, 8 and 8.5) and temperature (20, 25, 30 and 35°C) and its decolorization potential. *Paramecium* samples were provided by the Molecular Biology Lab at the Institute of Zoology, University of the Punjab, Lahore. For studies of growth phases, *Paramecium* culture was maintained at a pH of 7.2 and a temperature of 25°C. Growth was monitored on daily basis for 15 days. The growth of *P. jeninjsi* were observed at different pH and temperature of treated and control samples for 30 days. The maximum growth of *P. jeninjsi* was observed at pH 7 and temperature 25°C *i.e.,* 2600 and 3200 cells/ml in control and treated samples, respectively. 85% decolorization was observed in treated samples after 6 days. Analysis of dye degradation products was carried out using FTIR. The experiments were performed in triplicates. Results revealed that *P. jeninjsi* can be used as efficient bioremediation tool in cleaning wastewater containing toxic azo dyes.

CBGP-14

A Study of Level of Fasting Blood Sugar, Serum insulin and insulin sensitivity index in Obese Postmenopausal women of Karachi, Pakistan

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The prevalence of obesity in women around and after menopause is high and is rising worldwide, changes in hormone levels can trigger fluctuations in blood sugar level and insulin resistance. This study was planned to examine the differences in BMI, FBG and insulin level in obese subjects as compared to normal weight. This experiment was carried out in Karachi city of Pakistan between, January 2015 to April 2015. We included women aged 45-60 years (n=84) with ceased menstruation for at least 12 month and had a natural menopause, Anthropometry measurements were taken to calculate BMI and WHR. A fasting venous blood sample of 5ml was taken and serum was separated and stored. FBG level was measured by using GOD PAP method, while Serum insulin, was measured with ELISA. Insulin index was calculated by formula using QUICKI method. Unpaired t-test was used to compare the mean of control (n=13) and obese (n=71) group. Our findings evaluated the significant differences in the average BMI values of control (22.14 ± 0.023) kg/m^2 and obese postmenopausal women (35.93 ± 0.72) kg/m^2. BMI of obese females were significantly higher than control females (P<0.001). Mean FBG level of control (92.15 ± 1.48) and obese postmenopausal women (117.56 ± 0.95) mg/dl were significantly higher in obese group (P<0.001). Serum insulin level and insulin sensitivity index of control females were averaged at 24.13 ± 3.03 and 0.30 ± 0.006 respectively. While serum insulin mean values and insulin sensitivity index of obese women were 40.37 ± 5.07 and 0.28 ± 0.003 respectively. Both the parameters were related significantly in two groups (P<0.05 and P<0.05) respectively. This study concluded that FBG, serum insulin and its sensitivity index are elevated in obese women. Menopause and adiposity are more common factors that put the women at a risk of developing diabetes. Lifestyle modifications play a major role in controlling obesity and fluctuated FBG and insulin levels.

CBGP-15

Association of Diabetes and Serum Vitamin D levels in Obese/ Overweight Diabetic and Non-diabetic Women

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The world has been facing a pandemic namely “Type 2 Diabetes Mellitus” (T2DM) since ages with extremely high prevalence in almost every population. It is more commonly found among obese and overweight individuals with females being a constant target. The purpose of this study is to investigate three variable based hypothesis patterns – Vitamin D deficiency induces obesity developing into T2DM, along with the consideration of physical and clinical parameters in Pakistani women Lahore. The study group included 60 diabetic whereas the control group consisted of 60 non- diabetic healthy women. Subjects of both groups were obese/ overweight with BMI more than 25kg/m^2 and of similar age ranging from 30-70 years specifically with vitamin D deficiency. Physical parameters including BMI, diet, rate of physical activity, sunlight exposure and family history were obtained through questionnaires. The clinical factors including serum vitamin D, calcium and fasting glucose were obtained through blood serum and whole blood testing, respectively. Results showed that 76% of healthy women had glucose levels more than 100mg/dL indicating a high risk of diabetes onset, whereas the experimental group already had high levels with the mean range of 223 mg/dL and Std. deviation ± 50.2. Non-diabetic females had

more Vitamin D3 deficiency with mean value 20 ng/ml with Std. deviation ± 19.7 compared to diabetic group with mean insufficiency value of 25.5 ng/ml and Std. deviation ± 10.8. Both groups were observed to have majority women with normal calcium levels with mean values ranging from 9.2 to 9.3 mg/dL. The obtained clinical values mark an abnormally reversible metabolism. Majority of the healthy females were found to be at risk of diabetes development due to an extremely lower rate of vit D accompanied by similarities with the study group in various parameters. Results concluded that there is a weak positive significant difference between Vitamin D, calcium, BMI of both diabetic and nondiabetic overweight patients.

CBGP-16

Study of Heat Shock Proteins (HSP20) in *Trogoderma granarium*

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Trogoderma granarium (Everts), control has become difficult due to the emergence of resistance against almost all the known insecticides and fumigants. Moreover, they have hazardous effects on human health. Heat treatment has been used to control the khapra beetle infestation in storage goods. However, khapra beetle shows a great tolerance to heat stress. Larval stages of khapra beetles are the most tolerant life stages to thermal stress. In present study, 4th and 5th larval instar of Lodhran and Lahore populations were exposed for 1 hour with increasing temperatures (40°C, 45°C, 50°C, 55°C, 60°C). Larvae exposed to 35°C for 1 hour were treated as control. Characterization of insect homogenate showed that the heat shock protein was one of the major elements in the ability of thermotolerance. By using 10% SDS PAGE analysis, heat shock protein with molecular weight of 25kDa was observed in 4th and 5th larvae of both populations. Results of present study showed that the small heat shock proteins (shsp25) were significantly higher expressed during active larval stages of both populations. The expression of sHsp25 was significantly upregulated with increasing temperatures (40°C, 45°C, 50°C) but its expression diminishes at extreme temperature (60°C). Intensity of bands showed that the Lahore population is more resistant to thermal stress as compared to Lodhran population. The expression of heat shock protein in response to increasing temperature appears to be associated with the ability of khapra beetles to survive in response to heat shock stress. The current study reported small heat shock protein (sHSP25) in *Trogoderma granarium* which may give insights to the researchers for the control strategies of this invasive pest.

CBGP-17

Discovery of Differentially Expressed Genes of *Paramecium* sp. Under Copper Ions Stress Using Transcriptome Sequencing

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Ciliates are mostly present in the heavy meatal 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. multimicronucleatum* were assembled with Trinity program. Transcript abundance and differential expression of genes was analyzed by RSEM and edgeR. Taxonomy of the data was verified using Blastx and diamond with MEGAN. Contaminated sequences base on taxonomy removed from the data. Genomic data revealed 18, 401 sequences from *Paramecium multimicronucleatum.* Copper up regulated genes are 1,172 identified with significant value 0.5 and $\log_2$ Fold change. 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 shoch 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 for the survival of cell.

CBGP-18

Association of *IRGM* Promoter Region Polymorphisms and Haplotype with Pulmonary Tuberculosis in Pakistani (Punjab) Population

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The human immunity related GTPase M (*IRGM*) is a key factor in autophagy. Single nucleotide polymorphisms (SNPs) in *IRGM* have been reported to affect the *Mycobacterium tuberculosis* (*M.tb)* degradation pathway, causing *M.tb* cellular retention and promoting tuberculosis (TB) pathogenesis. The objective of our case-control study was to screen the promoter region of *IRGM* gene for regulatory SNPs, in a Pakistani population including 70 patients and 30 healthy controls (15 control TB non-exposed (Ctrl-TBne)) and 15 control TB-exposed (Ctrl-TBe)). DNA was extracted from blood, and the upstream promoter-enhancer amplified and sequenced. Our findings showed group specific variations in allelic and genotypic frequencies at four loci: -1161*T/C* (rs4958843), -1133*G/A* (rs4958423), -1049*C/T* (rs4958424) and -708*G/A* (rs35707106). Allele *G* (p-value = 0.027) and genotype *GG* (p-value = 0.04) at -1133*G/A*; allele *C* (p-value = 0.029) and genotype *CC* (p-value = 0.05) at -1049*C/T*; and allele *G* (p-value = 0.02) and genotype *GG* (p-value = 0.04), showed significantly higher association with TB patients as compared to healthy controls (both Ctrl-TBe and Ctrl-TBne). At -1161*T/C*, allele *T* was found to be more frequent in patients (p-value = 0.03), but no difference in genotypic frequency was found among the groups. These SNPs display strong linkage disequilibrium (LD). Haplotype analysis of these SNPs yielded ten haplotypes, of which -1161*T*/ -1133*G*/ -1049*C*/ -708*G* (p-value= 0.007) was found to be associated with TB status. This 4-SNP haplotype also represents an Expression Quantitative Trait Locus (eQTL), associated with Crohn's disease and chronic inflammatory diseases. Our findings support the hypothesis that variants -1161*T/C*, -1133*G/A*, -1049*C/T*, and -708*G/A* are associated with *IRGM* expression and susceptibility to TB in a Pakistani (Punjab) population.

CBGP-19

Prevalence of Various Genes Causing Epilepsy in Pakistani Population

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Epilepsy is the neurological disorder that indicates abnormal activity in central nervous system. It is caused due to genetic as well as non-genetic factor. Prevalence rate is higher in non-developed countries. In Pakistan the prevalence of epilepsy is about 9.99/1000. Different risk factors such as head trauma, central nervous system infections, poverty and tumors are associated with development of epilepsy in different age groups. This study was performed to identify pathogenic variants by WES in Pakistani Population. In the present study patients with epilepsy were sort out from different hospitals of Punjab, Pakistan from 1st December 2017 to 31st August 2019. We performed next generation sequencing with epilepsy patients.

We identified three missense pathogenic or likely pathogenic mutation in three genes such as heterozygous c.4442A>G (p.Asp1481Gly) mutation in DMXL2 gene, heterozygous c.1991T>C (p.Val664Ala) mutation in CACNA1H and homozygous c.6695A>G (p.Tyr2232Cys) mutation in GPR98 gene. All patients showed generalized tonic colonic seizure. Different parameters show different frequency. All patients have showed different onset age. Frequency of tonic colonic seizure is higher as compared to other seizure types. Frequency of seizure onset age was higher between 11-20 years of age. In present study disease prevalence is higher in male as compared to females. Patients that used antiepileptic drug showed highest frequency as compared to those that do not use medicines. These all are already reported genes which involved in epilepsy. All parameters showed association with reported literature.

CBGP-20

Effect of Inhibitor UNC0642 on Expression of G9a and Its Proliferative and Apoptotic Markers in Breast Cancer Cell Line MCF-7

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G9a is a lysine methyltransferase that has been associated with various types of cancers. In cancerous cells, the expression of G9a has been reported to be upregulated. Moreover, G9a has been reported to downregulate expression of tumor suppressor genes in a variety of cancerous cells. Therefore, making it a target for anti-cancerous therapies. While various inhibitors of G9a are under study, the present study explores the anti-cancer activity of UNC0642, a novel potent inhibitor of G9a. UNC0642 treatment at various concentrations i.e., 1µM, 5µM, 10µM, 15µM, and 20µM was given to MCF-7 breast cancer cell line. Analysis of growth and proliferation parameters by various cell-based assays such as neutral red assay, MTT assay and BrdU cell proliferation assay showed that lower concentrations of UNC0642 were less cytotoxic to the cells whereas the higher concentrations were lethal for the cancerous cells. IC50 was found to be 12.6µM. Further contextualization of therapeutic potential of G9a inhibition was provided by expression analysis of G9a gene and genes associated with cell proliferation, tumor suppression, and apoptosis. The gene expression of fibroblast growth factor 1 (FGF1), enolase 2 (ENO2) cyclin D1 (CCND1), catalytic subunit of AMP-activated protein kinase (AMPKα2), RNA polymerase II transcription elongation factor (ELL2), and pro-apoptotic Bcl-2 homology 3-only protein (BIM) in MCF-7 breast cancer cell line and normal human embryonic kidney HEK-293 cells was studied in response to treatment with the aforementioned concentrations of UNC0642. Inhibition of G9a expression was observed in dose-dependent manner in both cell lines with increasing UNC0642 concentrations. A dose-dependent downregulation of gene expression of proliferation marker genes (FGF-1, CCND1, and ENO2) was observed in both cell lines, whereas upregulation of tumor suppressor genes (AMPKα2 and ELL2) and apoptotic marker gene (BIM) was observed in dose-dependent manner. The results indicated the potential of G9a inhibition in reduction of cancerous cell proliferation and inducing apoptosis in cancerous cells. Further elucidation of the signaling pathways associated with G9a, in-vitro and in-vivo safety analyses is required to fully establish G9a as a therapeutic target for cancer progression and UNC0642 as an anti-cancerous therapeutic agent for treatment of breast cancer.

CBGP-21

Effect of Metformin on p53 and its Interacting Partners in Breast Cancer Cell Line MCF-7

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Metformin is known to favor p53 anti-cancer activity and promotes apoptosis and cell senescence in the case of cancer cells. It decreases the incidence of several cancers but the findings regarding breast cancer are mixed. In the present study, the effect of metformin on the expression of p53 and its interacting partners MDM-2, PIRH2

ΔNp73 was studied on breast cancer cell line MCF-7 and it was compared with normal kidney cell line HEK293 after providing metformin treatment of different concentrations to both cell lines. Analysis of the cytotoxicity and proliferation parameters showed that higher concentrations of metformin were cytotoxic for the breast cancer cells with EC_{50} of 22.75μM. Analysis of expression of p53 and the interacting genes showed that metformin upregulate p53 expression in dose-dependent manner, while the expression of interacting partners is downregulated indicating that metformin exhibits the anti-cancerous properties by modulating p53 pathway. Altogether this study for the first time reported the expression analysis of p53 and its interacting partners in breast cancer cell line MCF-7 after metformin treatment that can help provide protective effect of metformin on breast cancer risk, however further investigation is needed to ensure the link between decreased breast cancer risk and metformin.

CBGP-22

Heat Shock Proteins are Expressed in Higher Quantities in Longevity Individuals of D.I. Khan District

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The cellular response to stress is mediated by intracellular proteins, called Heat Shock Proteins (HSPs). Among various known stressors, heat is a major factor that induces the production of HSP70. Keeping in view the very hot conditions of Dera Ismail Khan (D. I. Khan) division where the temperature remains at 45-50°C during the months of June to September, it was hypothesized that heat stress conditions do induce the overexpression of HSPs, especially Hsp70. It was thus attempted to find out the possible role of Hsp70 in those human being having the age of 90 years or above, called longevity people, against heat stress conditions. Whole blood samples of 45 longevity individuals and 20 samples of control people were collected in D. I. Khan during September 2018 to October 2019 after proper approval from Gomal University ethical review board and written consent of each individual was taken prior to collection of blood sample. For serum collection, blood samples were centrifuged at 1000xg for 15 minutes. Quantitative measurement of Hsp70 protein was done using sandwich ELISA technique. The maximum serum HSP70 level observed was 42ng/ml and minimum serum Hsp70 value was 13ng/ml, with median value of 28ng/ml. In control group, maximum concentration observed was 38ng/ml while the minimum serum level was 18ng/ml with median value of 13ng/ml. In longevity males, serum Hsp70 levels increased in individuals between 89 to 91 years of age, peaked between 92 to 97 years but comparatively lower having the age of above 98 years. On the other hand, serum concentration of Hsp70 in longevity females were highest in those having 89 to 92 years, lower in 93 to 97 years and, like males, lowest having age above 98 years. The study hence, showed that longevity individuals had higher quantities of serum Hsp70 compared to control group, and again, males contained higher concentration than longevity females, showing that thermal stress was the agent leading to over-expression of Hsp70 especially in longevity individuals. Whether this increased expression had any impact on longevity is still not clear that needs to be deciphered.

CBGP-23

Molecular Identifications of Family Ranidae from Changa Manga Forest, Punjab, Pakistan

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Identification of amphibians on morphological basis is still considered authentic. However, molecular analysis of these taxa is required for exact species identification. During present survey 48 amphibian specimens were captured from the study area. The captured specimens were represented by 2 species, 2 genera belongs to 1 family. The average SVL of *Hoplobatrachus tigerinus* and *Euphylctis cyanophylictis* was 82±22.13 mm and 44.25±2.197 mm, SL was

5.7±1.18 and 3.15±0.455, HL was 27.85±5.92 and 13.05±0.761, ED was 4.55±0.74 and 3.6±0.458, HTYD was 6.67±1.57 and 3.34±0.475, VTYD was 6.22±2.04 and 3.4±0.490, HAL was 15.355±1.62 and 12.58±0.381, FTL was 37.55±6.54 and 22.69±0.909 and average body weight was 88.11±70.53 and 14.57±3.370. Total genomic DNA of *Hoplobatrachus tigerinus* and *Euphylictis cyanophylctis* was extracted from blood. Phylogenetic trees were constructed viz., the neighbor-joining tree, the maximum likelihood tree and parsimony using MEGA 10 to check relationships among species. The obtained DNA sequence has shown reliable and clear species identification. After trimming ambiguous bases, the obtained 16S rRNA fragment of *Hoplobatrachus tigerinus* and *Euphlyctis cyanophlyctis* was 536 and 515 bp while 16S rNRA fragments aligned with NCBI sequences comprised 510 bp. The intraspecific variation of *Hoplobatrachus tigerinus* is 3-7% and the intraspecific variation of *Euphlyctis cyanophylctis* is 17%. The interspecific variations between *Hoplobatrachus tigerinus* and *Euphlyctis cyanophylctis* is 7-17%.

CBGP-24

Molecular Phylogenetics of Family Elapidae from District Kasur, Punjab, Pakistan

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Molecular based identification and phylogenetic relationships of family Elapidae is still unclear in Pakistan. Present study is therefore planned to explore and identify species of family Elapidae from district Kasur, Punjab. Specimens of Common krait (*Bungarus caeruleus*) and Cobra (*Naja naja*) were collected from selected sites of study area and each captured specimen was tagged with specific number. Three specimens of each species were euthanized and preserved in 75% ethanol for molecular characterization. Total genomic DNA was extracted from preserved tissues by using phenol chloroform method. Purity of DNA was checked through agarose gel electrophoresis. Extracted DNA was amplified using 16S rRNA primer set. The obtained DNA sequences have shown reliable and clear species identification of all the captured specimens. After trimming ambiguous bases, the obtained 16SrRNA fragment of *Bungarus caeruleus* and *Naja naja* was 690 bp and 666 bp respectively. Recently few DNA barcoding studies of Asian reptiles have been carried out and sequences for related species were available at NCBI. Closely matched DNA sequences were retrieved from NCBI in blast searches and incorporated in N-J tree. The overall, genetic divergence of common krait and cobra was 0.155±0.044 and 0.023±0.013 respectively.

CBGP-25

Effect of Butyrate on Gene Expression of AKT and Mtor-Involved in Regulation of Cellular Proliferation in Murine Brain

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Butyrate is a short chain fatty acid produced naturally by gut microbiota. It has a significant potential to inhibit the expression of histone deacetylase complex thus controlling the regulation of many genes. Butyrate exerts a beneficial neuropharmacological effect on brain disorders resulting in reduced risk of neurodegenerative diseases. Akt/mTOR axis is important in maintaining cellular growth and proliferation where changes in nutrient availability would lead to fluctuation in metabolic energy homeostasis. The current study compares the expressions of Akt and mTOR in murine brain tissues having orally and intraperitoneally administered NaB (butyrate salt) and metformin with those of control group. 15-18 weeks old mice were given drugs dosage after every 24 h for 16 days. The mice were sacrificed and internal organs were dissected out. Total RNA was extracted from brain tissues and used for cDNA synthesis. Real time PCR was performed to measure relative gene expression. Results showed

the increased expressions of Akt (fold=1.93; p=0.04) and mTOR (fold=1.84; p=0.07) in response to oral NaB treatment. The intraperitoneal NaB resulted in slightly decreased expressions of Akt (fold=0.81; p=0.8) and mTOR (fold=0.95; p=0.8). In metformin group, expressions of Akt (fold=0.71; p=0.2) and mTOR (fold=0.70; p=0.4) were decreased in oral treatment. Similarly, expressions of Akt (fold=0.88; p=0.7) and mTOR (fold=0.50; p=0.09) were decreased in intraperitoneal administration. This study revealed differences in the pattern of genetic expression with oral and intraperitoneal route of NaB in mice. Whereas metformin showed decreased expressions of Akt/mTOR axis in both routes of drug dosage. Increased expressions of Akt/mTOR axis in oral NaB can be related to provide more energy and survival signals for the growth and proliferation of healthy cells. Decreased expressions of Akt/mTOR axis in mouse models have anti-cancer effect in regulating the apoptosis of abnormal cells to prevent their further growth and proliferation.

CBGP-26

Effect of Butyrate nn Gene Expression of Sirt1 and AMPK - Involved in Nutrient Sensing and Energy Homeostasis - in Murine Brain

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Butyrate has been characterized as a histone deacetylase inhibitor. It causes acetylation of histone altering expression of regulatory proteins and several transcription factors, thereby affecting cellular energy homeostasis and proliferation. Butyrate restores brain functions and exhibits several neuroprotective effects in many neurodegenerative diseases. Sirt1 and AMPK can reciprocally enhance each other's activity and have a crosstalk in regulation of metabolic responses. In current study, murine brain cells were used to determine the effect of NaB (butyrate salt) on gene expression of AMPK and Sirt1. Mice (15-18 weeks old) were treated with NaB (experimental group), metformin (positive control) and PBS (negative control); all given orally as well as intraperitoneally (I.P) for 16 days. Total RNA was isolated followed by cDNA synthesis and gene expression was determined by real time PCR. The expression of AMPK was increased 1.62 (p=0.3) and 2.81 folds (p=0.01) in response to oral NaB and metformin, respectively. Sirt1 expression remained unchanged by NaB but was increased by 2.12 folds (p=0.1) in response to oral metformin treatment. Similarly, in case of I.P treatment, NaB and metformin groups showed insignificantly decreased genetic expression of AMPK; 0.78 and 0.90 folds, respectively. The expression of Sirt1 was increased by 2.88 folds (p=0.3) and 1.22 folds (p=0.3) in response to I.P NaB and metformin treatments, respectively. These results showed that NaB exerts same effect on AMPK/Sirt1 axis in murine brain as that of metformin. This study constitutes a step forward in understanding the neuroprotective role of NaB through enhanced expression of factors involved in AMPK/Sirt1 axis.

CBGP-27

Cloning and Characterization of Cry11 Crystal Protein from *Bacillus thuringiensis*

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Bacillus thuringiensis is an entopathogenic soil dwelling bacteria which produce cry and cyt toxin and are being used as a bio pesticide rather than chemical insecticide to control resistance in insects. The present study describes the screening of toxic *Bt*. (9NF, 4NF, 6NF) isolates having 99% homology with *Bti* .prototoxin *Bacillus thuringiensis* (AXJ97553.1 & novel OUB27301.1) which harbouring full length *cry11* gene (1.9kb). Full length *cry11* (1.9kb) gene was initially cloned in pTZ57R/T and subcloned in pET-30a (+) for expression. The suitable optimized condition IPTG induction was 1mM and incubation period was ranging 3.5 -4

hours at 37ºC to get good expression. Bioassays were performed with expressed purified and crude recombinant protein against 3rd instar larvae of *Aedes aeygpti* using recombinant organism (*E.coli* BL21, DE3) transmuted with *cry11* gene. Purified *Bt.* protein is most toxic with LC50 value of 42.883±6 µg /ml against dipterans larvae.

CBGP-28

Prevalance of Hepatitus B and C in Thalasemic Patients of Bagh

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Thalassemia is a well-known inherited hematologic disorder caused by a decrease or an absence of globin production. Thalassemia patients depend upon regular blood transfusion for maintaining their hemoglobin level. Due to regular blood transfusion in these patients their lives saves, but increases the risk of getting viral infections like hepatitis B virus, hepatitis C virus and human immunodeficiency virus. The aim of this study was to find out the relative abundance of HBV and HCV in some districts of Azad Jammu and Kashmir. During the study period, a total of 145 Thalassemic patients were enrolled in two different centers (hospitals) of Azad Jammu and Kashmir. All of these patients were previously admitted and regularly receiving blood in respective centers. Out of them, 81 were registered in Sheikh Khalifa Bin Zaid Hospital, Rawalakot and 64 in District Headquarter Hospital Bagh, Azad Jammu and Kashmir. Out of the total 145 Thalassemic patients, 15 (10.34%) were positive for HCV while all others were negative and only 3 (3.70%) out of 81 patients were HBsAg positive in Sheikh Khalifa Bin Zaid Hospital Rawalakot while no one was HBsAg positive in District Headquarter Hospital Bagh. The highest number of HCV and HBV positive patients was found in Rawalakot as compare to Bagh. More blood donor screening programs and effective screening techniques are needed to prevent transmission of HCV infection among Thalassemic patients. All Thalassemic patients should be vaccinated for HBV before transfusion. Blood donor screening programs and effective screening techniques are needed to prevent transmission of HBV and HCV infection in Thalassemic patients.

CBGP-29

Sequence of C-Peptide and Residues on the Acyl-Side of Scissile Bond Determines the Cleavage Specificity of Trypsin for Conversion of Proinsulin to Insulin

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In vivo, proinsulin is processed to insulin using two prohormone convertases, PC1 and PC2and a carboxypeptidase E. The convertasesshow specificity for the cleavage of dibasic (RR and KR)–X bond at A/C and B/C junction. In vitro, these two classes of enzymes aresubstituted by trypsin and carboxypeptidase B respectively.A kinetic study of trypsin proteolysis of M–proinsulin in the absence and presence of carboxypeptidase B was performed. The proteolysis of M–proinsulin with trypsin alone, initially produced M–insulin–RR and M–insulin–R which preferentially gave Des–30–M–insulin as a major product. But in the presence of carboxypeptidase B along with trypsin, these extra arginine residues, from M–insulin–RR and M–insulin–R, were cleaved immediately by carboxypeptidase B and converted into M–insulin, with minor traces of Des–30–M–insulin. The results suggest the protection of the K_{29}–A_{30} bond of insulin by the attack of trypsin. This protection could be due to the fact that insulin contains compact secondary structure that does not allow trypsin to reach the K_{29}–A_{30} bond. However, the unexpected feature in our work is that the mere presence of arginine residues at the C-terminal of insulin B-chain, in M–insulin–RR or M–insulin–R, makes this region less compact and the K_{29}–A_{30} bond becomes accessible to trypsin.

CBGP-30

Co-Expression of Chaperonin Groel to Enhance Soluble Expression of Recombinant Prochymosin In *Escherichia Coli*

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Prochymosin is an inactive form of chymosin that is widely used in cheese preparation due to its higher ability for milk clotting and less proteolytic activity. Traditionally, chymosin has been isolated from the calf's stomach but in modern era as the consumption of cheese increasing worldwide, therefore recombinant DNA technology is useful to produce chymosin at large scale. Previously, it was studied that prochymosin is expressed as inclusion bodies in *E. coli* host system using pET21a vector. The objective of this study was to co-express prochymosin and GroEL proteins in *E.coli (Rosetta gami)* host system under optimized conditions. For this purpose, cDNA of M-prochymosin was cloned in pETDUET-1 alone (M-prochymosin/ pETDUET-1) and in another pETDUET1 expression vector that already contain GroEL gene in one of the MCS of vector (M-prochymosin/GroEL/pETDUET1). Various conditions (IPTG concentration, post-induction time and temperature) were optimized for better soluble expression of Met-prochymosin in *Rosetta-gami* cells. The soluble expression of M-prochymosin was obtained at 25ºC temperature with induction at 1 mM IPTG for 48 hours. The results here indicated that soluble expression yield of M-prochymosin was increased by assisting its expression with chaperone, GroEL. These findings were remarkably comparable with the results when Met-prochymosin was expressed alone without chaperone assistance. It can be presumed that it might be a potential tool to enhance solubility of aggregation-prone proteins.

CBGP-31

Study on the Total Proteins Expression of Different Regions of Epididymis in Damani Goat Buck

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The provision of animal origin protein to the ever raising population in the country demands the exploration of the hidden productive and reproductive potential of the local indigenous animal resources. Accordingly here we attempted to documents the exploration of the potential reproductive capabilities of the damani bucks, especially appraisal of total protein expression in three different region of the epididymis which were associated with diverse reproductive functionality including semen maturation and preparing for the fertilization capability. Experiments were carried out on the epididymis specimen of the adult dammani bucks that were collected from the local slaughter houses in Peshawar. The specimens were brought the laboratory of Vet. Anatomy and histopathology, CVS. Protein expression in the three segment of the epididymis were carried out in the protemic section in Histopathology laboratory using recently developed protemic protocol. During current proteomic study, structural protein as indicate 70 and 100 were predominantly expressed in all the three region of the epididymis. The protein associated with secretary activities were also expressed in the three region of the epididymis as indicated with 35. Additionally the protein having relevance with both structure and secretion were expressed in the head, body and tail segment of the epididymis in the damani buck as indicated 15 and 25 respectively. Thus the current study demonstrated the significance of the protein expression profile in the different region of the epididymis in the dammani buck that have the relevance in the enhancement of the reproductive management and improvement to explore the hidden potential of the local animal resources.

CBGP-32

Molecular Cloning and Characterization of the Gene Coding for the NADH Dependent Azoreductase (AzK) from *Klebsiella pneumoniae GM04*

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Eco-friendly and cost effective approaches are needed to remediate dye-contaminated wastewater from various industries before their release into the ecosystem. In this study, a local bacterial strain was isolated from a textile wastewater, capable of decolorizing disperse blue 284 dye and identified as *Klebsiella pneumoniae*. For maximum decolorization the conditions was optimized. The DNA was isolated by phenol-chloroform method and azoreductase gene was amplified by using specific primers. The amplified gene was ligated into cloning vector. The gene sequenced was submitted to NCBI and under accession number MT758472. The gene was further cloned in expression vector pET21a and transformed into $BL21C^{+}$ for expression. The optimum condition for expression of AzK was obtained at 0.5mM IPTG for 6hr. Three dyes DB-284, RRR and BGL were decolorized by crude extract and purified AzK enzyme analyzed by UV-vis spectrophotometry. The purified enzyme showed maximum decolorization 96% as compare to crude extract 76%. The metabolites were confirmed by GC-MS analysis.

CBGP-33

Identification of Novel Natural STAT3 Inhibitors by Virtual Screening

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Cancer is the second leading cause of death worldwide, characterized by disruption of various epigenetic, genetic, metabolic and signaling pathways. Signal transducer and activator of transcription 3 (STAT3) is one of the most important oncogenic transcription factor and constitutive activation of STAT3 play an essential role in cancer initiation, proliferation, metastasis, progression, chemo-resistance and immune invasion. Therefore, it has become an attractive therapeutic target for cancer drug development. In this context, 100 compounds from natural compound library were screened out against STAT3 protein. By docking analysis, twelve compounds were found to target STAT3 protein but three compounds including solasodine, euscaphic acid, and cichoriin appeared as top candidates with high binding energies -8.4, -8.4, -7.9 kcal/mol respectively in comparison with well-known commercially available STAT3 inhibitor S3I-201 (-7.6 kcal/mol). These compounds inhibited the constitutive activation of STAT3 by directly binding to DNA binding domain of STAT3 and impaired targeted genes expression. Moreover, pharmacokinetic properties of these compounds by ADMET (Adsorption, distribution, metabolism, excretion, toxicity) analysis also spoke for their efficacy in pharmacodynamic activities these findings collectively suggest that solasodine, euscaphic acid, and cichoriin are novel potent anticancer agent and may be worth for developing anticancer therapies after further investigations.

CBGP-34

Effect of Levofloxacin on Complete Blood Count Profile Shifa Rabbani

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A total number of 10 young individuals ranging from 20 to 30 years of age were included in this research from the University of the Punjab during the months of December 2019 to February 2020. The subjects were divided into two groups; one was the controlled group in which the blood samples were taken from the subjects without any drug treatment while the other one was the experimental group in which the subjects were treated with 6 doses of Levofloxacin (500mg) while they were suffering from common flu and then their blood samples were recollected after using Levofloxacin for three days. The blood samples from the controlled and experimental groups were analysed for complete blood count profile. The data demonstrated that the level of Haemoglobin (Hb), Mean Corpuscular Haemoglobin Concentration (MCHC) and Neutrophils was lower a bit in experimental group as compared to the controlled group. Moreover, the number of Red Blood Cells (RBCs), Haematocrit value and Eosinophils increased in experimental group as compared to the controlled group. The other parameters; Lymphocytes, Platelets, Mean Corpuscular Volume (MCV), Mean Corpuscular Haemoglobin (MCH) and Monocytes were significantly lower in experimental group as compared to the controlled group but there was almost the same average of White Blood Cells found in both of the groups. To conclude, the findings of present study demonstrated that Levofloxacin could affect complete blood count profile of human.

CBGP-35

Clinical Characteristics and Factors Associated with Amenorrhea in Female Population in Peshawar

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Amenorrhea is the absence of menstrual bleeding. In females of reproductive age, diagnosing amenorrhea is a matter of determining etiology behind it. The aim of present study was to investigate factors associated with amenorrhea in female population in Peshawar. A total of 200 patients (aged 15-39) with amenorrhea, who visited the department of Gynecology Health Care Center Peshawar between July, 2020 and March, 2021 were included in this study. Questionnaire is designed including different factors. 2% of patients were suffering with primary amenorrhea and 98% were suffering with secondary amenorrhea. The secondary amenorrhea was higher in married females (85%) than unmarried (14.5%). The common symptoms among patients were stress (78.7%), PCOS (30%), mood swings (81.2%), bloating (81.7%), fatigue (81.2%), Hirsutism (64.0%), acne (51.3%), pelvic pain (56.9%) and osteoporosis (17.3%). Only 18.8% patients perform physical activity while 90.5% don't have habit of exercise. Primary infertility was also higher than secondary infertility among the analyzed patients. Only 2% of patients gave a history of diabetes and 13.7% patients reported for galactorrhea only. The study reported high prevalence of secondary amenorrhea due to PCOS, abnormal hormonal balance, stress and obesity. Since the complications of amenorrhea take considerable time to develop, it is recommended that females should visit to the doctor early to prevent future complications like infertility.

CBGP-36

Sequence Analysis, Phylogenetic Tree Analysis, Secondary Structure Prediction and 3D-Homology Molecular Modeling of *Oryctolagus cuniculus* (Rabbit) Leptin

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Leptin is a member of a cytokine family synthesized by adipocytes and primarily functions against obesity. Leptin reaches the central and peripheral nervous systems, and acts by binding with leptin receptor and activating it, thus regulates appetite and food ingestion, discharge of insulin, basal metabolism, bone mass and reproduction. Recent work was conducted to study sequence analysis, multiple sequence alignment and phylogenic tree analysis of leptin. This study predicted the secondary structure of leptin family proteins. The multiple sequence analysis of rabbit leptin showed that out of 167 amino acid residues, 68 positions are found conserved. Phylogenic tree analysis has shown a close relationship between African elephant, woolly hare and rabbit leptin. The predicted 3D structure of rabbit leptin shows the presence of four alpha-helices. At positions 94 and 144, and 59 and 117, functionally important and conserved cysteine and tyrosine residues are present, respectively. Mutation analyses in human leptin has shown the presence of certain amino acids in rabbit as wild type. These finding suggests that rabbit can be used as promising model to study human leptin related diseases.

CBGP-37

Anti-adipogenic Potential of *Cissus quadrangularis*

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Obesity is a multifaceted disease which involves an excessive amount of body fat. It is consider as a medical problem that increases the risk of other diseases and health problems, such as heart disease, diabetes, high blood pressure and certain cancers. There are severe side effects of obesity medication approved by FDA. The herbal alternative for weight loss medication will not only provide effective reduction in BMI (body mass index) but also will be free of severe side effects. *Cissus quadrangularis* (CQ) has potential to be used as alternative to other weight management medications. The study in our laboratory shows anti-adipogenic potential of CQ solvent fractions and its implications on obesity. Analysis of cell viability, growth, proliferation and metabolic activity assays on 3T3-L1 cell line revealed the non-cytotoxic, metabolic and proliferative concentrations of Ethyl Acetate (CQ-EA) and Butanol (CQ-B) (0.0001µg/ml, 001µg/ml, 1 µg/ml and 10 µg/ml). 3T3-L1 cells were treated with these non-detrimental doses of selected solvent fractions during cell differentiation into adipocytes (adipogenesis). In correlation with its results, expression profile analysis was also performed which revealed that CQ fractions downregulated expression of adipogenic and lipogenic marker genes including *PPAR-γ, aP2, LPN and ADIN*. The expression profiles of adipogenic marker and lipogenic marker genes indicate that these CQ solvent fractions (CQ-EA and CQ-B) have anti-adipogenic potential. This conclusion correlates with the results of triglycerides estimation and semi-quantification of neutral lipids by ORO staining. The threshold for a good anti-obesity drug was set at reduction of 40 – 50% triglycerides and neutral lipid content of the cells. *Cissus quadrangularis* proves to be responsible for inhibition or delay in the cell differentiation process (3T3-L1) and lipid synthesis, acting as a good anti-obesity drug which should also enhance synthesis of cytokines (adiponectin and leptin).

3. HUMAN AND ANIMAL DISEASES

CBGP-38

Developing Innovative and Alternative Regime for Controlling Bovine Tuberculosis in Animal-Human Interface

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Bovine tuberculosis (bTB) is a neglected endemic zoonosis, causing lot of mortalities every year. Previous methods of controlling bTB, like vaccination, antibiotics, have raised the concern of animal product consumers regarding microbial resistance. These measures have not been proved effective in developing countries, so disease prevalence in these areas is increasing continuously. In a report from WHO, Pakistan have been declared Eight out of ten countries with the highest incidence of bTB. So, there is dire need to find new therapeutic and preventive measures against Mycobacterium infection. Identification of selection signatures for genetic resistance is promising new alternate to combat bTB. Many of countries have opted this new approach and have reported useful data in cattle but very limited efforts have been put into the river buffaloes. River buffaloes of Indo-Pak region are world famous for their superior genetic potentials and inter-breed variations that provides substantial basis for identification of significant selection signatures. Present research was planned to explore IFNg and Toll-Like receptor genes in river buffalo for its association with bTB. Interferon gamma (IFNg) and Toll-Like receptor genes are key responder cytokines in Mycobacterium infection. For their genetic characterization, blood was collected from tuberculin negative (n=267) and tuberculin positive (n=194) animals. DNA was extracted and Sanger's method of DNA sequencing was used. Significance of each variation was tested by Hardy Weinberg equilibrium (P<0.05). Association was performed by one way ANOVA. Sequence comparison of two groups provided a total of five variations. Results illustrated only one variation found significantly associated with better immunity against bTB. For purpose of some additional and supportive information phylogenetic analysis was also being performed by neighbor joining method with bootstrap value-1,000. Tree indicated that river buffaloes are in closest proximity to Bos taurus and its genetic distance from other species may also be seen in Figures provided.

CBGP-39

Seroprevalence of *Borrelia burgdorferi* sensu lato in camel (*Camelus dromedarius*) in Punjab, Pakistan

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A seroprevalence study conducted on the presence of *Borrelia burgdorferi* sensu lato antibodies in camel of two district of Punjab, Pakistan from May 2019 to January 2021. The aim of present study was to detect the antibodies against *Borrelia burgdorferi* sensu lato in camels. A total of 405 serum samples were collected from two districts of Punjab i.e., Bhakkar and Bahawalpur. A questionnaire was used to collect data regarding potential risk factors like gender, age and tick infestation. Serological examination revealed the positive percentage of *Borrelia burgdorferi* sensu lato in camels was 2.47% (10/405). Risk factor analysis showed that gender, age and tick infestation are significantly ($p < 0.05$) associated with occurrence of borreliosis in camels. This study reports, for the first-time, presence of antibodies against *Borrelia burgdorferi* sensu lato in camels in Pakistan. Camels may play an important role in the transmission of borreliosis in other animal species as well as humans in Pakistan.

CBGP-40

Assessment of Respiratory Problems in Workers Associated with Intensive Poultry Facilities in Pakistan

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The poultry industry in Pakistan has flourished since the 1960s; however, there are scarce data regarding the impact of occupational exposure on the pulmonary health of farm workers in terms of years working in the industry. The objective of the present study was to assess the effect of poultry environment on the health of occupationally exposed poultry farmers in countries of warm climatic regions, such as Pakistan. This study will also show the effect of exposure to poultry facilities on the health of poultry farmers in the context of low-income countries with a relatively inadequate occupational exposure risk management. The lung function capacity of 79 poultry workers was measured using a spirometer. Along with spirometry, a structured questionnaire was also administrated to obtain information about age, height, weight, smokers/nonsmokers, years of working experience, and pulmonary health of farm workers. The workers who were directly involved in the care and handling of birds in these intensive facilities were considered and divided into four groups based on their years of working experience: Group I (3-10 months), Group II (1-5 years), Group III (6-10 years), and Group IV (more than 11 years). The forced vital capacity (FVC), forced expiratory volume in one second (FEV1) and the FEV1/FVC ratio were considered to identify lung function abnormalities. Statistical analysis was carried out using independent sample t test, Chi-square test, Pearson's correlation, and linear regression. Based on the performed spirometry, 68 (86 %) of workers were found normal and healthy, whereas 11 (14 %) had a mild obstruction. Of the 11 workers with mild obstruction, the highest number with respect to the total was in Group IV (more than 11 years of working experience) followed by Group III and Group II. Most of the workers were found healthy, which seems to be because of the healthy survivor effect. For the independent sample t test, a significant difference was noticed between healthy and nonhealthy farmers, whereas Chi-square test showed a significant association with height, drugs, and working experience. Linear regression that was stratified by respiratory symptoms showed for workers with symptoms, regression models for all spirometric parameters (FVC, FEV1, and FEV1/FVC) have better predictive power or R square value than those of workers without symptoms. These findings suggest that lung function capacity was directly related to years of working experience. With increasing number of working years, symptoms of various respiratory problems enhanced in the poultry workers. It should be noted that most of the poultry workers were healthy and young, the rationale being that there is a high turnover rate in this profession. The mobility in this job and our finding of 86% of the healthy workers in the present study also proposed healthy worker survivor effect.

CBGP-41

Assessment of Tuberculosis in Patients Visiting District Hospital Charsadda

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Tuberculosis is an infectious disease caused by rod shape bacteria called mycobacterium. Tuberculosis generally affects lungs, but can also affect other parts of the body such as bones, lymph organs and intestine. Tuberculosis is more common in people with immune system problem, the classic symptoms of active TB are a chronic cough, fever, night sweats and weight loss. The study aimed to found out the prevalence tuberculosis in District Charsadda, Khyber Pakhtunkhwa. The study was conducted at DHQ hospital Charsadda. The Secondary data was used from hospital record. A total of (921=100%) patients were screened to investigate the presence of TB bacteria during three month (). The Majority of people of age 25-45 were

suffering from tuberculosis. The prevalence was higher in males than female. According to the present study the ratio of pulmonary tuberculosis is higher than extra-pulmonary tuberculosis in district Charsadda. The patients of pulmonary tuberculosis were (500=54%) and extra-pulmonary was (421=45%).

CBGP-42

Risk Factors Associated With an Outbreak of Dengue Fever in District Kasur, Punjab, Pakistan

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Dengue fever (DF) appeared to be emerging in 112 union councils of District Kasur Punjab, Pakistan in January to November in 2021. A controlled case study was performed to investigate risk factors for the surveillance of DF in Tehsil Kasur (43 union councils), Pattoki (27 union councils), Kot Radha Kishan (11 union councils) and Chunian (31 union councils) of district Kasur. A total of 132 patients with DF were studied in all the union councils of all four tehsils of the district Kasur. Out of 132 patients 96 were male and 36 were female. We further divided under study patients in three categories such as below 25 years (38 patients), 25 to 40 years (63 patients) and above 40 years (31 patients). The risk factors for these patients were factories, water ponds, godowns, swimming pools, nurseries, service stations, abundant buildings, marriage halls, hotels, schools, grave yards, mosques, religious places, parks, tyre shops, junk yards, workshops, railway stations, colleges, bus terminals, tube wells, grid stations, high raised buildings, parking stands, horticulture places, filtration plants, dairy plants, open sewerage system, supply of water through water tanks, its improper storages at homes, unhygienic conditions found during indoor survey especially in rented areas, under construction buildings and living in a house discharging sewage directly into to ponds were all significantly associated with DF. These all risk factors provided best habitat for the growth of dengue larva at these areas. These results contributed to the understanding of the dynamics of dengue transmission in 112 union councils from which 48 were red (with dengue patients and dengue larva), 56 yellow (with dengue larva) and 8 were green (neither dengue patients and dengue larva) and its vicinity, which was needed to implement dengue prevention and control programmes effectively and efficiently.

CBGP-43

Identification and Characterization of Sesquiterpene Lactones as Potential Falcipain-2 Inhibitors

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Malaria is a disease transmitted through the bite of a female *Anopheles* species of mosquito infected with one of the four species of *plasmodium: Plasmodium falciparum, Plasmodium vivax, Plasmodium ovale* and *Plasmodium malariae* in humans. *Plasmodium falciparum* is a protozoan parasite that causes the most virulent form of human malaria and kills at least one million children annually. According to World Health Organization (WHO) reports 1999–2004, over two billion people, representing more than 40% of the world's population, are at risk of contracting malaria, and the number of malaria deaths worldwide has been estimated to be 1.1–1.3 million per annum. In Pakistan, 500,000 malaria infections and 50,000 malaria-attributable deaths occur each year. At present, different anti-malarial drugs are available in the market for example, Chlorquine and other similar Quinolones (e.g. Hydroxychloroquine**),** Quinine, Primaquine, Mefloquine, Sulfonamides and Artesunate & Artemether (Artemisinin analogs). However, *Plasmodium falciparum* has developed resistance to all these drugs*.* Falcipain-2 (FP-2) of

Plasmodium falciparum is a papain-family (C1A) cysteine protease that plays an important role in the parasite life cycle by degrading erythrocyte proteins, most notably hemoglobin. Inhibition of FP-2 and its paralogues prevents parasite maturation, suggesting these proteins may be valuable targets for the design of novel anti-malarial drugs. Since prevailing anti-malarial drugs are suffering from drug resistance, therefore identification of new novel bioactive molecules with potent anti-malarial activity are highly desirable. Here in this study, we found two sesquiterpene lactones; Alantolactone and Brevilin A as falcipain-2 inhibitors. Alantolactone has been found to show hydrophobic interactions with TRP206, CYS42 and HIS174 residues of 2GHU at a bond distance 3.69181Å, 4.70387Å and 5.28753Å, respectively. The binding energy value obtained from the interaction of Alantolactone with 2GHU was -7.2kcal/mol. The inhibition constant value acquired from binding energy value was 5.205μM. While our second docked compound Brevilin A form hydrogen bonding with ASN173 and TRP206 residues of 2GHU at a bond distance 2.40334Å and 2.50892Å, respectively. The binding energy value obtained from the interaction of Brevilin A with 2GHU was -8.1kcal/mol. The inhibition constant value acquired from binding energy value was 1.136μM. Our Molecular Docking study results have suggested that both studied sesquiterpene lactones are potential inhibitors of falcipain-2 but Brevilin A is predicted to be the best inhibitor of falcipain-2 as it forms strong bonding (hydrogen bonding) with amino acid residues of falcipain-2 and has lower value of binding energy and inhibition constant. Further *in vivo* and *in vitro* studies should be done to validate these findings and develop these two bioactive sesquiterpene lactone compounds into novel anti-malarial drugs.

CBGP-44

Association of Epidemiological and Hematological Parameters with Repeated Spontaneous Miscarriages during First-trimester of Pregnancy: A Case Control Study

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We aimed to investigate the association of first trimester repeated spontaneous miscarriages with hematological profile, blood group and age. This case-control study was conducted at the laboratories of Zoology department The Women University Multan and the Department of Hematology, Nishter Hospital Multan, from June 2016 to Dec 2019. A total of 500 participants, 300 with spontaneous abortion and 200 healthy pregnant controls in first trimester of pregnancy were included in this study. The data was collected through questionnaire at the time of sampling after obtaining informed consent. ABO and Rh blood group was identified by using Antisera (including Anti-A, Anti-B and Anti-D) The analysis of haematological indices was done by using automated haematological analyzer (Sysmex Co. Japan).The mean maternal age in this study was 30.35±7.94 years for cases and 28.53±6.59 years for controls. Highest frequency of miscarriages 90 (30%) was observed in cases of age group 35-39 while lowest frequency of miscarriages 30 (10%) was observed in age group 20-24. Whereas, highest frequency 94 (47%) and lowest 2(1%) of controls were observed in age group 25-29 and 15-19 respectively. Out of 500 women 438 (87.6%) were Rh positive (including 256 cases and 182 control) and 62 (12.4%) were Rh-negative (including 44 cases and 18 controls). The observed ABO distribution pattern was B>A>O>AB. Blood group B was most frequent (34%) including 18% cases and 16% controls. Percentage of Rh-negative was higher in cases than controls 14.6% vs 9% but ABO and Rh blood groups showed no association with RSM in this population p=0.372; p=0.08 respectively. Haematological evaluation revealed significant decrease in Hb (p<0.001), MCV (p<0.001) and MCHC (p=0.006) values in cases as compared to controls whereas no significant differences found between the case and control

groups in terms of RBC, WBCs, HCT, MCH, neutrophils, lymphocytes, and PLT ($p>0.05$). It is concluded that the age groups 35-39 years and significant changes in the values of Hb, MCV and MCHC may be associated with repeated spontaneous miscarriage in this population.

CBGP-45

A Descriptive Epidemiological Study of Head and Neck Cancer in Nishtar Hospital Multan

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Number of head and neck cancer patients is increasing every day worldwide. Much research has been done all over the world regarding different features of HNC but in Southern Punjab little or no work has been done. 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. Data was collected from biopsy proven Head and Neck Cancer patients during April 2017 to July 2019 and analyzed for clinico-pathological features. The ratio of HNC was more in male patients as compared to female patients Mean age of patients was 54.77±15.96 and 44.31±14.79 for male and female respectively. Majority of the patients belonged to Dera Ghazi Khan Division. The habit of smoking was identified in 51% patients and 49% patients were nonsmokers. Majority patients belonged to poor family background and vegetarians were more frequent. Only 47.1% patients did care of oral cleanliness. More than half of the patients were of stage III. Moderately differentiated tumour (Grade 2) was the most frequent grade. Regarding tumour size and nodal status, T3-4 and N0 were more frequent with frequency of 71.0% and 50.4% respectively. The Larynx was found to be the most common affected site of HNC patients with significant subsites of Glottic area. Squamous cell carcinoma was the commonest type as compared to Basal Cell Carcinoma, Adenocarcinoma and Lymphoma.

CBGP-46

Seroprevalene of Toxoplasmosis in Residence of Karor Pakka District Lodhran

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This study was conducted to evaluate the prevalence of toxoplasmosis in humans of Kehror Pakka, district Lodhran. The blood sample (n=92) were collected in EDTA vacutainers, and then prevalence of toxoplasmosis was analyzed through commercial Enzyme Linked Immunosorbent Assay (ELISA) kit and also studied the effect of *Toxoplasma gondii* on haematology of hosts. The overall prevalence of toxoplasmosis was 45.16%. the relationship between gender of peoples revealed that prevalence was high in females (45.16%) than males (45%). Similar relationship between the age groups 12-23, 24-35, 36-47 and >48 years showed prevalence 48.14, 39.53, 46.66 and 62.5% respectively, which showed higher prevalence in age year >48 and lower in age year 24-35. The relationship between literacy rate of peoples indicated that prevalence was higher in non-educated males (45.5%) than educated males (44.4%). Similarly, prevalence was high in educated females (57.14%) than non-educated females (37.5%). The relationship between socioeconomic status and prevalence of toxoplasmosis showed 48.57, 40 and 62.5% in poor, middle and rich peoples respectively. For analysis of hematological parameters blood samples were collected. The Mean ± SEM values of WBC, LYM, MID, GRA, HGB, MCHC, MCH, and MCV were 8.731 ± 0.609, 2.914 ± 0.246, 0.7078 ± 0.0493, 7.03 ± 2.03, 9.748 ± 0.449, 28.868 ± 0.431, 24.051 ± 0.790, and 82.86 ± 1.85 respectively high in non-infected peoples. Whereas RBC, RDW-SD, RDW-CV, HCT, PLT, MPV, PDW, PCT and PLCR were 4.2910 ± 0.0921, 46.751 ± 0.611, 17.227 ± 0.570, 34.45 ± 1.02, 271.9 ± 35.1, 8.437 ± 0.164, 12.842 ± 0.406, 0.2235 ± 0.00258, and 27.62 ± 1.53 respectively high in infected peoples.

CBGP-47

Prevalence of Giardia lamblia in Children of Peshawar

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Giardia lamblia is a water-born protozoan that infects intestinal tract causing infectious gastroenteritis. In developed countries, Giardiasis account for 2-7% of all diarrheal illness. Clinical manifestation of Giardiasis can be variable ranging from asymptomatic to acute or chronic diarrheal diseases. The present study was conducted to determine the age, sex and month-wise prevalence of Giardia lamblia in children aged 1-12 years frim April to September 2018. A total of 150 children were enrolled in the study. Stool samples were collected and analyzed for parasite presence using microscopy. Out of 150 samples Giardia lamblia was detected in 6 (4%) cases. Prevalence was higher in children with aged 5-8 years (6.1%) compared to other groups. Male children were more infected (4.2%) as compared to female children with a Prevalence rate of (3.2%) respectively, but the difference was not significant. Different seasons also affected the Prevalence rate of Giardia lamblia being more prevalent in summer. The higher Prevalence rate of 11% was observed in the month of August followed by 8.3% and 4.3% in the months of July and September respectively. The lowest rate was recorded in month of April 2018 and September 2018, 150children were randomly selected. A stool sample with socio-demographic data was collected from each child. Climate change and population growth are also predicted to increase both malnutrition and the prevalence of these parasites in children.

4. MICROBIOLOGY

CBGP-48

Antimicrobial effect on Comfort properties (Absorbency, Air Permeability) of Cotton Fabric

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Cellulosic fabrics have great surface area and ability to provide good atmosphere for the progression of microbes thus they produce bad smell and irritation problems beside with textile weakening. This study was aimed to applying eco-friendly antimicrobial finish on textiles. The antimicrobial finish was extracted from leaves of *Azadirachata indica, Butea monosperma* and *Litchi chinensis* plants and applied on 100% cotton. Before and after applying, presence of microorganisms, FTIR, SEM, fabric properties and sustainability to washes were checked. The antimicrobial finish was applied by pad dry cure method and finish was fixed by using of poly urethane binder. The presence of microorganisms was checked by ASTEM E2149 shake flask method. The results were analyzed through MANOVA and ANOVA. The fabric properties were checked by using AATCC and ISO standard test methods. The eco-friendly antimicrobial finish made 89% reduction in microbial growth. In case of comfort related properties (Absorbency, Air Permeability) antimicrobial finish had positive effect on cotton fabric. The antimicrobial finish lasted up to 25 washes. The study suggested that antimicrobial fabric is suitable to provide protection cover for medical industry, paramedical staff, sports wears, home furnishing as well as common people.

CBGP-49

Evaluation of methicillin resistance in field isolates of *Staphylococcus aureus*: an emerging issue of indigenous bovine breeds

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The emergence of resistant strains of *Staphylococcus aureus (S. aureus)* particularly methicillin-resistant *S. aureus* (MRSA) confers overwhelming economic losses to the global dairy industry. The current study was planned to investigate the *S. aureus* and MRSA associated subclinical mastitis in 345 milk samples (Cattle n=173, Buffalo n=172) collected from indigenous bovines of district Rawalpindi. The milk samples were screened for *S. aureus* and the confirmed isolates were subjected to disc diffusion test, PCR and SDS-PAGE analysis for the confirmation of methicillin resistance. The results revealed an overall molecular prevalence of 28.69% for *S. aureus among which* MRSA-associated mastitis was found 47.61% prevalent. The SDS PAGE analysis depicted the presence of a 78KDa protein band specific for *PBP2a* protein in MRSA. The comparative risk factor analysis showed significant variation among risk factors associated with *S. aureus* and MRSA-induced mastitis. The phylogenetic analysis of MRSA *mec*A gene showed a high resemblance of the study isolates with MRSA isolates of the USA, Turkey, India, Africa, and Brazil. This is the first study regarding the molecular characterization and phylogenetic analysis of MRSA isolates from study area.

CBGP-50

Optimizing the Antibacterial Effect of Vinegar on Chopped Fruits and Vegetables

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Pre- and post-harvest contaminants threaten the safety of fruits and vegetables. Sanitizing effect of vinegar on some fresh fruits and vegetables was assessed for consumer's satisfaction. Five samples of chopped fruits and vegetables i.e. cucumber, melon, carrot, banana and apple were purchased from locally super market in Shad Bagh Lahore, Pakistan. The samples were treated with 2.5%, 5%, 7.5% and 10% acetic acid for 0, 15, 30, 45 and 60 minutes. Samples treated with 7.5%and 10%, acetic acid showed bacterial inhibition in fruits and vegetable after 30 min, 45 min and 60 minutes, at 28 ˚C to 31˚C. This study shows that acetic acid can be used as an effective sanitizer for fruits and vegetables for the inhibition of microbial contaminants and their growth.

CBGP-51

Assessment of Fruit Bat's (*Pteropus Medius*) Oral Microbiota through N.G.S

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A total of 5 specimens of *Pteropus medius* were captured from different roosting sites within the district Kasur, Punjab, Pakistan using mist nets. Sterile cotton swabs were used to collect saliva samples. DNA was extracted using QIAamp DNA Microbiome kit following the manufacturer's instructions. The next-generation sequencing of PCR products was done using overseas commercially available facility at macrogen Korea. The analysis result of bacterial species annotation is visually shown in KRONA plot. The abundance of identified bacterial phylum was Proteobacteria 81% > Firmicutes and Actinobacteria were 16%. Bacterial classes include Bacteroidia, Saccharimonadia, Negativicutes, Actinobacteria, Bacilli and Gammaproteobacteria were identified. The order of abundance was Gammaproteobacteria 81% > Bacilli 15% > Actinobacteria 3%. Similarly, Saccharimonadales, Xanthomonadales, Betaproteobacteriales, Pseudomonadales, Selenomonadales, Pasteurellales, Corynebacteriales, Bacillales, Lactobacillales were different bacteria order identified in saliva of fruit bat. The relative abundance of identified families was Enterobacteriaceae 79% > Streptococcaceae 8% > Corynebacteriaceae 3% > Pasteurellaceae 1%. Bacteria genera including Actinobacillus, Pseudomonas, Veillonella, Weissella, Pantoea, Staphylococcus, Streptococcus and Escherichia were identified. The percentage of Escherichia was 76%> Streptococcus 8%> Staphylococcus 5% > Pantoea 2% > and Weissella were 1%. The relative abundance of Escherichia Shigella was 76% followed by *Staphylococcus aureus* which is 3%. In our findings it can be concluded that fruit bat (*Pteropus medius*) can be the reservoir of pathogenic bacteria and can affect directly humans and livestock.

CBGP-52

Bacterial Laccases Mediated Decolourization and Degradation of Dianix Yellow Brown Disperse

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Rapid industrialization poses a serious threat to both the environment and human health because of toxic effluents. The conventional physicochemical approaches are not efficient to eliminate all types of industrial effluents. The bioremediation of industrial waste can be made more efficient by using ligninolytic laccase enzymes. Bacterial laccases actually belongs to the multicopper oxidases family and is engaged in the crosslinking of monomers, which is important in the degradation of a variety of

industrial pollutants. The present research was employed to assess the decolorization and biodegradation efficiency of Dianix yellow brown, a textile disperse dyes by using laccase producing bacteria. Three locally isolated laccase producing bacterial strains namely GY3, AY4 and AY1 showed significant biodegradation activity against Dianix yellow brown. The decolorization of dianix yellow brown resulted change in color from yellow brown to light yellow color. Under optimum conditions biodegradation efficiency of dianix yellow brown by using laccase producing bacterial strains was 72% with GY3, 89% with AY1 and 91% with AY4 after 48h. UV Visible spectroscopy and Fourier-transform infrared spectroscopy (FTIR) confirmed the biodegradation of dianix yellow brown.

CBGP-53

Prevalence of Multiple-Metal-Resistant Bacteria in Air Column at Different Localities of Lahore, Pakistan

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The study has been carried out to check out for the prevalence of various metal resistant bacteria in air column at Lahore, Punjab, Pakistan. Six different metals (Cu, Cr, Ni, Pb, Zn and Fe) have been used during this study, as the number of bacteria tolerant to each specific metal is checked at four different concentration levels (250ppm, 500ppm, 750 ppm and 1000 ppm). Load of aforementioned heavy metal resistant bacteria was observed from ten separate localities of Lahore district (Thokar Bypass, Thokar Niaz Baig, Doctor Hospital Under pass, Campus Under pass, Muslim Town Under pass, Dharampura Underpass, Mughalpura Under pass, Pakistan mint, Daroghawala Chowk and Iqbal colony). Bacterial colonies of Lead, Iron, Copper and Nickel resistant bacteria were clearly observed while Chromium and Zinc don't have any bacterial growth. Thus, representing the much higher proportion of air pollution in Lahore district, caused by Pb, Fe, Cu and Ni whereas comparatively much lesser air pollution prevailing due to Cr and Zn. Three localities namely Daroghawala Chowk, Iqbal colony and Muslim Town Under pass are under the worst scenario in case of air pollution caused by these observed heavy metals because of industrial waste (Daroghawala Chowk and Iqbal colony) and waste from heavy traffic (Muslim Town Under pass).

CBGP-54

Efficacy of Honey as Antibiofilm, Antiquorum Sensing and Dispersal Agent Against Multispecies Bacterial Biofilm

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Bacterial biofilms are a major worldwide healthcare problem (urinary tract infections) and are associated with decreasing quality of life and significant patient morbidity. This study is first to test Pakistani honey bess, *Apis dorsata* and *A. cerana* honey samples as anti biofilm, anti quorum sensing (QS) and biofilm dispersal agents honey against multispecies biofilm of bacteria (obtained from obese patients). Briefly, five previously identified isolates *Pseudomonas aeruginosa*, *Escherichia coli, Staphylococcus aureus*, *Morganella morganii* and *Klebsiella pneumoniae* (MT448672-MT448676) were selected. Antibiogram study of all five isolates was tested against three antibiotics *viz*., erythromycin (20 µg/mL), lincomycin (100 µg/mL) and rifampicin (100 µg/mL). In order to form multispecies biofilm, identified bacteria were grown in batch culture by mixing equal volumes (OD_{590nm}= 0.1) of 2, 3 and 5 bacterial isolates. In total 11 groups (g1-g11) were made. Crystal violet (CV) staining method was used to evaluate the antibiofilm potential and biofilm dispersal potential of both honey samples. QS inhibition in *P. aeruginosa* was measured following culture supernatant method. Antibiogram study showed significant ($p < 0.05$) resistance by *P. aeruginosa* against tested antibiotics. *E. coli*, *M. morganii* and *K. pneumoniae* were significantly susceptible to erythromycin and *S. aureus* to lincomycin. Minimum inhibitory concentrations (MIC) values of both honey samples showed 2 and 5% concentrations as having significant ($p < 0.05$) inhibition potential of multispecies biofilm by all test groups (g1-g11).

Though *A. dorsata* honey significantly inhibited biofilm formation at 2 and 5% against all groups but 2% concentration was highly significant against g2-g4 groups. Regarding *A. cerana* honey, 2% concentration was significantly effective against g1, g4-g7 and g9-g11 groups. Both honey samples significantly inhibited QS at 2 and 5%. The 5% concentration of *A. dorsata* honey significantly dispersed biofilm by all groups compared to 2% which showed dispersal potential only by g2 and g3 groups. Collectively, honey samples showed significant antibiofilm, anti-QS and biofilm dispersal potentials thus can be considered as good alternative to antibiotics.

CBGP-55

Role of Direct Fed Microbials (DFM) in the Enhancement of Nutritional Capabilities of Ruminants- A Current Scenario

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The gastrointestinal tractc (GI) is populated with as many as 2000 different types of bacteria. Some of these bacteria are beneficial, while others are pathogenic. The balance between these two types of bacteria helps the overall health of the animal. All bacteria require a source of nutrition for survival and beneficial bacteria and pathogenic bacteria compete for nutrients and attachment sites on the gastrointestinal mucosa. However some of the beneficial bacteria in the GI tract, such as bifidobacteria, use specific substrates for nourishment that pathogenic bacteria can not.Feeding a prebiotic that serve as a source of nutrition for the probiotic organism but not for the pathogenic bacteria gives a beneficial bacteria a competitive advantage over pathogenic bacteria. For instance, simultaneously feeding a probiotic bifidobacterium Animalis ACH7 with the prebiotic fructooligosaccharides(FOS) encourages the growth and survival of Bifidobacterium animalis ACH7. Feeding the prebiotic also results in increase persistence of probiotic in the GI tract. Probiotics are live microbial feed supplements which beneficially affect the host by improving its microbial intestinal balance. Correspondingly, in feed regulation probiotics are included in the group of feed additives stabilizing the microbial communities of the digestive tract in monogastric animal and ruminants. They are also known as digestive bio regulators or direct fed microbials. .Well known examples are the use of bacteria mainly lactic acid bacteria (LAB) for production of silage, fermented cabbage and sour milk products such as yogurt, cottage cheese and kefir and the use of yeasts mainly Saccromyces cervicae for production of bread, beer and wine. As man and animals are born with a sterile digestive tract, but very soon after the birth a wide diversity of microorganisms begins to colonize the digestive tract. The digestive compartments which are the most rich in microbes are the fore stomach (rumen) in polygastric animals while large intestine in the man and monogastric animal. An open and complex ecosystem is created which has an essential role for the host. On one hand the digestive microflora is involved in digestion, on the other hand it has a local impact on the immune system, thus offering the possibility to exert a positive and completely natural effect on health, well being and performance of animal through its autochotonous microflora. Supplementing different probiotics (fungi/yeast and bacteria) resulted in improved nutrient status and productivity of the ruminants under certain conditions. Lactic acid bacteria has been used for millennia in the production of fermented milk products and silage. Some form the main intestinal microflora and therefore an indispensable form of the resident microflora in man and animal. Lactic acid bacteria convert certain type of sugars by fermentation mainly into lactic acid. Important lactic acid bacteria in probiotics belong to the genera including Lactobacilli, Pediococci, Bifidobacteria and enterococci. Enterococcus faecieum previously known as Streptococcus faecium is the most important species used in the animal nutrition. More investigations are needed with different diets to confirm these effects and improve the knowledge on the mode of action of BL as additive for ruminants.

CBGP-56

Prevalence of Superficial Human Pathogenic Fungi in, Gilgit

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Fungi are eukaryotic unicellular such as yeasts to multicellular organisms such as puffballs with cell wall composed of chitin. They are fundamental for life on earth in their roles as symbionts, e.g. in the form of mycorrhizae, insect symbionts, and lichens. The total number of eukaryotic species on Earth has recently been estimated at 8.7 million with fungi making up approximately 7% (611,000 species) of this number .The fungal lineage is one of the three large eukaryotic lineages that dominate terrestrial ecosystems. They share a common ancestor with animals in the eukaryotic super group Opisthokonta. Fungi are of an ancient lineage and have a fossil record that extends back to the Devonian and Pre-Cambrian era. The earliest written record of fungi are not of the fungi themselves, but of their depredations. To the physician and poet Nicander fungi were 'the evil ferment of the earth; poisonous kinds originating from the breath of vipers. Mycology is that branch of biology where we studying about fungi. Fungi are multicellular eukaryotic fungi ranging from unicellular to multicellular fungi like yeasts. They are fundamental for life on earth in their roles as symbionts, e.g. in the form of mycorrhizae, insect symbionts, and lichens. Likewise fungi have its own significance regarding its beneficial to harmful effect ever on plants, animals or humans. Human pathogenic fungi is more prevalent in our environment due its consequences on human's hiddnley that's why called as "Hidden killers". Medical Mycology, a study of fungal epidemiology, ecology, pathogenesis, diagnosis, prevention and treatment in Human beings, is a newly recognized discipline of biomedical sciences, advancing rapidly. Fungal infections today are among the most difficult diseases to manage in humans. These diseases kill more than 1.5 million and affect over a billion people. Fungal diseases are a worldwide problem ranging from superficial infections easy to cure to more invasive life threatening infections that are much harder to diagnose and treat. Recent estimates suggest that invasive fungal infections cause at least as many deaths as malaria and tuberculosis. The burden of fungal disease continues to increase as the number of people with weakened immune system increase. They attack people with serious illness, and frequently jeopardize the success of the newest medical advances in cancer care, solid organ and hematopoietic stem cell transplantation, neonatal medicine, autoimmune disease therapies, trauma and intensive care, and sophisticated surgery. Gilgit city is the main city of GB, which is the main attraction area to people for its beauty and resource purposes like education sectors, job opportunities and health facilities. People use together for different purposes related to job, study or other work. This city is mainly surrounded by other towns like danyore, Shanglidaar and oshikhnadass. There are 4 main hospitals found in Gilgit are; DHQ hospital, City hospital, GMC hospital and CMH hospital Gilgit. Along with these hospitals one newly build hospital consist of 30 beds known as Shanglidaar hospital located in between Muhammad Abad danyore and oshikhnadass. According to my area of research 3 hospitals were chosen to collect human fungal skin samples are; DHQ hospital, City hospital and Shanglidaar hospital. Total of 30 patients were examined collectively from these hospitals, 14 fungal species (*Cryptococcus Neoformans, Actinomyces Israelii, Ajellomyces, Candida albicans, Cladosporium, Coccidioides ssp, Cryptococcus Neoformans, Emmonsia ssp, Geotrichum Candidum, Lacazia Loboi, Microsporum audouinii, Microsporum canis, Malassezia Fur Fur and Trichophyton Rubrum*).The identified ssp belonging to 8 families and 10 genera the highest number of ssp is from Tinea which is four in number of genus Trichophyton. Identification was done in KIU biology Lab.

CBGP-57

Low Cost Production of Bacterial Extracellular Polysaccharides

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Various industries manufacture polymers for well beings of human from centuries. But the industrial polymers have less uses in numerous fields for human as compared to the biopolymers. The exopolysaccharides or extracellular polysaccharides (EPS) are the biopolymers produced from cells. Both microbial and plants cells produce the extracellular polymers. But the plants biopolymers took long time for their generation and have less carbon chain length, molecular weight as well as less branching as compared to the microbial polymers. The high degree of branching and high molecular weights of EPS have many uses in the various fields of life, especially in pharmaceutical industries. This study mainly emphasized on high molecular weight exopolysaccharide production through microbes using low cost substrates. For this purpose pure strain of halophilic bacterium *Bacillus licheniformis* JF38 was grown on sucrose containing medium as well as on the low cost substrates like, potato peel, grape fruit peel and sugar cane bagasse. The product formed was tested by specific rotation, paper chromatography, TLC and FTIR. This study concluded that the one of these low cost substrate i.e potato peel was equally effective for production of levan exopolysaccharide as that of expensive substrate like sucrose.

5. PHYSIOLOGY

CBGP-58

Trace Element Composition in Whole Blood of Pregnant Women

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Elements like calcium(Ca), magnesium(Mg), iron(Fe), zinc(Zn), copper(Cu), cobalt(Co), nickel(Ni), chromium(Cr), manganese(Mn) and cadmium(Cd) are extremely important in maintaining the metabolism in human body. During pregnancy the metabolic demand of mother increases to support the metabolism of developing fetus and as a result the micronutrient demand of a mother´s body increases. Micronutrient deficiencies may cause significant risks during pregnancy like pregnancy induced hypertension, gestational diabetes mellitus, anemia, preeclampsia, miscarriage or labor complications. Although trace metal concentration was detected in general but the relationship of trace elements to the etiology of pregnancy is yet to be identified. . This study focused to estimate the levels of micro and macronutrients in whole blood of Pakistani pregnant women to investigate the changes in the concentration of these elements with the progression of gestation. Approval of study was obtained from "Bioethics Committee for research on Human Subjects", Faculty of Biological Sciences, Quaid-i-Azam University, Islamabad, Pakistan. A study group of 40 healthy non diabetic, non-hypertensive females was recruited and further divided into two age groups (Group I:20-30 years and Group II:30-40 years). Another group of 20 healthy non-pregnant females was formed and further sub divided into two according to age. Their sociodemographic, anthropomorphic and diet record was maintained and blood was collected by puncturing antecubital vein. Samples from the study group were collected three times (1st, 2nd and 3rd trimester). Samples were predigested by adding conc. nitric acid (65% extra pure) and then manually digested on a hotplate at 400 °C inside a fume hood for the estimation of concentration of trace metals through flame atomic absorption spectrophotometry (FAAS). One way ANOVA was applied on data to compare the trace element concentration between study group and control group and between 1st, 2nd and 3rd trimester. Correlation was determined by Pearson´s correlation and $p<0.05$ was considered as a statistically significant difference. The concentration of Fe in both groups was observed to decrease significantly in 2nd and 3rd trimester as compared to 1st and control group. Zn concentration was significantly lowered in 2nd and 3rd trimester as compared to non-pregnant control and 1st trimester in both groups. Ca level was significantly lowered as compared to 1st and control in group I, while in group II, the significant decrease in 2nd and 3rd trimester from 1st was observed. Mg in group I was significantly decreased in 1st, 2nd and 3rd trimesters as compared to control and also significantly lowered in 3rd from 1st in both groups. In both the groups, Mn levels were remained non-significantly different in 2nd and 3rd trimesters as compared to control and 1st trimester. Cu level was observed to be significantly elevated in 3rd trimester as compared to control and 1st in group I, while in group II, Cu was significantly increased in 3rd as compared to 1st and 2nd trimester. In group I, Co was also found to significantly increase in 2nd as compared to 1st and also in 3rd in comparison to control, 1st and 2nd. In group II, Co was also increased significantly in 3rd trimester as compared to 1st. Cr level was significantly lowered in 2nd and 3rd trimester as compared to 1st and control in group I. In group II, the level of Cr was also significantly lowered in 2nd and 3rd trimester as compared to 1st. In both groups, Ni was significantly lowered in 2nd trimester as compared to control and 1st while the level of Ni was significantly reduced in 3rd as compared to control. It has been observed that during the course of gestation Zn has a positive correlation with Ca and Mg. The correlation between Fe and Mg becomes strong in 2nd trimester and very strong in 3rd trimester. Ca and Mg positive correlation is the strongest of all during gestation becoming stronger by each passing trimester. The current study was focused on changes in the levels of trace elements in pregnant women during the course of gestation. The levels of trace elements show alteration in each trimester showing a gradual increase in Cu and Co levels but decrease in Fe, Ca, Mg, Cr, Ni and Zn levels. Concentration of Mn remained non-significantly different. Further studies are required to

justify the levels of ultra-trace elements in pregnancy. Our findings will provide a great help in monitoring the maternal health status and fetal growth. However, further detailed and comprehensive studies are still needed in this regard. Although the study has provided a data on whole blood levels of trace elements concentrations of Pakistani women. There are, however, some limitations that must be noted. Firstly, the concentrations of some ultra-trace elements such as Co and Cr are at very low levels, thus the risk of contamination during blood collection, sample preparation and determination has to be seriously considered. Secondly, we have recruited only healthy females having no major disease, hypertension or diabetes mellitus but in future more studies can be performed recruiting pregnant females and comparing the levels of trace elements in diseased and healthy.

CBGP-59

Disorders Associated with Female Infertility in District Bagh and Ponch Azad Jammu and Kashmir

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The purpose of this study was to identify various disorders associated with female infertility and to calculate the frequency of these disorders. Data was collected by directly approaching known patients and by visiting different hospitals of Bagh and Rawlakot. A well-designed questionnaire was completed by patients. Out of 106 participants, 58 (54.7%) were found to have ovulatory dysfunction; 37 patients (34.9%) were found to have ovarian functional problems; 9 (8.5%) were found to have unexplained infertility; 8 patients (7.5%) were found to have tubal factors; 6 patients (5.7%) were found to have leiomyomas or fibroids; 4 (12.5%) secondary infertile women had preeclampsia; 2 (2.7%) primary infertile patients had PID and 4 patients (5.4%) with primary infertility had endometriosis. Various risk factors were found to be associated with female infertility including stress (67%), allergy (20.7%), liver and stomach problems (6.6%), tuberculosis (4.7%), thyroid problems (4.7%), hypertension (20.7%) and diabetes (5.6%). Ovulatory dysfunction was found to be the most prevalent disorder following ovarian functional problems which are linked with ovulatory dysfunction. The main causes of ovulatory dysfunction might include PCOS, sedentary lifestyle, obesity, and unhealthy eating habits. Lifestyle modifications can help to overcome these disorders. Moreover, there is a lack of awareness among females regarding health and fitness, steps must be taken to spread awareness and to educate females in this regard.

CBGP-60

Effect of Graded Dose of Vitamin E on Blood and Serum Biochemistry of Sheep

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Vitamin E is part of the non-enzymatic body's antioxidant system which fights with oxidative stress. Vitamin E defends cell membranes from oxidation through responding with lipid radicals which is formed in lipid peroxidation responses. The present study was conducted at livestock experimental Farm, department of Veterinary and medicine, University of Poonch Rawalakot of AJ&K to investigate the effects of vitamin E on the blood and serum biochemistry of sheep. For this study, all the sheep were weighed and divided randomly into three groups; Control, T1 and T2. T1 and T2 group were treated orally with two doses of vitamin E (150mg/kg body weight and 200mg/kg body weight respectively). At the end of the experiment, the results showed significant increase ($P<0.05$) in blood parameters in the vitamin E supplemented groups including RBC, RDW%, WBC, LYM concentration and LYM% while HCT%, HGB

concentration, MCV, MPV, MCH, MCHC, MID concentration, MID%, GRAN concentration and percentage of GRA showed insignificant effect in treated groups. In serum biochemical parameters including albumin and AST concentration increased ($P<0.05$) in treated group while total protein and globulin concentration insignificantly effected by vitamin E in treated groups. So it is concluded that vitamin E had positive effect on the life of sheep.

CBGP-61

Menstrual disorders and complications of different age groups from the main hospitals of district Hyderabad and Jamshoro

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Menstrual disorder has been increasing over the entire world in both married and unmarried females. Menstrual disorder is physical and emotional problem that interfere with normal menstrual cycle causing pain and unusually heavy or light bleeding delayed menarche and missed period. Menstrual disorder is disruptive state in which the woman menstrual cycle becomes irregular. In the research project menstrual disorder was done by study of 20 patients from Liaquat University of Medical and Health Sciences, Jamshoro and civil hospital of Hyderabad during July to November 2020, which show patients suffering from four menstrual disorder namely Amenorrhea, Dysmenorrhea, Oligomenorrhea and Abnormal uterine bleeding. The Results show that in married females, ratio is 10% amenorrhea, 10% premenstrual syndrome, 60% Dysmenorrhea 20% Menorrhagea. In unmarried the ratio is 10% Dysmenorrhea, 60% amenorrhea, 20% Menorrhagia, 10% Metrorrhagia.

CBGP-62

Coronary Artery By-Pass/Angioplasty is not a Solution to Probe Liver Physiology

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Angioplasty/Coronary Artery By-Pass is common practice in our prevailing medical system for protection of life from the life threatening coronary artery blockage (atherosclerosis, coronary artery disease or coronary heart disease) or lumen contraction leading to cardiac failure or heart attack. The formation of vascular thrombus or blood clot (which usually occurs) makes situation more drastic. The vascular thrombus grows under the endothelium of blood vessel, in its first step, by the Weakening of Endothelium under the stress of POISONOUS substances present in the blood stream. This weak endothelium gives way for the penetration or entry of Macrophages within the wall of vessel below the endothelium. Now the low-density lipo-proteins move to the interior of blood vessel from this weak endothelium and penetrate into these lodged cells, and along with it, cholesterol also settles down in the vicinity of these lodged debris. This plaque gradually grows and squeezes the lumen of the vessel. This is the partial story of the problem as several physically hard-working people taking complete protective medicines along with possible balanced food may get heart attack. A more frustrating situation is observed in those persons who have had coronary artery by-pass recently may also get growing arterial plaque and even contract heart attack. What is obscure as to how formation of this plaque growth is not seen in extremely carefree persons. I can quote two examples of heart attack after coronary artery by-pass that came under my treatment (1) a fellow of 49 year contracted severe category of heart attack just after 50 days after coronary artery by-pass and he was managed accordingly under homeopathic medication. (2) A young man of 34, he had had coronary artery by-pass 7 months after that he suddenly fell unconscious and the expert cardiologists recommended 2nd by-pass. They preferred homeopathic treatment at my clinic. These patients require an extremely wise, cautious and

comprehensive treatment. For immediate protection of the heart and minimizing necrosis, the extra Oxygen supply and blood-plasma in the vicinity of the meager cardiac cells. A few homeopathic medicine play miraculous role i. e. *Carbo vege* 30, *Vanadium* 30 and *Arnica montana* 30 are given. Several cardiac homeopathic medicines are essential according to the condition of the patient that include *Crataegus oxyacantha* Q, *Cactus* 30, *Naja* 30, *Spigelia* 30 and *Adonis vernalis* 30 and several other medicines. Lastly a few medicines that normalize LIVER-physiology are also provided. These medicines impart positive results at the spot. These positives are observed through sphygmomanometer and stethoscope. These medicines are *Chelidonium majus* Q, *Myrica* Q *Cheonanthus* Q, *Cholestrinum* Q and *Lycopodium* 30 and etc. Here all medicines play their part according to their function, the demand of medicines that normalize the physiology of liver indicate that blood toxicity is not properly managed. In the atherosclerosis, the physiology of liver is not considered properly which is the root cause of the problem. The emergency condition is preferably coped with in the current methodologies of treatment instead of uprooting the actual causes of the trouble. I believe that the actual causes of the trouble ought to be tackled contrary to the make-shift and emergent tactics to slumber the issue.

CBGP-63

Increased Risk of Infertility, Marital Maladjustment and Psychological Morbidity in PCOS Patients of Southern Punjab, Pakistan

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The clinical manifestations of polycystic ovarian syndrome (PCOS) have been linked with psychotic morbidity and infertility in the women of fertile age. Considering limited research data available about the psychological aspects in these patients, we conducted current study to assess psychotic distress and infertility in PCOS patients of southern Punjab, Pakistan. In this study 204 PCOS women and 150 controls were enrolled. Data of recruited patients was collected from different hospitals of South Punjab (Bakhtawar Amin Memorial hospital Multan, Nishtar hospital Multan, DHQ Muzaffargarh, THQ Jatoi, Muzaffargarh and Indus hospital Muzaffargarh). A standardized questionnaire was administered in order to collect the data after obtaining formal consent and ethical approval. For statistical analysis of data, SPSS version 20 was used. Findings revealed that psychological morbidity was most common among infertile PCOS patients. The prevalence of anxiety (61.8% vs. 18.7%), depression (56.9% vs.15.3%), sleep apnea (35.3% vs. 6.7%), eating disorders (18.1% vs. 1.3%), marital maladjustment (27.5% vs. 5.3%), poor quality of life (35.3% vs. 3.3%) and migraine (55.4% vs. 10.7%) was significantly high in PCOS women as compared to controls ($p<0.001$). Infertility was significantly linked to psychotic implications and PCOS female ($p<0.001$). So, infertile PCOS patients were more depressed and anxious as compared to fertile. Infertility, especially primary infertility represents a major risk factor for psychological implications in Pakistani PCOS women of southern Punjab. Psychological disturbance was found to be more prevalent in married females as compared to unmarried females.

CBGP-64

Effect of *Ferula jaeschkeana* on Estrus Induction and Conception Rate in Anoestrous and Delayed Pubertal Achai Dairy Cattle

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Herbs are considered as the oldest remedy for treating different diseases throughout the world. *Ferula Jaeschkeana* is a herb, common for its use in human reproductive disorders as well as for its

estrogenic activity in lab animals. Here we attempted to explore the reproductive biological impact of *Ferula Jaeschkeana* in anestrous and delayed pubertal reproductive disorders as these reproductive disorders are associated with heavy economic losses of the livestock industry. Experiments were carried out in the 24 animals of native cattle breed with three doses of *Ferula Jaeschkeana* (30, 50 and 70 grams) which were shade dried, powdered and were given to the animals in their routine feeds as a bolus in morning and evening along with it blood was collected before and 3 days after the feeding of this herbs for the determination of progesterone and estrogen profile. As result of the trial animals showed the signs of behavioral estrus (restlessness, rising of tail, bellowing and mounting) and physical changes like the swelling of vulva and mucus discharge in 54.16% treated animals comprising of 33.34% animals from the delayed pubertal heifers group whereas 75 % animals were from Anoestrus multiparous animals group. Likewise 0.08% animals in the delayed pubertal heifers group and 50% animals from Anoestrus multiparous animals group became pregnant and were confirmed on day 90 post breeding. Furthermore, the current study demonstrated the significantly high level of Serum estradiol hormone in tandem with significantly low level of progesterone hormone recorded in 50 and 70 grams *Ferula Jaeschkeana* feeding groups in comparison with the 30 grams and control group. Thus it could be deduced from the current study that feeding 50 grams *Ferula Jaeschkeana* herb roots in anestrous and delayed puberty Achai cows might be associated with the serum high level of estradiol hormone and low level progesterone hormone and resulting in the enhancement of the conception rates in The Achai cattle. Consequently, this herb may be used in the treatment of anestrous, silent estrus and delayed puberty in Achai dairy cattle under the existing management system.

CBGP-65

Study on Biochemical Profile of the Abortive Women in Distract Peshawar

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Human pregnancy is the series of developmental events. However theses events are often associated with the metabolic alteration in the normal physiology of the maternal circulation which in turn resulted in the abortion. The abortion is associated with an enormous health, financial, and social burden on women in the developing countries including Pakistan. The retrospective case control, cross-sectional study was carried out during current dissertation. For this purpose a total of 60 pregnant women with age 18-40years were selected randomly through convenient sampling techniques. Standard procedure was adopted during collection of the specimen that included the collection of the maternal blood, the above mentioned biological specimen was collected from 30 abortive pregnant women and 30 normal pregnant women. The biochemical indices were executed using the commercially available kits. The kits were used as per manufacturer 'instructions in the laboratory. During current study, the serum biochemical feature in the abortive women in the comparison with the normal delivered women were appraised. These serum biochemical feature included protein profile such as total protein, albumin, globulin, bilirubin, urea, uric acid; energetic profile i.e., glucose, cholesterol, triglyceride; mineral profile i.e., Phosphorous, calcium and magenium; enzymatic profile, i.e., AST, LDH and hormonal profile, i.e., Estrogen, Progesterone. The finding of current study demonstrated significant deviation from the normal in theses biochemical indices. TP(7.1±0.10g/dL vs 6.5±0.10g/dL), Chol(245.9±6.5mg/dl vs 162.6±9.5mg/dl), Mg(0.59±0.7mg/dl vs 2.1±0.14mg/dl), AST(23.3±1.1mg/dl vs 4.2±0.6mg/dl), Ph(5.2±1.9mg/dl vs 4.1±0.8mg/dl) concentrations increases at ($P<0.05$), while estrogen (3938.8±122.3 Pg/ml vs 1744.7±158.4 Pg/ml),

progesteron(166.6±15.1 Pg/ml vs 56.3±5.3 Pg/ml), ALT(14.0±1.1mg/dl vs 2.1±0.2mg/dl), ALP(169.1±10.3mg/dl vs 59.6±4.3mg/dl), Ca(6.89±0.2mg/dl Vs 9.1±0.1mg/dl), Uric Acid(4.5±0.4 mg/dl vs 2.9±0.2 mg/dl), TG(234.6±11.3 mg/dl vs 107.9±4.4 mg/dl), HDL(61.7±2.3 mg/dl vs 35.9±1.1 mg/dl), Albumin(3.5 ± 0.10g/dL vs 2.0 ± 0.10g/dL), Globulin(3.4± 0.0.1g/dL vs 1.5±0.1g/dL) concentrations were observed significantly reduced at (P<0.01) in abortive women when the comparison was made with the normal deliversies. On the other hand, Glucose (73.7±0.8mg/dl vs 93.2±5.6 mg/dl), creatinine (0.5±0.02 mg/dl vs 1.1±0.1 mg/dl), urea (10.2±0.35mg/dl vs 18.2±2.0 mg/dl), Total bilrubin (0.5±0.04 mg/dl vs 1.9 ±0.3 mg/dl), LDH (289.1±11.7mg/dl vs 515.8±10.5mg/dl,p=0.002) concentrations were significantly higher in the abortive women when compared with normal at (P<0.01).In conclusion, the current study demonstrated considerable variation in blood/serum biochemical factors in abortive women when compared with women having normal deliveries. These results signify a continuous existence of each biochemical factors in the normal deliveries, deviation of either lowered or higher from the normal biochemical range might be associated with causation of abortion. These parameters will help in finding diseases and will maintain the health of mother and fetus.

CBGP-66

Study of Relationship of Polycystic Ovarian Syndrome with Infertility among Female Patients at Lady Reading Hospital Peshawar

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Polycystic ovarian syndrome (PCOS) is a heterogeneous endocrine disorder affecting about 5-20% females of child bearing age. PCOS is characterized by Hyperandrogenemia, Oligoamenohhrea, Substantial number of immature follicles, inadequate LH:FSH ratio, hirsitism, fibroids etc. The target of the present study is to ascertain the relationship of PCOS with infertility. For this purpose 100 respondents were studied in Lady Reading Hospital Peshawar. Data was collected through well fabricated questionnaire. The result revealed that women with PCOS had higher percentages of hirsutism(92%), acne(88%), fibroids(60%), depression(63%), imbalanced hormone(85%), irregular menstrual cycle(85%), heavy bleeding(73%), and (68 %) of women were facing difficulty to conceive a baby. It was collected that hirsutism, acne, depression, fibroids, hormonal imbalance, irregular menstrual cycle, and infertility are positively associated with PCOS. It was concluded that PCOS is the leading cause of anovulatery infertility among the females of child bearing age.

CBGP-67

Prevalence of Diabetes (A Case Study of Peshawar)

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The aim of present study was to find the prevalence of diabetes. As a non-communicable disease diabetes mellitus (DM) has major public health importance and its occurrence is swiftly growing all over the world at alarming rate. The current study was conducted to find the diabetes prevalence at Peshawar region in both urban and rural areas. The population studied consists of 100 families, 60 from urban and 40 from rural area. The questionnaire was filled from a responsible individual of each family, and data was obtained regarding diabetic and non-diabetic members. Out of 616 individuals of 100 families 61 individuals were found to be diabetic and 555 were non diabetic. Percentage of male diabetic individuals was recorded to be 12% and the percentage of female diabetic individuals was 8.70%. In urban areas a total of 354 individuals were studied among 60 families, 141 males 213 female, among these 38 (10.73%) were found to be diabetic, 19(13.47%)

male and 19(8.92%) were female and a total of 316 (89.26%) were found to be non-diabetic. Similarly a total of 262 individuals were studied among 40 families of rural area, 119 were male and 143 were female, among these 23 (8.77%) were found to be diabetic, 11 (9.24%) male and 12 (8.39%) female, and a total of 239 (91.22%) were non diabetic. The above percentage revealed that the prevalence of diabetes is higher in males than in females. On the whole the diabetes prevalence for Peshawar population was 10.42%.The higher prevalence of diabetes calls for immediate attention towards prevention and health promotion, programs designed to reduce the load of this disease. Preventive measures should be taken to avoid the serious consequences of this disease. It is recommended that every person should follow healthy eating plan, be physically active, take medicines and check blood glucose levels on regular basis.

CBGP-68

Prevalence of Osteoarthritis Caused by the Deficiency of Corticosteroid Hormone in Male and Female

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An attempt was made to study the possible role of corticosteroid hormones deficiency causing osteoarthritis. In this content, 15 patients suffering from the osteoarthritis were examined at wazir x-ray and Liaquat medical Hospital Jamshoro .According to the information sought the majority cases were old aged women and malnutrition persons. It was also noted that patients who had low in take of milk and had imbalance level of corticosteroid hormones were suffering from osteoarthritis. It is concluded that (i) Corticosteroid deficiency is the root cause of osteoarthritis (ii) The low milk consumption also affect the osteoarthritis (iii) The tissue cushioning the joint is deteriorate by many factors such as physical trauma, low level of corticosteroid hormones in the body (iv) Obesity is one of symptoms of OA (v) Irregular menstrual cycle in the patient is noted.

CBGP-69

Analysis of Pancreatic Gland Dysfunctioning in Hypothyroid Patients in District Gujranwala, Punjab, Pakistan

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Hypothyroidism, characterized by low levels of thyroid hormones and elevated levels of TSH, affects the functioning of pancreatic gland by altering the levels of insulin secretion from pancreatic β-cells due to decreased production of thyroid hormones. The present study was aimed to analyze the relationship between hypothyroidism and pancreatic gland dysfunctioning Blood samples were collected from control and hypothyroid patients in district Gujranwala, Punjab, Pakistan. Blood samples of sixty normal and sixty hypothyroid patients were taken. Information regarding age, gender, weight, height, B. P was collected from participants. Inclusion and exclusion criteria were designed. Hypothyroid patients with high levels of TSH had significantly ($P<0.05$) low insulin and HDL cholesterol levels. However, the levels of fasting glucose, HOMA-IR, triglycerides, HbA1C and LDL cholesterol were significantly ($P<0.05$) high in hypothyroid patients indicating the diabetic condition. The current study indicated the high prevalence of pancreatic disorder in hypothyroid patients and thus, provided the clinical manifestation of the diabetes disease in hypothyroid patients by its early diagnosis and treatment.

6. TOXICOLOGY

CBGP-70

Therapeutic Effect of 2-(Thiophen-2-yl) 2,3 Dihydrobenzothiazole on Rotenone Induced Parkinson's Rat Model

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Rotenone is a pesticide and mitochondrial complex I inhibitor. It produces toxicity in humans and also in animals. The present study evaluated the therapeutic effect of 2-(thiophen-2-yl) 2,3 dihydrobenzothiazole against rotenone-induced Parkinson's disease. Rotenone was injected intraperitoneally at the dose of 1.5 mg/kg for 8 days. Administration of 2-(thiophen-2-yl) 2,3 dihydrobenzothiazole (10 mg/kg/day) was started before 15 days of rotenone injection. The effects of pre-treatment of 2-(thiophen-2-yl) 2,3 dihydrobenzothiazole were evaluated by different motor behavioral parameters (pole test, Kondziela's inverted screen test, inclined plane test, open field test, Rota rod test and footprint test). Determination of Hematological Parameters was also done by analysis of Blood and serum collections. Pre-treatment with 2-(thiophen-2-yl) 2,3 dihydrobenzothiazole reversed the gross motor impairments which were produced by rotenone. We conclude that 2-(thiophen-2-yl) 2,3 dihydrobenzothiazole, like its other candidate drug also protects against toxic effect of rotenone and can be beneficial against different neurodegenerative diseases.

CBGP-71

Determination of LC50 of *Moringa oleifera* on Khapra Beetle *(Trogoderma granarium E.)*

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Trogoderma granarium (Everts), is known as world's most damaging pests of stored grain products (specifically wheat). Deltamethrin and phosphine are used in Pakistan to control its progeny, but these insecticides have lost their efficacy as this pest has developed resistance against them. Moreover, these insecticides have hazardous influence on human health. The aim of the present investigation was to find out the most effectiveness of lethal concentration of *Moringa Oleifera* leaf extract and exposure time period capable of controlling larvae infestation of *T. granarium*. The LC_{50} value of 4^{th} and 5^{th} instar of Gujranwala population (obtained from lab culture) was calculated through mortality data and it was found that 4^{th} instar larvae were the most resistant (showed highest LC_{50}) while 5^{th} instar larvae came forward as sensitive population (lowest LC_{50}). Both instars were then proceeded to carry out biochemical analysis. The toxicity of Moringa leaf extract was determined on the energy reserves *i.e,* soluble protein, total protein contents and glucose contents. The obtained result showed the decline in total protein contents of 4^{th} and 5^{th} instar larvae at LC_{50}. However, soluble protein contents and glucose contents were found to be elevated in both 4^{th} and 5^{th} instar larvae. Statistical analysis was performed to check the toxicity of Moringa leaf extract on *T. granarium*. Results obtained from this study showed that Moringa leaf extract had adverse effects on the energy reserves of *T. granarium*. This extract may be used to control the stored grain pests.

CBGP-72

Histopathological Changes in Liver and Kidney of Freshwater Fish (*Channa punctatus*) Induced by Permethrin

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Permethrin is a broad spectrum synthetic pyrethroid insecticide recommended with restricted use due to its high toxicity for aquatic organisms. But increased use of permethrin in agricultural sector has resulted in increased insecticidal stress to freshwater fish. Thereby, current study was designed to investigate the histopathological changes of permethrin in liver and kidney of freshwater fish, *Channa punctatus*. Total twenty-five spotted snakehead fish (*Channa punctatus*) with 7-10cm length were divided into five groups (E0, E1, E2, E3 and E4) having five fish in each. Fish in group E0 were kept as control in uncontaminated fresh water, while those in group E1, E2, E3 and E4 were exposed to 0.25ppb, 0.50ppb, 0.75ppb, 1.00ppb of permethrin in fresh water, respectively for 96 hours. Water temperature observed during trial was 20-23°C, pH: 7.6-7.8 and dissolved oxygen was 100% saturated. Water and permethrin solution were renewed daily throughout experiment. At the end of experimental period, the morphometric parameters including total weight, total length, standard length and organ weight showed significant difference. Morphometric parameters have shown decrease by increasing permethrin toxicity. Samples from liver and kidney were histologically analyzed using microtomy. Hepatocytes showed degenerative changes including vacuolation, pyknosis, congestion of blood vessels, necrosis and infiltration of lymphocytes. While intestinal damage was observed as atrophy, blood congestion, detachment of villi, fusion of villi, goblet cell formation, shortening of villi and pyknosis. It was concluded that use of permethrin caused extreme toxicity to *Channa punctatus* so proper monitoring and care is recommended for its usage.

CBGP-73

Studies on Acute Toxicity of Silver Nanoparticles to *Labeo rohita*

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The effect of silver nanoparticles on histology and hematology of fish was evaluated. Seven healthy individuals of Labeo rohita were randomly distributed in each aquarium. Three different doses of silver nanoparticles were designated for three replicates i.e. 5 mg/l, 10 mg/l and 20 mg/l. Histological studies in organs like liver, gills, skin, kidney, and muscles were made to assess tissue damage due to silver nanoparticles after 96 hours of exposure. In gills fusion of primary and secondary lamella were observed. In muscles abnormal arrangement of muscle bundles was observed. In liver separation of macrophages and in kidney congestion of cells were observed. In case of skin inflammation of epidermis was observed. Biochemical parameters like serum protein, albumin, globulin and glucose were compared with normal control. In hematological parameters WBC, RBC, Hb, PLT, MCH and MCHC etc were also compared with normal control. Our research concluded that silver nanoparticles adversely affect the fish fauna. Physicochemical parameters of water were also checked during each trial.

CBGP-74

ZnO Nanoparticles Induce Severe Liver Damage and Mild Kidney Problem in A Mammalian Model

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Nanoparticles are most of the times intentionally synthesized particles ranging in size from 10-100 nm. Their relatively small size to large surface area make them as good loading and accessible tool in biomedicine. However, use of nanoparticles in modern biomedicine has faced a great deal of problems ranging from toxicity to alteration of genetic makeup. ZnO nanoparticles (ZnO-NPs) are the most widely used nanoparticles. Safe use of ZnO-NPs still needs careful and detailed investigations for their toxicity profiling. In the present study, toxic effects of orally administered ZnO-NPs were evaluated in albino mice for a period of 21 days. Histopathology (H & E), clinical biochemistry and bio-distribution analyses were performed after prerequisite period of treatment. ZnO-NPs at dose value of 250 and 500 mg/kg of the body weight induced toxicity in liver and kidney tissues. Inflammation and degeneration in liver hepatocytes was more pronounced than in kidney tissues. Also, few renal corpuscles, proximal and distal tubules were disturbed and enlarged. An increase in levels of ALT, ALP, AST, cholesterol and urea was observed, whereas a decrease in total proteins and albumin levels was recorded in the treatment groups. Zn content was increased in liver and kidneys, while there was no change recorded for the heart tissues.

CBGP-75

Determination of Lead Concentration in Selected Tissues of *Euphlyctis Cyanophlyctis* (Amphibia; Dicroglossidae) in Thatta District

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This study, determine the concentration of Pb (Lead) in kidney, liver and skin of adult *Euphlyctis cyanophlyctis (Amphibia.* The samples were collected from an urban area, Thatta city and an agricultural area, Mirpur Sakro. The water samples from the study areas were also collected. Samples were collected regularly during four seasons; Northeast monsoon, Pre monsoon, Southwest monsoon and Post monsoon. In Northeast monsoon, the contamination of Pb was at highest in liver of the individuals from Mirpur Sakro. However, the analysis of water samples showed low amount of Pb contamination. In pre monsoon, highest concentration of Pb was observed in liver, followed by kidney of the individuals from Thatta city while the lowest concentration was observed in the skin of the individuals from Mirpur Sakro. In South west and post monsoon seasons, highest concentration of Pb was noticed in the water samples from both study areas and both seasons. However, the concentration of Pb was relatively low in the tissues. The study reveals that the anuran fauna inhibiting, Thatta district are vulnerable to heavy metal toxicity in their environments. The outcome of this research will further provide the information about the conservation of frog species, and their role as the bio-indicators of respective environment.

7. VIROLOGY

CBGP-76

Surveillance of Honey Bee (*Apis mellifera*) Against Viral Diseases in District Karak

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Honey bees are characterized by their ability to produce honey that is a source of energy and have various medicinal benefits. Honey bee belongs to the family Apidae, in class Insecta. The present study aimed to find out ''the surveillance of honey bee against viral diseases in district Karak Khyber Pakhtunkhwa''. Twenty five apiaries (colonies =100%) were randomly selected in three main areas; Tehsil Karak, Takht-e-nasrati and Banda daud shah of district karak. Viral infected colonies were (1-19.3%) and non-infected colonies were (1-81.7%). They were further divided as managed apiaries (colonies=60%) and non-managed apiaries (colonies=39%). In managed apiaries infected colonies were separately arranged and regularly checked by beekeeper to minimize the transmission rate of viral infection. While the non-managed apiaries with viral infected colonies remain unchecked as beekeeper were unaware of the viral infection transmission. It was observed that the rate of transmission of infection is less in managed apiaries as compared to non-managed apiaries. Similarly the survival of honey bees and the production of honey from managed aperies is higher than non-managed apiaries.

CBGP-77

Detection of SARS-CoV-2 in Clinical and Environmental Samples from Lahore, Pakistan

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The surveillance of sewage water has become an extremely essential tool to trace the circulation of viruses in a population and to predict the outbreak of viral diseases. Sewage monitoring is more important especially for those viruses which cause subclinical infections since it is difficult to determine their prevalence. The present study aimed at investigating the presence of Novel coronavirus SARS-CoV-2, causing coronavirus disease (COVID-19), in sewage water collected from six drains of Lahore, Pakistan. Considering the high transmissibility and rapid spread of SARS-CoV-2, it was also planned to develop a robust and cheaper colorimetric RT-LAMP assay for naked-eye detection of SARS-COV-2 in sewage water. The viruses in sewage water were concentrated by PEG method before isolating viral nucleic acids. SARS-COV-2 was detected by RT-PCR. This data showed the presence of SARS-CoV-2 in all selected drains of Lahore. Furthermore, developed RdRp-based LAMP assay was successfully detect SARS-CoV-2 in clinical as well as sewage samples within 20 minutes. SARS-CoV-2 RNA was detected using our optimized LAMP assay in all of the sewage water samples. Likewise, LAMP assay described here could successfully detect the virus RNA in 26/28 (93%) of RT-PCR tested positive COVID-19 clinical samples with 100% specificity (n = 7) showing comparable efficiency to the qRT-PCR. The effect of various additives also tested on the performance of LAMP assay and found that addition of 10 mg/ml bovine serum albumin (BSA) could increase the sensitivity of assay up to 10^1 copies of target sequence. In conclusion, the present study is the first ever to describe the prevalence of SARS-CoV-2 in sewage water in the city of Lahore. Further, LAMP-based detection of SARS-CoV-2 in sewage as well as clinical samples could provide a sensitive first tier strategy for SARS-CoV-2 screening and can potentially help diagnostic laboratories in better handling of high sample turnout during pandemic situation.

CBGP-78

Alantolactone: A Potential Multitarget Drug Candidate for Prevention of SARS-CoV-2 Cell Entry

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The rapidly growing coronavirus throughout the world is associated with high death rates and transmission power. SARS-CoV-2 is a severe respiratory syndrome caused by a positive sSRNA enveloped virus. It was first diagnosed in Wuhan, China in December 2021. A total of 117 million cases were reported with 2.6 million deaths till March, 2021. SARS-CoV-2 has badly influenced the social and economy behaviors and created anxiety all over the world. Repurposing drug is a move toward to discovering the drugs with less time consumption and in a cost effective manner. The current investigation, proposed naturally occurring Alantolactone, member of sesquiterpene family as a potential SARS-CoV-2 inhibitor and it also inhibit various human protein involved in its entry into the cell and its biogenesis using molecular docking. Alantolactone efficiently binds with SARS-CoV-2 proteins including spike glycoprotein (S-protein), nucleocapsid protein (N-protein), main-protease and papain like proteases (pLpro), with binding affinity of -7.3, -7.9, -6.8, -7.1 kcal/mol, respectively. Alantolactone binds strongly to human receptor that is angiotensin converting enzyme-2 (ACE-2), S1-RBD & ACE2 interphase, Furin, AAK1, GAK and both closed and open configuration of TPC2 channel with binding energies of -6.7, -6.9, -8., -7.3 and -7.9 kcal/mol, respectively. Alantolactone binds with virus proteins and human targeted protein through hydrogen bonding and hydrophobic interactions. Alantolactone binds successfully with target viral proteins such that it binds with S-protein through hydrogen bonding with ARG1014 and through hydrophobic interactions with ALA766 and LEU1012 amino acid residue. It binds with N-protein through hydrogen bonding with GLN71 and hydrophobic interaction with PRO163 and LEU162 amino acid residues while it binds with Mpro through hydrophobic interactions with MET49, CYS145, MET165 and HIS41 amino acid residues. Alantolactone bound successfully to the human receptor protein ACE2 and makes hydrophobic interactions with PHE40 and PHE390 amino acid residues while it makes hydrogen bonding at amino-acid residue SER44 and hydrophobic interactions with TRP349 of S1-RBD complex. Alantolactone shows strong association with Furin by making hydrogen bonds with ASN310, GLN488 and GLY307 and through hydrophobic interactions with TRP531, PRO266 and TRP531 amino acid residues. Alantolactone tethered with GAK making hydrogen bonds with ASP27, PHE28, VAL29 and hydrophobic interactions with VAL45 amino acid residue. Alantolactone binds strongly with both open and closed states of TPC2. In open state configuration of TPC2, Alantolactone merges with binding region by making hydrophobic interaction with VAL294, PHE230 and PHE233 amino acid residues. However, Alantolactone forms hydrophobic interactions with PHE230, LEU229 and LEU556 amino acid residues. Molecular docking simulations and the ADMET properties and toxicity predictions suggest that Alantolactone could effectively binds with various viral target protein as well as human target proteins and could be developed into a novel SARS-coV-2 inhibitor. However, the further in-vivo & in-vitro studies are mandatory to confirm Alantolactone against SARS-coV-2.

CBGP-79

Incidence of Covid-19 Among the Population of District Attock

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Corona virus is another pandemic with almost no data accessible about its transmission and relationship with ecological factors. In comparison with known corona viruses, SARS-CoV-2 that can affect individuals is defined as the seventh corona virus with certain structural differences. The episode of COVID started as the unknown reason of

pneumonia in Wuhan, China, in December 2019, which has been presently scattering quickly to other countries out of Wuhan. Objective of the recent research was to determine the incidence rate of Corona virus among the population of Attock city, Punjab.This retrospective hospital-based observational study used data from 01 April 2020 to 07 December 2020. A sum of 22,962 supposed individuals for Corona virus visited Government hospitals and laboratories in District Attock, Pakistan. Pharyngeal and nasal swab specimens were taken and tested for viral nucleic acid by using real-time reverse-transcriptase polymerase chain reaction assay (RT-qPCR). The total positive confirmed cases out of 22,962 suspected individuals were 843(3.67%). Out of those confirmed positive cases, 367(43.53%) were reported from Tehsil Attock, 94(11.15%) Were from Tehsil Fateh Jang, 51(6.05%) were from Tehsil Hassanabdal, 211(25.03%) were from Tehsil Hazro, 30 (3.56%)were from Tehsil Jand 59(7%) were from PindiGheb, and 31(3.68%) were from Travelers. The overall number of deaths is 22 (2.61%), active cases were 96 (11.39%), and recovered patients were 725 (86%). It was concluded that the incidence rate is maximum in Thesil Attock and minimum in Thesil Jund as compared to other Thesil of District Attock.

8. FORENSIC SCIENCES

CBGP-80

Insect succession and decomposition pattern on *Oryctolagus cuniculus* carcass

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Insect succession and decomposition pattern can be used as a tool for the calculation of Post Mortem Interval Analysis (PMI) in medico-legal issues. The present study was conducted to determine the insect succession pattern and decomposition stages on domesticated rabbit (*Oryctolagus cuniculus*) carcass at Dir, Pakistan. Five decomposition stages were detected which were fresh, bloated, active decay, advanced decay and dry remains stage. A total of 8 different insect species were recorded on the rabbit carcass. The most common and abundant insect species that visited the carcass was *Chrysomya megacephala* (Calliphoridae). Temperature and relative humidity in the study area were directly correlated with the insect succession and decomposition pattern on the rabbit carcass. Findings of the present study can be used for the calculation of Post Mortem Interval in resolving medico-legal issues and for crimes scene detection in forensic analysis. This study can be conducted on different animal models that resemble more to human beings in order to get more precise results for the calculation of PMI. Further studies are recommended to cover a wide spectrum of different ecological and topographical areas with different climatic conditions for obtaining a more precise model to resolve medico-legal issues with the help of forensically important insect fauna.

9. OTHERS (LATECOMERS)

CBGP-81

Biocontrol Potential Of Cry 1c Gene Against Lepidopteran Pests

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The prospective about Bacillus thuringiensis in managing different insect pests, especially Lepidoptera has been reported. Bacillus thuringiensis-based product having old background shown its nontoxic character and applications in agrochemical industries. A number of Bacillus thuringiensis insecticides have been reported for field applications. Various crystal proteins are obtained from Bacillus thuringiensis. These crystal proteins have unique insecticidal activity and are pathogenic to many insect orders, such as Lepidoptera, Diptera, Coleoptera etc. Numerous Bacillus thuringiensis strains have been reported. A unique crystal protein is obtained by each Bacillus thuringiensis strain. Bacillus thuringiensis crystal proteins encoded by various transgenic plants. Toxins formed by Bacillus thuringiensis have been examined. These Bt. toxins have high toxicity against harmful insect pests. The toxicity of Bt. toxins against Lepidoptera pest reported. These insecticidal proteins are active against many insect pests. These insect pests are harmful for the development and final yield of Bt. crops. Bacillus thuringiensis isolates have high resistance against Lepidoptera pests. So, Bacillus thuringiensis insecticides have successful application in the management of Lepidoptera pests. The lethal concentrations (LC values) of Bacillus thuringiensis strains have been calculated. Bacillus thuringiensis proteins have historical importance with broad range of agrochemical and many other applications. They may be used for drug or gene delivery, environmental protection and detection of human fatal diseases, such as cancer etc.

CBGP-82

Evaluation Of Cyto-Physiological Effects Induced By Methomyl In Ctenopharyngodon Idella

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It is well known fact that pesticides are important tools of modern agriculture used to shield crops from pests and in public health to prevent diseases. These pesticides enter the aquatic ecosystem in whole or in residual form, posing a major threat to aquatic organisms in general and fish in particular. In this connection the present investigation was undertaken to evaluate the cyto-physiological alterations induced by methomyl (insecticide) in Ctenopharyngodon idella. Fish were divided into four groups. One group was considered as control group and was kept without treatment while the other three groups were treated with different concentrations (0.2 mgL-1, 0.8 mgL-1 and 1.2 mgL-1) and time duration (3,6,9,12,15 days) against methomyl respectively, and observed the significant modulations in haematological, histopathological features and red blood cells and nuclear anomalies in fresh water fish (Ctenopharyngodon idella). The red blood cells count (RBC), hemoglobin (Hb), hematocrit (Hct), mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC), neutrophils, eosinophils and monocytes concentrations were declined in the fish exposed to various concentrations of methomyl as compared to control group. However, mean corpuscular volume (MCV), total leucocyte count, lymphocytes, platelets were observed to be significantly higher. Histopathological alterations in the gills were epithelial lifting, curling, erosion of secondary lamellae, blood congestion in the secondary lamellae, fusion of secondary gills lamellae and disruption of cartilage core. In the liver histopathological alterations were lymphocyte infiltration, cloudy swelling of hepatocytes, degeneration of hepatocytes, necrosis in hepatpcytes, cytoplasmic vacuolation and blood congestion. Brain tissue reported anomalies as blood congestion, degeneration of neuronal cells,

leukocytic infiltration, necrosis and vacuolization. In the intestine histopathological alterations were hemorrhages, leukocytic infiltration, necrosis, fusion of villi, detachment of villi and villi sloughing. Similarly in kidney tissue abnormalities were expansion of space inside the bowman's capsule, degeneration of bowman's capsule, necrotic changes, cytoplasmic vacuolization and glomerular shrinkage. While in muscle tissues histopathological alterations were degeneration in muscle bundles, splitting of muscle fibers, vacuolar degeneration, muscle oedema, zig-zag of muscle fibers, necrosis of muscle fibers and lesion in muscle tissues. Various red blood cells and nucleus anomalies including deformed cell, swollen cell, hemolyzed cell, deformed nucleus, nuclear shift, and micronucleus were observed against different concentrations of methomyl. It is obvious that the various concentrations of methomyl caused significant variations in hematological indices and irreversible changes in histology of gills, liver, brain, intestine, kidneys and muscle of fish, while various red blood cells and nucleus anomalies were also reported that indicate the DNA damage in the nucleus of red blood cells.

CBGP-83

Impact Of Selected Parameters Examining Through Hematological Samples In Local Population Of Razzar, Swabi

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Specific hematological references are used for specific population ad used for diagnosis and treatment purposes. According to age wise study the Reference interval of male show significant difference with RBCs, HGB, MCHC, Lymphocytes% and P-LCR while female R1 show only significant difference with P-LCR. Male RBC reference value at age group 15-25 were 4.63×1012/L (2.35-5.90×1012/L), 26-35 were 4.59×1012/L (4.43-5.89×1012/L), 36-45 were 4.60×1012/L (3.69-5.52×1012/L), 46-55 were 4.49×1012/L (2.35-6.72), 56-65 were 4.271012/L (2.38-5.25×1012/L), with P-value (0.005). HBG at age 15-25 were mean values 12.16g/dL (6.40-15.90g/dL), at age 26-3511.92g/dL (6.60-16.10), at age 36-45 were 11.89g/dL (5.90-16.10g/dL), at age 46-55 were 12.09g/dL (5.90-15.90g/dL), at age 56-65 were mean value 10.80g/dL (5.80-14.80g/dL) with a p-value (0.011). MCHC at age 15-25 were 33.10g/dL (28.60-72.40g/dL), 26-35 were 32.10g/dL (26.90-37.80g/dL), 36-45 were 32.07g/dL (24.60-37.50g/dL), 46-55 mean value 33.38g/dL (22.10-39.30g/dL), 56-65 were 31.64g/dL (27.50-33.90g/dL) with p-value(0.039). Lymphocytes at age 15-25 mean values were 26.35% (6.80-42.50%), 26-35 were 24.8% (9.30-49.50%), 36-45 were 27.63% (8.20-53.10%), 46-55 mean value 31.98% (9.70-81.00%), 56-65 were 28.69% (5.80-64.50) with P-value (0.029). P-LCR at age 15-25 mean values were 32.15% (16.70-46.10%), at age 26-35 were 29.06% (2.40-49.50%), at age 36-45 were 31.08% (14-62.50%), at age 46-55 were 33.64% (18.50-67.60%) and 56-65 were 29.06% (13.60-49.20%) with P value 0.042. Age wise reference value of females, the P-LCR only show statistically significant difference with respect to blood parameters having age groups 15-25 P-LCR mean value 30.75% with minimum and maximum value (16.60-60.30%), at age 26-35 having 28.36% (18.50-50.20%), at age 36-45 having value 30.51% (15.20-53.20%), at age 46-55 having mean value 29.10% (16.70-45.70%), and at age 56-65 mean value 33.48% (15.60-51.90%) and show statistically significant relation with blood parameter P-LCR having P-value (0.040). The Reference 1nterval for both male and female according to gender wise study include 250 males and 250 females with minimum and maximum limit. For male the RBC 4.51×1012/L (2.35-6.72×1012/L), for female RBCs 4.32×1012/L (2.46-6.16×1012/L) having P-value (0.000). HBG for male 11.77g/dL (5.80-16.10%), HGB for female 11.12g/dL (4.12-15.30g/dL) having P-value (0.000). HCT for male 36.20% (3.93-55.90%), HCT for female 34.70% (11.40-48.60%) having P-value (0.003). MCHC for male 32.46g/dL (22.10-72.40g/dL), MCHC for female 31.93g/dL (24.70-37.20g/dL) having P-value (0.032). Lymphocytes for male 27.90% (5.80-81.00%), Lymphocytes for female 26.05% (4.30-59.70%) having P-value (0.045). Monocytes for male 7.98% (3.10-20.40%), Monocytes for female 7.25% (2.70-22.20%) having P-value (0.002). Neutrophil for male 63.95% (12.20-87.40%), Neutrophil for female 66.38% (4.40-87.60%) having P-value (0.011). These parameters show significant difference with respect to gender wise study. Total 500 samples

included 87 smokers and 413 non-smokers in which the White blood cells having Mean value for smokers is 10.18×109/L (3.20-40.20×109/L), for non-smokers mean value of WBCs 9.19×109/L (1.30-35.30×109/L) with P-value (0.043) and Monocytes having Mean value for smokers 8.18×109/L (3.10-20.40×109/L), for non-smokers Monocytes Mean value 7.49×109/L (2.70-22.20×109/L) with P-value (0.029) show statistically significant association with blood parameters. HBG and MCHC show statistically significant relation with marital status. Total 500 samples having 358 married while 142 unmarried. The Hemoglobin (HBG) mean value of married 11.30g/dL having minimum and maximum value (4.12-16.10g/dL), while unmarried having mean value 11.83g/dL (4.30-16.10g/dL) with P-value (0.010). Mean corpuscular hemoglobin concentration (MCHC) also show significant association with blood parameters having mean value of married are 32.02g/dL (22.10-38.10g/dL), while unmarried having mean value 11.83g/dL (24.70-72.40g/dL) with P-value (0.021). Some hematological parameters of blood show statistically significant relation with sleeping duration of individuals. These parameters were Hematocrit (HCT), Red Distribution Width-CV (RDW-CV), White Blood Cells (WBC), Monocytes (MID), and Lymphocytes (LYMP). The Mean value of Hematocrit at 5 hours sleeping duration is 32.52% with minimum and maximum values (3.93-47.50%), at 6 hours sleeping duration 36.52% (24.10-55.90%), at 7 hours sleeping duration mean value 35.26% (16.40-45.60%), at 8 hours sleeping duration 35.93% (18.20-48.60%), at 9 hours sleeping duration 35.01% (19.30-47.20%), and more than 9 hours sleeping duration Mean value 36.23% (19.90-44.90%) having P-value (0.025). The Mean value for RDW-CV at 5 hours sleeping duration is 14.85% (11.90-35.30%), at 6 hours sleeping duration 13.38% (11.10-19.40%), at 7 hours sleeping duration 13.62% (11.50-23.10%), at 8 hours sleeping duration 13.47% (11.80-17.5%), at 9 hours sleeping duration 13.70% (12-20.50%), at more than 9 hours sleeping duration mean value is 13.50% (12-19.80%) having P-value (0.004). The Mean value for White blood cell at 5 hours sleeping duration is 11.43×109/L (6.40-35.30×109/L), at 6 hours sleeping time 8.31×109/L (1.50-18.90×109/L), at 7 hours sleeping duration mean value 9.48×109/L (2.10-40.20×109/L), at 8 hours sleeping duration 9.32×109/L (1.30-31.30×109/L), at 9 hours mean value 9.15×109/L (3.20-28.90×109/L), at more than 9 hours sleeping time the mean value for WBCs 9.63×109/L (2.90-22.90×109/L) having P-value (0.016). The Mean value for Monocytes at 5 hours sleeping duration 7.94% (4.40-46%), at 6 hours sleeping duration 6.82% (3.10-64.5%), at 7 hours sleeping duration 7.93% (2.70-81%), at 8 hours sleeping duration 7.50% (3.20-57.70%), at 9 hours sleeping duration 7.51% (2.80-59.70%), at more than 9 hours sleeping duration the mean value of monocytes 8.24% (3.90-65.90%) having P-value (0.041). The Mean value of absolute Lymphocytes at 5 hours sleeping duration is 5.02×109/L (1.20-81.70×109/L), at 6 hours sleeping duration 2.28×109/L (0.30-9.20×109/L), at 7 hours sleeping duration 2.43×109/L (0.60-8.00×109/L), at 8 hours sleeping duration 2.26×109/L (0.30-9.20×109/L), at 9 hours sleeping duration 2.40×109/L (070-7.50×109/L), at more than 9 hours sleeping time the mean value for Lymphocytes is 2.55×109/L (0.890-12×109/L) having P-value (0.005). These values show statistically significant difference with hematological blood parameters. The socio-economic status and exercise show difference within groups but show no statistically significant differences.

CBGP-84

Toxicity Of Bacillus Thuringiensis And Cry2ab Gene Against Lepidopteran Pests

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Vegetables are an essential source of nutrients and commonly used as a food regularly. The yielding ratio of crops are affected by many lepidopteron species act as a pest. The present study were designed to analyze the biocidal activities of endotoxins produced by Bacillus thuringiensisfrom cry2Ab gene against commonly found lepidopteron pests (Spodoptera litura, Helicoverpa armigera, and Chilo partellus). The vegetable plants were grown in a confined field trails under insect proof netting. Similarly, the Bacillus thuringiensis(Kurstaki species) having active cry2Ab were grown in control laboratory conditions using L.B media to get maximum colonies for formulation of spore/crystal mixture with varying concentration (100µg/ml to 1000 µg/ml). Also, different pest's larva were reared

in control laboratory conditions. After experimentations, the calculated L.C50 (96-hours) of cry2Ab gene spore-crystal mixture against different lepidopteron pests were 138.95µg/mlfor H. armigera, 277.27µg/ml for S. litura,and 106.72µg/ml for C. partellus respectively. The comparative potencies analysis results revealed that the endotoxins mixtures of cry2Ab shows high potency of 100% mortality caused inC. partelluswith 400µg/ml followed by H. armigera with 350 µg/ml, and S. litura with 700µg/ml. The overall results indicated that the Bt. cry2Ab gene endotoxins provide an effective and sustainable results in order to prevent from economical loss of crops yielding through taking control of lepidopteron pests. Based on our research findings, the Bt. cry2Ab gene endotoxins biocidal activity against different lepidopteron pests shows promising outcomes for controlling of pests in pest managements.

CBGP-85

Effect Of Paraquat On Cytophysiological Parameters Of Grass Carp (*Ctenopphyrengodon Idella*)

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Pesticides are particularly used to reduce the number of pests and increase productivity of crops but intensive utilization of these chemicals has deleterious impact on non-targeted organisms. Pesticides drain directly or indirectly to aquatic bodies and greatly disturb ecosystem of aquatic fauna. Among aquatic organisms, fish are greatly affected by pesticides and it induce several physiological and biochemical alterations. As important component of food chain, human being also faces severe health problems by feeding on contaminated fish. The present study was designed to explore various histo-physiological anomalies of grass carp (Ctenohpharyngodon idella) against the various toxic sub-lethal concentrations of paraquat (herbicide). Grass carp was exposed to 0.02, 0.04 and 0.06 mg/L paraquat for 04, 08 and 06 days respectively. The present study unveiled the toxic impact of paraquat by exploring the decrementing level of hemoglobin, hematocrit, mean cell hemoglobin, mean corpuscular volume and red blood cells while increase in concentration of leucocytes and platelets were observed. Besides these alteration red blood cells and nucleus abnormalities were also observed including swollen nucleus, terminal nucleus, damaged red blood cells and micronucleus. Similarly, various tissues abnormalities were observed as; in gills tissues cellular necrosis, irregular cells, inflammatory cell and degeneration of epithelial cells were observed, while swelling of laminar propria, large lumen and flattened villi were observed in intestine tissues. Other notable histological alterations in kidneys were hemorrhage, enlarged bowman capsule while pyknosis were observed in liver tissues. From our study it has been concluded that herbicide find their way to reach the aquatic body where it alters the ecosystem and cause severe damages to aquatic fauna. Beside these it also effects human health when they feed on contaminated fish. Therefore, all pesticides should be used in a control way in order to prevent aquatic pollution.

CBGP-86

The Adverse Effects Of Malathion On Histo-Hematological Parameters Of Grass Carp (*Ctenopharyngodon idella)*

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Pesticides are widely utilized against pests to reduce the deleterious impact of pest and increase productivity of crops. Excessive uses of these chemicals ultimately become harmful to other organisms including human beings. Fish as the occupant of the aquatic bodies cannot stay away from the harmful impact of these chemicals. Municipal Solid Waste (MSW) comprises solid waste from households, commercial area, construction waste and chemical waste that were not drown in open places. They are highly degradable and easily dissolve with air, which can disperse and contaminate water result in increased risk of pollution in aquatic bodies. In the present investigation, grass carp (Ctenopharyngodon idella) was exposed to various concentrations of malathion (insecticides), 0.02, 0.04 and 0.06 mg/L for 4, 8 and 12 days respectively. Results indicated that blood indices alteration is dose dependent like with increase in concentration of malathion, elevated level of leucocytes and platelets were observed while hemoglobin, hematocrit, mean cell hemoglobin, mean corpuscular volume and red blood cells level decreases. To cope with the stress environment, white blood cells (WBC) concentrations were incremented. Blood samples were also checked for red blood cells and nucleus abnormalities. Among red blood cells and nuclear anomalies infected cells, swollen nucleus and karyopikonisis were reported. Malathion induces severe histological disorders in grass carp including necrosis, inflammatory cells and swollen cells in gills while hemorrhage, degeneration of bowman capsule in kidney tissues of grass carp. Similarly, various histological alterations were reported in liver like larger vacuoles, pyknosis while large lumen and cellular necrosis were reported in intestine tissues.

SECTION – I I

PESTS AND PEST CONTROL

PC-1

Drying Techniques in Fruits and Vegetables to Enhance the Shelf life and Reduce the Postharvest Losses

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Drying is known as the best method to preserve fruits and vegetables, decreasing not only the raw material volume but also its weight. This results in cheaper transportation and increments the product shelf life, limiting the food waste. Drying involves the application of energy in order to vaporize and mobilize the moisture content within the porous products. During this process, the heat and mass transfer occurs simultaneously. The quality of dehydrated fruits, vegetables, and aromatic herbs is a key problem closely related to the development and optimization of novel drying techniques. This study reports the weaknesses of common drying methods applied for fruits, vegetables, and the possible options to improve the quality of dried products using different drying techniques or their combination. The quality parameters under study include color, bulk density, porosity, shrinkage, phytochemicals, antioxidant capacity, sugars, proteins, volatile compounds, and sensory attributes. In general, drying leads to reduction in all studied parameters. However, the behavior of each plant material is different. On the whole, the optimal drying technique is different for each of the materials studied and specific conditions must be recommended after a proper evaluation of the drying protocols. However, a novel or combined technique must assure a high quality of dried products. Furthermore, the term quality must englobe the energy efficiency and the environmental impact leading to production of sustainable dried products.

PC-2

Evaluation of Relative Susceptibility of *Callosobruchus maculatus* (F.) (Coleoptera: Chrysomelidae) on Two Different Stored Pulses

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The *Callosobruchus maculatus* commonly known as Cowpea weevil is a worldwide insect pest that infests pulses in the fields and seeds in storage. An investigation has been conducted on the life history of Cowpea weevil reared on Green gram and Mash gram pulses through three successive generations. The result obtained revealed that Green gram was susceptible while Mash gram had moderately resistant stored pulses against *Callosobruchus maculatus*.

PC-3

Population diversity of Chewing lice (Phthiraptera: Amblycera and Ischnocera) infesting Ducks and Geese (Aves: Anseriformes: Anatidae) of Sindh, Pakistan

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In Pakistan there are 37 species of ducks and geese representing 23 species in Sindh. Ducks and geese are aquatic game birds and migrate to Pakistan during winter seasons and stay from October to March of every year at various

waterbodies in Sindh region.These birds carries both types of parasites ectoparasites as well as endoparasites. The present investigation of ectoparasites has been undertaken on total 76 birds, including 8 species of ducks and geese, *Anas crecca* (Linnaeus), *Anas clypeata* (Linnaeus), *Anas platyrhynchos* (Linnaeus), *Anas querquedula* (Linnaeus), *Aythya ferina* (Linnaeus), *Aythya fuligula* (Linnaeus), *Anser anser* (Linnaeus) and *Anser albifrons* (Linnaeus) were collected from different districts of Sindh Province. Out of 76 birds, only 57 birds were found infested with the prevalence of 75%. Presently, total of 575 chewing lice specimens were being recovered, including six species, *Anaticola crassicornis* (Scopoli, 1763), *Anaticola mergiserrati* (De Geer, 1778), *Anatoecous icterodes* (Nitzsch, 1818), *Anatoecous dentatus* (Scopoli,763), *Trinoton qurequdulae* (Linnaeus, 1758) and *Holomenopon leucoxanthum* (Burmiester, 1838).The species-wise burden of chewing lice has been recorded maximum by *Anaticola crassicornis* 170 (29.56%) followed by *Trinoton qurequdulae* 165 (28.69%), *Holomenopon laucoxanthum* 80 (13.91%), while minimum burden was recorded by *Anaticola mergiserrati* 40 (6.95%), *Anatoecous dentatus* 45 (7.82%) and *Anatoecous icterodes* 75,(13.04%).The district wise prevalence was calculated, with maximum in Karachi and Badin (100%), then it is also high in Hyderabad (80%), Larkana (76.47%), Jamshoro (71%) and Kambar Shadadkot (70%), whereas the minimum prevalence of chewing lice was found in district Noushahro feroze (57.14%) and Dadu (66.66%).The total prevalence of chewing lice on ducks and geese species was calculated as maximum was recorded in *Anas crecca* (92.85%), *Anas clypeata* (87.5%), *Aythya ferina* (80%), *Anas querquedula* (75%) and *Aythya fuligula* (75%), whereas minimum prevalence was recorded in *Anser albifrons* (55.55%), *Anser anser* (60%) and *Anas platyrhynchos* (66.66%).The complete life cycle of these six species were observed on anatid birds their quantitative parameters like prevalence, population abundance, physical effects on feather and seasonal variation of all species of chewing lice were studied in the present project.

PC-4

Current Outbreak of *Spodoptera Frugiperda* (Fall Armyworm) on Fodder Crops (Maize) of Sindh

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The fall armyworm (FAW) *Spodoptera frugiperda* (Smith) (Lepidoptera: Noctuidae) is an obtrusive polyphagous lepidopterian pest of different yields that cause weighty infestation on vegetables, organic products cotton crops maize, and other fodder crops, especially harming maize and corn, although it is endemic to the American continents, it has spread to Africa and Asia. However, there has been no confirmed report of its presence from Pakistan. Except for the upper Sindh districts of Jacobabad, Larkana, and Shikarpur, the prevalence of FAW has been documented in all maize-growing areas of Sindh. The current study was carried out on fodder crops, specifically maize crops, from July 2020 to October 2021. Fodder maize experienced more damage than other fodder crops. Fall armyworm (FAW) infestation in fodder maize led to the destruction of thousands of hectares of maize. In the Matyari district, extensive damage to fodder maize was observed. The major cause of the current outbreak was the favorable climatic circumstances for numerous invading pests, such as high humidity and moderate temperatures. The current study revealed that climatic change is a significant factor and also a big challenge for governments, academia, and the entire globe. As a result, a country-wide study, as well as molecular identification of FAW, should be carried out to confirm its presence in Pakistan's maize areas. With proper management, this could be helpful for preventing its spread.

PC-5

Abundance of *Myzus persicae* in Jacobabad District Sindh Pakistan

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Aphids are harmful pests. Aphids not only harm crops but it creates very dangerous diseases. The survey was conducted in January 2017 till February specimens were brought to the insectary of the zoology department at the University of Sindh Pakistan. The identification of aphids was done by standard taxonomic keys. Four Localities of Jacobabad Gahri sabhayo, Dasti, Ali pur and rind wahi were observed. Myzus persicae was found abundantly in months of January and February.

PC-6

The Reflection and Abundance of Fruit Flies (*Bactrocera* Spp.) on Some Mango Varieties in Sindh Pakistan

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The fruit fly is one of budding pest that is very harmful to mango production in Pakistan. The originality about fruit fly species in certain area is crucial to scrutinize, pest risk assessment, to develop of appropriate standards for plant quarantine treatment, and to manage of fruit fly monitoring and control programs. This study aims to analyze the fruit fly abundance and composition among three mango varieties ("Chunsa", "Sindhri", and "Beganpali") in Mirpukhas, Hyderabad and Tado Muhammad khan Districts, in Sindh Pakistan. The Infested mangoes were collected from orchards (fields), markets and traditional vendors from above areas. All samples were transferred and reared in the laboratory, larvae to pupae and allowed to emerge as in mangoes. The results showed that *Bactrocera dorsalis* (Hendel), *Bactrocera carambolae* Drew & Hancock, and an interspecific hybrid of both species were found on mangoes in above Regence.The *Bactrocera zonata* was merely found on mangoes in same areas. The *B. dorsalis* was the abundant species in all mango varieties. There is (+) correlation between the nutritional content of mangoes with the fruit flies species diversity and pupae weights of fruit flies.

PC-7

Survey of Orthoptera pests and their affliction with plants from various agricultural regions of Pakistan

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A preliminary survey was conducted in various localities and important pests of 3 families were observed to cause huge damages in valued crops i-e *Phyllo choreiara makrishnai* (Eumastacoidea) makes leaf like appearance, stick grasshoppers (Proscopiidae) do mimicry like wooden sticks in form and coloration. They also use advanced legs for escaping and jumping. They are considered as destructive pests because it destroys most economical crops, their outbreak seen in hot and dry weather, they also damage fruits and woods. Beside this few species of family Tettigonidea was also seen. Most of their activity in the field has been observed in daytime but they are highly active at nighttime and produce different sounds. They spend the whole day in vegetation and at night they engage in reproductive activities. In order to compile all the orthoptera pests a detailed survey is needed.

PC-8

Insecticidal potential of indigenous weeds extracts of Bahawalpur Pakistan against dusky cotton bug (*Oxycarenus hyalinipennis*) (Hemiptera: Lygaidae) under laboratory conditions

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This study evaluated the aqueous extracts of three weeds namely *Datura alba, Chenopodium album and Withania somnifera* for insecticidal potential against *Oxycarenus hyalinipennis* (Hemiptera: Lygaeidae) under laboratory conditions. Extracts were prepared from three plant parts *e.g.,* leaves, stems and roots and applied at six concentrations ranging from 1 % to 20 % and a control treatment with water only. Mortality of pest insects was checked after three exposure periods *e.g.,* 24 hours, 48 hours and 72 hours. Results showed maximum mortality was generated due to 20 % concentration of extracts. Roots extracts were more potent followed by leaves and minimum mortality was due to stem extracts. Maximum mortality of insects was after 72 hours period followed by 48 hours and minimum was after 24 hours period. Among the three weeds *D. alba* proved more toxic in terms of mortality of *O. hyalinipennis* compared with other two weeds. These results pinpoint towards *D. alba* weed with potential to evaluate further for insecticidal properties for different important sucking insect pests of agricultural crops including *O. hyalinipennis*.

PC-9

Infestation of *Liposcelis entomophilia* (Psocoptera: Liposcelididae) on Orthroptera Pests

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Serious infestation of *Liposcelis entomophila* (Enderlein) (Psocoptera: Liposcelididae) was observed in the insects preserved in Sindh Entomological Museum. *Liposcelis entomophila* is a nuisance pest that seriously threatens the safety of stored products. During the museum survey 15 boxes were found with heavy infestation on 242 specimens. All the insects preserved in these boxes have great economic value in evolutionary linkage. All the stages of *L. entomophila i-e* eggs, early-instar nymphs, and adults were seen in insects' bodies. It has been demonstrated that the survival of Liposcelida is highly dependent on the atmospheric moisture level.

PC-10

In Silico Analysis of Repellent Activity of Dimesterol and Chavicol against *Aedes Aegypti*

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Dengue is a mosquito-borne viral disease that is spread by vector *Aedes aegypti.* This disease has a global incidence of 50 to 400 million per year and is epidemic in Pakistan. Mosquito repellents are necessary to control mosquito borne diseases as these diseases poses a national and world-wide health and economic risk. However, the use of synthetic mosquito repellents has been reported to be associated with various environmental and health issues. Previous study from our institute has reported the potent repellent activity of the organic extract of *Illicium verum*

against the *A. aegypti*. The GC-MS of the extract revealed the presence of trans anethole, chavicol, estragole and dimestrol as its major components. In the present project effectiveness of chavicol and dimestrol as a mosquito repellent was evaluated against target protein AaegOBP1 using in silico techniques. MCULE software was used for docking of ligand to protein. Results were visualized using UCSF chimera and LigPlot+. Docking results of understudy compounds were compared with docking results of DEET, that exhibited H-bonding with Met91 residue of binding pocket and binding energy ΔG-7.7 kcal/mol. Dimestrol showed simmilar binding parameters with AaegOBP1 with free energy ΔG-8.0 kcal/mol and a H-bond with Ile125 residue of the binding pocket. Chavicol also proved to be a good competitor of DEET with binding energy ΔG-6.8 kcal/mol and H-bonding with Phe123. Dimestrol and chavicol were found to be safe compounds to use as topical repellents using ADMET analysis. In-vitro repellent bioassays should be performed to validate the efficacy of dimestrol and chavicol to be used as repellent.

PC-11

Efficacy of Entomopathogenic Fungi against Cotton Mealy Bug *Phenaccocus solenopsis* Tinsley Pseudococcidae: Homoptera

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Cotton, *Gossypium hirsutum* is a cash crop. Cotton crop is attacked by many pests and all of those pests cause severe damage on cotton crop and cause 20% to 40% yield loss every year. Firstly, mealy bug was introduced in North America after that in Asia and Europe. Cotton mealy bug causes yellowing, malformation and weakening of leaves. Many insecticides like carbamates, organophosphate and pyrethroids were applied but they give short term control. In case of repeated application pesticide resistance occurred. According to IPM, biological agents are used against insects in the form of entomopathogenic microorganisms. *Beauveria bassiana, Metarhizium anisopliae* and *Isaria fumosorosea* are used as entomopathogenic fungi against cotton mealy bug. Biological control agents were cultured in laboratories. Entomopathogenic fungi inoculated in the mealy bug. Among all biological agents, *Beauveria bassiana* and *Metarhzium anisopliae* are highly effective on 2nd instar of mealy bug with high mortality rate.

PC-12

Oviposition Preferences of Peach Fruit Fly *(Bactrocera zonata)* on Different Fruit Hosts

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Bactrocera zonata is a quarantine pest worldwide and affect a variety of fruits and vegetables. The current study was done to investigate the host selection of *B. zonata* under the laboratory conditions. For this purpose, four different fruits i.e., banana, guava, apple and citrus were used in both choice and no-choice test condition. Result revealed that banana have received the highest oviposition and number of pupal populations followed by guava apple and citrus in no-choice test. The same trend was observed in choice test, the highest pupal population of fruit fly was observed in banana under the choice condition .Furthermore the lowest pupal population was observed in guava and apple and citrus have no pupal population in choice test. *B. zonata* responds differentially to co-existing host species in the field under choice and no choice tests, according to the current research .The pest control tactics for fruit crops are influenced by *B. zonata*'s host and choice preferences.

PC-13

Botanical Insecticides on the Longevity of Adult Green Lacewing (*Chrysoperla Carnea)*

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Green lace wing is natural enemies of numerous insect pests of agriculture crops. To keep its population in field we need to alternate of insecticides because insecticides not kill the harmful insects but also kill its natural enemies. Botanicals pesticides are less harmful for natural enemies but we need further research to confirm the botanicals plant extract influence of green lace wing. So present study was designed to check the two botanicals plant extract Garlic and eucalyptus plants extract influence on adult's longevity of green lace wing. Three different concentration (10%, 20%, 30%) of both botanicals plant was test in artificial diet of green lace wing. In eucalyptus a statistically significantly increased adult longevity was observed in control group, while there was no statistically significant difference was found among 10, 20 and 30 % of treatments. While in garlic a statistically significant enhance adult longevity was observed in control group, as compared with given treatments, while no significant difference was observed between 10% and 30 % and also 30% and 20 % at adult longevity. But in Both botanicals plant extract was compared regarding adult longevity we observed eucalyptus plant extract were found more effectively compared to garlic extract in all give concentrations. We observed that eucalyptus plant extract significantly reduce the adult longevity of green lace wing as compared to garlic extract in all given concentration treatments. Present data will be helpful for research farmer and scientific community.

PC-14

Use of Different Colours of Sticky Traps on the Population of Whitefly *(Bemisia Tabaci*)

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White fly is one of the most serious insect pest attacking numerous agriculture crops in Pakistan. A wide range toxic pesticides have been used to mitigate the pest population. However, due to environmental contamination and public health risk the use of toxic pesticides need be minimized. In present study, various colours of sticky traps were used to evaluate population of white fly. Various colours of sticky traps such as Yellow, Red, Green, Blue and Black were used in the field of brinjal crop and thus data was recorded on daily basis for one week. Maximum population of white fly was recorded in Yellow sticky trap (88.99) followed by Green (14.55), Black (11.99) and Red (9.22) colour sticky trap. While a minimum population of white fly was observed in blue trap (7.99). Statistically significantly increased population of white fly was observed in yellow trap and green tarp. While no significant difference was found between black and red traps and also in red and blue traps. It was concluded that yellow color could be used in the field to suppress the population of white fly. The present data will be helpful for the research and scientific community for further research.

PC-15

SPLAT-PBW: An Environmental-Friendly, Costable Mating Disruption Tool for the Management of Pink Bollworm on Cotton

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The farmers of cotton crop have reaped the benefits of Bt cotton cultivation since commercialization [March 2002]. From 2014 the pink bollworm (PBW) outbreak in the larged cotton-growing areas of the country was witnessed. The pest increased and became more problematic for farmers and country economic. Its being controlled with the new management practices due to resistance to cry-toxins and chemicals. A non-chemical approach modifying the behavior of PBW was evaluated its effectiveness in comparison with existing management strategies. An area-wide management trial with disruption mating technology was carried out using pheromone, and lure application technology for pbw.Application of 1250 g/acre of the lure during 2017 in 154 acres and 206 acres during 2018 in India, recorded significant control of PBW. The results that SPLAT-PBW applied at maximum acres was found to be optimum, as minimum rosette flower (7.23%), green boll damage (8.30%),locule damage (7.40%), and higher yield (33.50q/ha) recorded.As compared to farmers' practice which yielded 22 q/ha even after applying the 6 rounds of chemicals spray. At the end of the 5 week, 42 of the active ingredient of pheromone was present in the field sample.It's show the slow release pheromone as compares to other. Non-chemical practices of insect pests in the cotton significantly benefit in decreased the load of pesticides and total output.In future insecticidal transgenic crops will use modified Bt toxins and new ways to such as RNA interference(RNAi).

PC-16

Outbreaks of *Schistocerca gregaria* in Various Districts of Sindh

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The present study focuses on *Schistocerca gregaria* commonly known as Desert Locust belonging to (Acrididae: Orthoptera) is an economically disastrous pest of the extensive range of crops including cereals. A survey for the collection of the specimens was carried out during the year 2019 from different districts of Sindh, which were recently affected by the swarm of *Schistocerca gregaria* Desert Locusts. The number of collected specimens is 935. Besides this, an immature identification key was also given for paper analysis. This species is observed as polyphagous and can strongly harm a wide range of grasses including wheat, cotton guar, maize, and fruits. This outbreak was the worst in history.

PC-17

The Management of Insect Pests by Using Entomopathogenic Fungi

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Insect pests cause huge damage to our crops. Synthetic pesticides are broadly used for controlof insect pests but this approach has various negative impacts on environment and non-target organisms. Due to excessive use of pesticide over the years the insects developed resistant against these chemicals. So, there is need for alternate option to manage these pests. Among different IPM program, use of microbial formulations is ecofriendly and safe for life. A biological control agent using entomopathogenic

fungi has been developed in place of chemical pesticide. Entomopathogens due to their eco friendliness are preferred to control insect pests by contact mode of action.Insect pathogenic fungi have resulted various improvements in mycoinsecticide products based on *Paecilomycesfumosoroseus*and *Beauveria bassiana*.The most effective entomopathogenic fungi included *Metarhiziumanisopliae, Beauveria bassiana, Cordyceps javanica.*These products of entomopathogenic fungi have been very effective; however, utilization of these products is very low, due to low performance under challenging conditions and lack of awareness. Vigorous research work needs to be done to improvetheir performance under challenging conditions, mass production, formulation, pathogen virulence and spectrum of action. It should be possible that best use of entomopathogens at wider range can eliminate the chemical use at larger level.

PC-18

Effect of Different Plant Extracts against Cotton Jassid Nymphs, *Amrasca biguttula* on Cotton

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Cotton is an important fibrous crop. It is one of the major crops of Pakistan. Cotton production play about 10 percent role in national GDP of Pakistan. Cotton is facing a serious threat from sucking and chewing insects for its revival in Pakistan. There are many sucking insect pests of cotton, jassid is one of them. Various synthetic insecticides are used by cotton growers to keep the insect's population below ETL level. Insecticides are expensive, harmful to environment and disturbing the natural fauna as well. Botanical extracts are very useful to manage pests' population under control and are eco-friendly. The present study carried out about to predict efficacy of different plant extracts against nymph of cotton jassid. During study four different plants bio extracts i.e., tobacco (*Nicotiana tabacium*), neem (*Azadirechtin indica*), kortumba (*Citrullus colocynthis*) and heing (*Ferulaassa-foetida*) were sprayed with 15 days of intervals. The result showed that the highest mortality by the tobacco (66.6%), by neem (33.3%), by kortumba (50%) and by Heing (55.6%). It was observed that botanicals were effective until 48 hours which was represented the much effectiveness of different plant extracts against cotton jassid. This present study suggested that the use of plant extracts is very useful to reduce jassids population without harming the natural enemies.

PC-19

Effect of Various Concentrations of Pyproxifen and Larvin on *Aedes Eagypti* Eggs

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The experiment was carried out to record the effect of Effect of various concentrations of Pyproxifen and larvin on *Aedes eagypti* eggs. *Aedes aegypti* (Diptera: Culicidae) is the main mosquito responsible for the transmission of dengue in tropical and subtropical regions of the world. Presently no vaccine is available for the prevention of dengue virus infection at the world level. Therefore, control of dengue vector is the only way of dengue management. The present study was carried out at the Nuclear Institute for Food and Agriculture (NIFA), Peshawar in Plant Protection Division during November, 2017. Two different insect growth regulators (IGR) as Pyriproxyfen and larvain were applied against freshly laid eggs of *Ae. aegypti* at six different concentrations as 2,4,8,16,20 and 40 ppm. Each concentration was repeated three times. The control was treated only with tap water. The counted no of freshly laid eggs of *Aedes aegypti* were exposed to all the tested concentrations under laboratory conditions (27℃, 75±5 RH). In the overall results, found the significant results in

the context of eggs inhibitions/ hatching in IGR (50.240% 49.731%) and larvain as (62.291%, 37.700%) respectively. Similarly among the tested concentrations, significantly recorded the highest level (40ppm) was highly effective followed by 20, 16,8, 4 and 2ppm) for maximum eggs inhibition. In the control, maximum eggs hatching was found as (81.867% 88.160) respectively with IGR and Larvan treatment. It was concluded that IGRs can be utilized as environment friendly control measures for *Culex* quinquefasciatus and *Aedes albopictus* spp of mosquitoes on small and large scale. This will reduce the use of conventional insecticides by the public health authorities and help in reducing selection pressure of insecticides.

PC-20
Population Fluctuations of Fruit Flies, *Bactrocera spp*. in Mango Orchard Ecosystem of Sindh, Pakistan

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Keeping in view the economic importance of fruit flies and losses incurred by *Bactrocera spp.* infestation which caused ban on export of mango to Europe. Studies on population fluctuations of Peach fruit fly *Bactrocera zonata* (Saunders) and Oriental Fruit Fly *Bactrocera dorsalis* (Hendel) were undertaken during 2018 on mango fruit in different climatic zones of Sindh Province. Investigations were carried out at district Larkana and district Hyderabad in mango orchards using methyl eugenol lured traps. The male lure tempted traps were displayed at three meter height and replenished on fortnightly basis in experimentation sites. Results revealed that significantly highest (658.6±20.26, 601.9±25.38) population of *B. zonata* were recorded in the month of June in mango orchards of district Hyderabad and Larkana. Similarly, higher (447.4±18.3, 396.9±38.79) population of *B. dorsalis* was recorded in June in Larkana and Hyderabad regions. Moreover, lowest (7.7±0.96, 5.9±0.97) population of both species were recorded in the month of December in Larkana. On contrary lower (12.9±1.35, 9.5±0.45) population of *B. zonata* and *B. dorsalis* were observed in the month of January in mango orchard eco-system of Hyderabad region. The ensnaring of both species were positively correlated with the temperature while relative humidity has slight negative effect on it. Results of the present investigation would be helpful in developing sustainable male annihilation technique (MAT) program as an important IPM component for various mango orchards in Sindh.factors, MAT.

PC-21
Invasion of Fall Armyworm (FAW), *Spodoptera frugiperda* from Maize and its Surrounding Agroecosystem in Hyderabad

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The fall armyworm (FAW), *Spodoptera frugiperda* is a sporadic pest that belongs to a Lepidopteran family Noctuidae. At present time, It is a rising threat to food and nutritional security of millions of people throughout the world as its voraciously feeds on more than 80 plant species including many crops causing major damage to economically important cultivated grasses particularly corn, sorghum, rice, sugarcane, wheat and other vegetable crops and cotton etc. It can cause famine in areas where cereals are subsistence crops. It is native to America but due to its potent flying abilities since the first detection of invasion, it rapidly spread to West Africa and to throughout sub-Saharan Africa and now it has been reported in most of the Asian countries like China, Myanmar, Thailand, India, Bangladesh and Sri Lanka. Pakistan is not an exception as its presence has also reported from Faisalabad and some localities of Sindh, Pakistan. Different biological characteristics like wide host range, inherent ability to survive in a broad range of habitats, strong migration capacity, high fecundity, rapid development of resistance to insecticides contribute to FAW invasiveness.

SECTION – I I I

E N T O M O L O G Y

ENT-1

Cladistic analysis of Chewing lice (Amblycera: Menoponidae) infesting fowls of District Hyderabad, Sindh, Pakistan

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The present research work covers the phylogentic relationship of five species which belongs to a family Menoponidae (Amblycera: Phithraptera), recovered from variety of fowls as host from district Hyderabad, Sindh Pakistan. The species are analyzed caldistically by cladogram, using of their apomorphic characters. The Key to the five species of family Menoponidae has also been developed for the three genera. The cladistic relationship of chewing lice species was analyzed to understand the evolutionary aspect of their morphologies as well as their host specificity by using the key characters of lice. This is the first investigation of this kind on various types and breeds of fowls of family Menoponidae from district Hyderabad, Sindh, Pakistan, made a valuable contribution to the chewing lice fauna of Pakistan.

ENT-2

Abundance of Aphidophagus Hover Flies in Larkana, Sindh, Pakistan

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Hover flies commonly known as blossom flies fit to large family of small to large flies worldwide about 6000 species have been reported, Aphidophagous hover flies deliver vital ecosystem services as pollinators, biological control agent. Aphidophagous hover flies are one of the important group of flies because their larvae feed on numerous insect pest such as aphids. Jassids, thrips, which feed on various crops like brassica, spinach, rice, wheat etc. present study help in pest controlling of crops in Mohan-jo-Daro Larkana and its peripheral areas. Larkana is the main agricultural area of Sindh where different flowering crops, vegetables and fruits are produced such as Mango, Banana, Guava, Brassica, and Wheat. The present study was conducted from October to, December 2021 from Mohen-jo-Daro Larkana in which different fields were visited during seasonal crops. Total 221 specimens of 2 species (*Episyrphus balteatus, Bacha baltetus*) belonging to genus *Episyrphus* and *Bacha* family syrphinae were collected from brassica, spinach and chili paper mostly in aphid colonies.

ENT-3

Study on the Morphological Identification of Family Chrysomelidae (Coleoptera) *From District Badin Sindh*

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The present study was carried out from the district Badin during the year 2021. A total of 432 specimen were collected from the different localities of District Badin and its adjoining areas, and sort out into single family i.e. Chrysomelidae with only one species i.e *chrysolina gramania(Linnaeus,1758)* it overall percentage was noted 52.08% for Female followed by 47.91% for Male. Collection was made on mint plant belongs to Laminacea family. Present study suggested more in frequent survey in other localities and other host plants.

ENT-4

A new record of Long horned grasshopper *Hexacentrus unicolor* Servilli 1831 (Hexacentrinae: Tettigonidae: Orthoptera*)* From Taulka Dadu

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During the preliminary survey of major cropping areas of Dadu a few species of *Hexacentrus unicolor* survilli 1831 were captured which seems a new record for the region.This species is very unique in its morphological appearance and collection of this specimen from Wheat crops is also surprising, this study will conform weather it will proved an major threat the various crops in future or not.

ENT-5

Taxonomical Survey of Orb Web Spiders from Wheat Crop, District Dadu, Sindh

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The district gets its name from its headquarters town Dadu. It lies between 24-57and 27-27 north degrees and 67 - 09 to 68 - 25 east longitudes. In Sindh 3.5 million tons wheat is made and Ranked at second number in Pakistan (ESP, 2015-16). Wheat is invaded with number of disturbances, for instance, aphids, caterpillars, crickets, wireworms, leaf bugs, grasshoppers, etc. Farmers generally use pesticides which are harmful for wheat and environment. During the present assessment, wheat field of Dadu was outlined in the time of November, 2019 to April, 2020. 527 models were assembled and managed into two families specifically Araneidae, Tetragnathidae. All families were gathered up to Genera and species level. *A. trifasciata*, *A. Pradhani* of family Araneidae, Tetragnathajavana of family Tetragnathidae are first time recorded from this zone. Unmistakable confirmation of given kinds of different families up to ordinary level similarly as species level with the help of taxonomical keys.

ENT-6

Foraging of Ants (Formicidae) Inhabiting on Mango Trees in District Sanghar

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This research was based on feeding strategies of ants (Formicidae), started from the year April 2019 to December, 2021. Total 7245 specimens were collected and sorted out into fifteen species, and six genera. It was found that ants have different feeding approaches towards the versatile sources of food including insects, small animals, plants, seeds, nectar etc. this co existence have great importance in the Mango fields. Because it was noticed that their role is vital not only for mango fields but for our environment. Hence they are known as sustainers of our environment.

ENT-7

Prevalence of Head Lice Infestation and its Associated Risk Factor in Primary School Children of Lahore, Pakistan

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Head lice infestation is a frequent public health condition that affects people of all ages, but is more prevalent among school-children. The goal of this study was to find out how common head lice infestation in among schoolchildren (age 4-11

years) and their associated risk factors. This cross-sectional study was conducted in different schools of Lahore, Pakistan, from February to May in 2016. A standard questionnaire was design for recording information about risk factors. Visual inspection and combing of hair for 3-4 minutes were made to check the presence of lice, nymphs and eggs. Significant difference for pediculosis and its related risk variables was determined using the X^2 test. There were 141 boys (38.21%) and 228 girls (61.79%) among the 369 students. A total of 243 students tested positive for head lice, resulting in a prevalence of 65.85%. The prevalence for boys were 24.69% and for girls were 75.31%. It was more for girls with significant statistical difference (X^2 =59.095, P<0.001). Prevalence was higher in 6-7 and 8-9 age groups for both sexes. This finding revealed a link between pediculosis and the number of siblings, low-income group, low personal hygiene practices, regularly checked by parents and sharing of accessories. Father's education and mother's occupation showed association with head lice infestation. Pediculosis was found to be inversely related to hair length, dandruff and lubrication of hair. There is a need to raise awareness about the dangers of head lice infestation and to educate teachers and parents on how to avoid pediculosis.

ENT-8

Some New Records of Earwigs (Dermaptera) from District Matiary Sindh

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Earwigs belong to order dermaptera are considerable importance. It is important to identify them accurately so that diagnosis of economic problem can be properly made. The Earwigs have been recorded as a pest of Irish sweet potatoes in storage damaging the root of vegetables grown in green houses. As a result of present investigation there are 302 specimens were collected, following species are recorded for the first time from Matiary districts different fields *Forcipulla akbari, Forcipula quadrinospinosa, Nala basilis Anisolobis martima, Euborellia anulipus and Anechura fedtschenkoi calciatti.*

ENT-9

Effect of Selenium on Pollination Efficiency and *Trifolium alexandrinum* L. Seed Yield

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Selenium deficiency may cause mastitis disease in cattle however, by adding selenium in fodder crop it will overcome the disease in livestock. Furthermore, selenium should be added in our staple food as selenium supplement may help human in overcome heart diseases, baldness and sometime cancer. Low dose of Selenium may favor the pollinators, it may extend the life of the bees and also increases the immune and antioxidant activities of the bees. The purpose of our study is to assess effect of selenium on efficacy of different native insect pollinators and ultimate effect of selenium on yield of berseem. There were five treatments of Selenium dose i.e. 00 g/ha (control), 05 g/ha, 10 g/ha, 15 g/ha and 20 g/ha and two sprays of Selenium were applied at one week interval. In our experiment there were three dominant groups of pollinators solitary bees (*P. oxybeloides, Xylocopa sp.*), Honeybees (*A. dorsata, A. mellifera, A. florea*) and syrphid flies (*E. aeneus, E. balteatus, I. scutellaris*) were found visiting berseem crop. Moreover, our study suggest that high dose of selenium in plant cause decrease in abundance, visitation rate and visit duration of pollinators however, low dose of selenium (5g ha^{-1}) assist pollination. In our study, maximum seed yield (number of seed per head, seed weight per head, 1000 seed weight) of berseem was obtained at low dose of selenium (5g ha^{-1}) On the other hand plant height and head weight were not affected by high dose of selenium, however, reduction in biomass of plant was observed at high dose treatments (15g ha^{-1} and 20g ha^{-1}). By applying suitable dose of selenium to the plants, may increase the seed yield as well as it will favor the pollinators.

ENT-10

The Occurrence of Gynandromorphism in Bees (Hymenoptera, Apidae); A review

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Gynandromorphism is an abnormal phenomenon by which both male and female phenotypical characters appear in an organism. Genetic mutations in the sex determining genes were thought to be the cause of this abnormality but latter it was reported that rather of being induced by genetic mutations, some anomalies in the preservation of regulatory signals that govern sex differentiation at single cell lineages cause it. There are basically three forms of gynandromorphism, bilaterally asymmetrical, mosaic and transverse type. The first one happens at early stages of development, when an organism's body has one side that is male and the other side that is female, the second one occurs latter in development, when the two sex characters are not clearly defined, whereas last one occurs when two asymmetrical portions of the sex characters are distributed. Gynandromorphism is reported in 13 orders and 69 families of insects till now. In bees it is documented in 140 species from all main biogeographic areas of the world, representing 35 genera from all families of Apoidea. The bees in the genera Megachile and Xylocopa have the most gynandromorphs documented. Females are more likely than males to experience cross-sex manifestation of character states. The purpose of studying gynandromorphism is to observe the role of sex linkages in evolution of a species.

ENT-11

Diversity of Pollinators in Oil Seeds Crops

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Pollination is a very essential service for the ecosystem in terms of maintaining the biodiversity of the important plants on earth. It contributes toward 35% of crop production all over the globe. Insect pollinators especially Honey bees enhance the seed weight, filled seed per head and seed yield per head in oilseeds crops and increase 30% of seed production. Pakistan imports 1.98 MT edible crude oil by spending about 45 billion rupees. The relative abundance of insect pollinators has a favorable effect on yield and yield components. About 12 insect visitor's affiliated to different orders Coleoptera, Lepidoptera, Diptera, and Hymenoptera were founded visiting the flower of sunflower head. The abundance of Hymenopterans were greatest then Dipterans and then others insects were founded. In Hymenopterans, honeybees show highest presence (65.22%) although Non-Apis bees and Scolid wasps has been recorded 20.39% and 1.69% respectively. The Hymenoptera order has the highest abundance rate of insect pollinators (89.8%), followed by Diptera (6.7%) and Lepidoptera (6.7%). The oil content and seed yield is increased by 6% and 30% respectively in hybrid varieties of sunflower by pollination through honey bees. Improving the populations of the pollinators improve the yield of oilseeds and other crops. It provide great nesting sites to the bees which help in securing the habitat for them.

ENT-12

Role of Managed Honeybees in Alfalfa Seed Production

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*Alfalfa (*Medicago sativa *L.) is one of the most important fodder crops having 20-24 % protein content more than other widely used fodder crops and is well adopted to wide range of climates and soils. Due to high yield and nutritional value alfalfa called as queen of fodders. It requires bee pollination for seed production. Alfalfa is a perennial, cross-pollinated crop that requires bees to "trip" flowers in order to release pollen for seed development.* Tripping is normally done by bees; Wild bees are effective alfalfa trippers and hence good cross-pollinators. The honey bee worked for as long as 11 hours a day, and pollen-collecting individuals opened 7 flowers in a minute which makes them also important pollinator alfalfa crop. To increase their yield alfalfa, seed farmers rent bees from Beekeepers, who strategically place the hives near to their blooming alfalfa fields to enhance pollination and seed output. Honey bees (Apis mellifera L.) are not enough for alfalfa trippers for efficient seed production in compared to solitary bees. Furthermore, Honeybees are greater in number and easily managed while solitary bees are efficient but hard to conserve. Yields per acre may decline by more than half if honeybees were only used for seed production. The decline may be greater than 90% if honeybees were completely missing. Bee pollinators are responsible for 80% of the world's plants pollination including 90% of different food crops. Solitary bees and honey bees both play an important role in pollination of alfalfa crop and its seed production. By placing honey bee hives in alfalfa field and by conserving solitary bees we can get maximum seed yield of alfalfa.

ENT-13

Effect of Selenium on Pollination Efficiency and *Trifolium alexandrinum* L. Seed Yield

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Selenium deficiency may cause mastitis disease in cattle however, by adding selenium in fodder crop it will overcome the disease in livestock. Furthermore, selenium should be added in our staple food as selenium supplement may help human in overcome heart diseases, baldness and sometime cancer. Low dose of Selenium may favor the pollinators, it may extend the life of the bees and also increases the immune and antioxidant activities of the bees. The purpose of our study is to assess effect of selenium on efficacy of different native insect pollinators and ultimate effect of selenium on yield of berseem. There were five treatments of Selenium dose i.e. 00 g/ha (control), 05 g/ha, 10 g/ha, 15 g/ha and 20 g/ha and two sprays of Selenium were applied at one week interval. In our experiment there were three dominant groups of pollinators solitary bees (*P. oxybeloides, Xylocopa sp.*), honeybees (*A. dorsata, A. mellifera, A. florea*) and syrphid flies (*E. aeneus, E. balteatus, I. scutellaris*) were found visiting berseem crop. Moreover, our study suggest that high dose of selenium in plant cause decrease in abundance, visitation rate and visit duration of pollinators however, low dose of selenium (5g ha^{-1}) assist pollination. In our study, maximum seed yield (number of seed per head, seed weight per head, 1000

seed weight) of berseem was obtained at low dose of selenium (5g ha^{-1}) On the other hand plant height and head weight were not affected by high dose of selenium, however, reduction in biomass of plant was observed at high dose treatments (15g ha^{-1} and 20g ha^{-1}). By applying suitable dose of selenium to the plants, may increase the seed yield as well as it will favor the pollinators.

ENT-14

Survey of Genus *Gryllus (Gryllidae: Orthoptera*) in Sindh

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Several species of family Gryllidae occur in different habitats i.e trees, shrubs, herbs and grasses. Its population was high during April, May and June. Rainfall varies from year to year. During present study we have collected about 85 specimens of Genus *Gryllus* and sorted them out into two species *Gryllus (Gryllus) bimaculatus* De-Geer,1773 and *Gryllus* (*Gryllus) campestris* Linnaeus, 1758. Sex was also identified on bases of wings, male have shorter, sturdier wings with rough underside surfaces known as file. These insects are omnivores, scavengers and herbivores. During field surveys male crickets were found dominant and show aggressive behavior towards females and to protect their territory. Several morphological variations were found; present study suggests that it might be due to geographical variation further, detailed surveys are needed.

ENT-15

Observation on Oviposition behavior of *Poekilocerus pictus* under Laboratory Conditions

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Poekilocerus pictus (Fabricius, 1775) is also known as Akk grasshopper or locally in a few tribal areas called Titighodo. It is a principal pest of *Calotropis procera* (Akk), but it also damages wheat, alfalfa, papaya, citrus, castor, brinjal and cow pea on large scale in India as well as in Pakistan. Some observations were made on the reproductive activities of the *P. pictus* under laboratory conditions. On attaining sexual maturity, the males took 3 to 4 days for copulating once final shedding, whereas the females took one to a pair of days or in rare cases sexual practice started instantly once final molt in each sex. After the 2-3 days of copulation females start egg-laying and deposit about 60-80 eggs and 2-3 egg pods during their entire life. It was also pointed out that oviposition normally occurs during the daytime mostly in the morning. Number of eggs reduces with increase in the frequencies of oviposition.

ENT-16

Entomophagy: Diversity of Insects used as a Food Source for Human Beings

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In 2050 world population is expected to be over 9 billion, to meet people's feed is a major discussion hotspot. The practice of eating edible insects has been recognized for a long time. Finding other sources like insects that have equal nutrients value to fish and meat are highly needed. Over 2300 species of 18 orders are reported as edible insects. Larvae of *Callipogon barbatus*,

Rhynchophorus phoenicis, *Hermetia illucens*, and pupae of *Musca domestica* are the most consumable edible insects due to their massive protein contents. Insects are rich in crude protein, vitamins, minerals and less in fat and cholesterol. Imago is also preferred like *Poekilocerus pictus, Ballatodia,* and *Apis mellifera*. Some insects are well accepted due to their flavor like aquatic insects have fish taste, the termite has a nutty flavor, ants are sweet, and stink bugs have apple flavor. People are using insects as they are inexpensive and even free to consume. For imminent food insecurity, feasible methods and strategies should be implemented to promote the consumption of edible insects.

ENT-17

Importance of Blow Flies with Respect to Forensic Entomology; A Review

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The Calliphoridae (commonly known as blowflies, flashflies, carrionflies, blue bottles, green bottles, or clusterflies) is a family of insects in the order Diptera, with 1,200 known species. Blowflies are important in forensic entomology, where the maximum and minimum postmortem intervals (PMI) are estimate on the basis of developmental stages of Dipteran larvae and pupae that consume dead tissue. Blowfly is usually the first insect that comes in contact with carrion, because they have the ability to smell dead animal matter from up to 2 km (1 mi) away. Females deposit eggs on carrion. Traditional estimations of time since death are generally recorded, the minimum period of insect (PIAmin: 72 hr) and (PMI:<48hr), assuming colonization occurred after death, blow fly specimens found infesting a corpse are used to determine if the corpse was relocated or if the individual ingested narcotics prior to death. The entomologist must know how the blowfly behaves specifically in the area where the body was discovered. This involves recording environment temperatures, time of day, condition of the body at the crime scene as well as retrieving a history of the climate in the region. *Calliphora livida, Calliphora vicina* and *Cynomya mortuorum* are important flies of forensic entomology. In this study, we determine morphology of all stages, their development and growth and the comparison of life cycle of different *Calliphora livida, Calliphora vicina* and *Cynomya mortuorum.* The results of this study may be helpful in carrion dead time investigation and also the effect of temperature variation on biology of these species.

ENT-18

Taxonomic studies of Thrips Tabaci on Allium Cepa in Pakistan

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Onion, Allium cepa is one of major dietary crop in Pakistan with high level of nutrients like Phosphorus, Calcium, and Carbohydrates. Pakistan is 6th largest onion producing country in the world with a share of 3% at international level. Among all vegetables produced in Pakistan, onion ccontribute 40%. Annually, Pakistan exports around $ 125 million vegetables of which onion, garlic, and leeks has up to $ 57 million in 2020. There are many reasons of lower production of this crop. Thrips tabaci has become a regular pest all over Pakistan. It causes both direct and indirect damage by feeding and ovipositing on leaves also transmit pathogens that reduced bulb size and quality. Due to it's smaller size cryptic habits, there are several problems in managing it. Th present study is being devised to observe biodiversity of this pest in vegetables. This would help to understand and foresee the pest management of Thrips tabaci for future needs.

ENT-19

Interactive Effect of Nutrition and Pollination on Crop Production- A Review

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Pollination is necessary for enhancing the crop production because 70% of the crops depends upon insect pollinators. The available nutrients and insect pollination both are necessary for increasing the yield of flowering crops. The relationship between the pollinators and flowering plants is very important for the maintenance of ecosystem services. Flowering plants are main source of insect pollinators because they provide nutrition to the insect pollinators. Most of the studies have been reported variable results for different levels of fertilizers on insect pollination and crop production on different crops i.e. it was found that common bean production was increases due to insect pollination at low nitrogenous fertilizer level. In Sunflower the maximum yield was reported at intermediate Nitrogen fertilizer level due to enhanced insect pollination. Moreover, in rapeseed the insect pollinator's visitation and crop yield was maximum at high dose of fertilizer (NPK). In alfalfa crop the yield and yield parameters were recorded maximum at the intermediate level of Phosphorus while at low level of phosphorus the crop production was decreased and ultimately pollination decreases. In Sunflower crop the effect of Potassium fertilizer was also reported. The crop production in terms of yield parameters such as head weight, head diameter, seed weight and number of seeds was maximum at the intermediate level of K. The maximum abundance of insect pollinators was also recorded at medium level of Potassium. The plant nutrition and insect pollination was necessary to increase the crop production and these studies would help us to determine best level of fertilizer at which the maximum benefits of insect pollination and seed production can be achieved.

ENT-20

Does the Duration of the Pre Oviposition Period of Honeybee Queens affect the Honey Production of Colonies?

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Data of the pre oviposition period (POP) of honey bee queens were collected from 25 colonies at mating station at HBRI NARC. Generally, the pre oviposition period of the tested queens lasted from 6 to 34 days with an average of 15.8 days. About 80.1% started egg laying 8 to 18 days after emergence. The length of POP varied significantly among years and months and among different queen bee breeders. Both, the type of mating and the mating location significantly affected POP. Artificially inseminated queens had the significant highest value (17.6 days) of POP in comparison with naturally mated queens at Islamabad (15.4 days) and margallah hills -mating (14.9 days) stations. The relationship between POP and honey production of bee colonies was not found to be significant. The results of this study have demonstrated that honey production, which is assumed to characterize queen vitality, is not affected by POP but that POP is highly affected by several environmental factors during the period before the start of egg laying. Consequently, the pre oviposition period of honeybee queens should not be used as a tool to pre-evaluate honeybee queens.

ENT-21

Comparison between the Attraction of Native and Non-Native Flowering Plants towards Insect Pollinators

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Biodiversity of the pollinators is decreasing globally due to various human activities i.e. agricultural infestation, habitat loss, pesticide use and low availability of flora. Habitat loss is one of the most critical factor in pollinators declining. Shortage of floral supplies and nesting habitat are among the natural and human-caused stresses that also have contributed to pollinators decline Moreover, managed bees (*Apis mellifera*) are also facing colony collapse disorders worldwide. There are native and non-native flowers were grown to attract the diversity of pollinators. About 90% of the flowering plants provide foraging resources for diversity of insect pollinators. Bees attracted towards the native plant but the solitary bees were attracted towards the non-native plants. Abundance of pollinators was directly proportional to the numbers of blooming flowers. Exotic and near native plants have an important role in enhancing the habitat for pollinators along with the native flowering plants. Temporal stability of floral resources is important for the reproduction of the pollinators but there were not work is done on conservation of insect pollinators by using these flowering plants in Pakistan due to this different bee species were unidentified in Pakistan till now. Hence by providing these floral resources we can conserve the pollinators. We suggest that these flowers should be tested and choose the highly attractive flowering plant of that area because native plants are cheap and easily available.

ENT-22

Mass Rearing of *Acrida exaltata* (Orthoprtra: Acrididae) Under Laboratory Condition

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Preliminary investigation was carried out in order to reared *Acrida exaltata* (Walker) under laboratory conditions. Target insects were reared on different diet and food consumption and utilization, growth (growth rate, average daily growth, specific growth rate and wet weight gain), survival and life span were noted. It was found significantly different in various diets. A detailed study is under progress.

ENT-23

Grasshoppers (Acrididae: Orthoptera) of Taluka Kandiyaro, District Naushahero Feroze

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Grasshoppers are the most numerous and diverse insect species. Grasshoppers have many advantages for such experiments, including their large body size, quick capture capacity, and high dominance, to the point that they have become a primary invertebrate category for biological indication in a broader context. They are found in all ecological systems and have a major economic impact due to their ability to destroy nearly all types of green vegetation. In grasslands, they are often the main invertebrate eaters and provide a valuable food source for a number of predators, including birds, lizards, and other mammals. The grasshoppers are classified in two categories: Caelifera which are short horn grasshopper and other are Ensifera which are large horned grasshopper. At present extensive surveys were conducted from taluka Kandiyaro district Naushahero Feroze to collect the grasshoppers. About 170 samples were captured and sorted out into 05 sub- families i-e: Acridinae, Cyrtacanthacridinae, Eyprepocnemidinae, Oxyinae, Spathosterninae and 10 species i-e: *Acrida exaltata, Truxalis eximia eximia, Phlaeoba tenebrosa, Anacridium aegyptium, Anacridium rubrispinum, Cyrtacanthacris tatarica, Eyprepocnemis alacris alacris, Oxya velox, Oxya bidentata* and *Spathosternum prasiniferum.* Besides, detail genitalia study is provided first time from the studied region. Definitely, this study will be helpful for the future scholars.

ENT-24

Study on Dragonflies of District Khairpur Mirs Sindh Pakistan

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Dragonflies and damselflies are part of the order Odonata, which is primarily found in tropical and subtropical climates. Except for the Antarctic region, reports of dragonflies come from everywhere across the planet. A majority of them live in countries with warmer climates or in tropical regions .From March 2021 to August 2021, research was conducted to gather data on the Khairpur district's dragonfly fauna. Two families were represented by a total of 219 specimens, of which nine species were found in five genera. Eight species of Libellulidae are found in four genera, while just one species is found in the Aeshnidae family. Compared to the Aeshnidae, the Libellulidae has the most species. *Orthetrum Chrysis Orthetrum sabina Orthetrum pruinosum neglectum Orthetrum cancellatum Acisoma panorpoides Pantla flevescens Crocothemis nigriforns Crocothertumis servilia* and *Anax imperator* were among the species found. the maximum proportion of Libellulidae was found to be 85.0 %, while the lowest percentage of Aeshnidae was found to be in the family Libellulidae 14.65 %.

ENT-25

Survey of Family Gryllidae from Vicinity of Shah Abdul Latif University Khairpur

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Gryllidae is the family of order Orthoptera that include insects called Crickets. Fossil evidence show that it belongs to the Jurassic period. In many parts of geographical distribution, populations of crickets have been decreased few decades ago. The crickets are endangered in central and northern Europe. The Gryllidae commonly use their mouthparts to dig out the soil and make a burrow, sometimes, they use their hindlegs for this purpose. Crickets call their partners for matting purpose by rubbing their wings having specialized location in their forewings. During the current study, survey of Gryllidae fauna was carried out from vicinity of Shah Abdul Latif University Khairpur. The collected samples were brought into entomological laboratory Department of Zoology, Shah Abdul Latif University Khairpur. The samples were killed by standardized entomological method and then were stretched on the stretching board. The specimens resulted in finding of 06 species of Gryllidae i.e: *Acheta domesticus,* Linnaeus, 1758, *Acheta meridionalis,* Uvarov, 1921, *Teleogryllus* (*Macroteleogryllus*) *mitratus* Burmeister, 1838, *Gryllus bimaculatus* De Geer, 1773, *Gryllodes sigillatus* Walker, 1869 and *Gryllodes supplicans* Walker, 1859 respectively. Additionally, the description of species along with digital images are also provided. Hopefully, this study will prove to be a base line for future researchers dealing with Gryllidae fauna.

ENT-26

Documentation of the Orthoptera Fauna of Khyber Pakhtunkhwa, Pakistan

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The Orthoptera fauna of Pakistan is one of the least explored in Pakistan particularly KhyberPakhtunkhwa province. The geographical conditions of Pakistan are of great importance with its intermingling of oriental, Palaearctic and Afro-tropical elements and prevent an ideal situation for the study of Orthoptera fauna. Unfortunately, information available about the species of Orthoptera and their distribution are quite inadequate. Therefore, present study was designed for documentation of Orthopteran fauna of this region. Present study was conducted from KhyberPakhtunkhwa, Pakistan. As a result of this study, *Diabolocatantops innotabilis, Diabolocatantops sp*, *Anacridium aegyptium, Anacridium rubrispinium, Cyrtacanthacris tatarica,Acrotylus humbertians, Acrotylus longipes longipes, Aiolopus thalassinus tamulus,Truxalis eximia eximia. Oxya velox, Oxya hyla hyla , Oxya bidentata , Acrida exaltata, , Phlaeoba tenebrosa, Eyprepocnemis alacris alacris, Spathosternum prasiniferum, Phaneroptera spinosa, Phaneroptera roseata , Trigonocorypha unicolor, Hexacentrus unicolor, Euconocephalus incertus, Euconocephalus pallidus, Euconocephalus nasutus, Euconocephalus mucro, Acheta domesticus, Gryllus bimaculatus* were recorded.

ENT-27

Study on Pyrgomorphidae (Orthoptera) of Taluka Ubaro District Ghotki Sindh Pakistan

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Pyrgomorphidae is a family of the order Orthoptera under the suborder Caelifera. The members of this family are generally known as gaudy grasshoppers. At present surveys were carried to collect the Pyrgomorphidae fauna of taluka Ubaro. Nearly, 240 specimens were collected and sorted into 05 genera viz: *Chrotogonus* Serville, 1838, *Tenuitarsus* Bolívar, 1904, *Pyrgomorpha* Serville, 1838, *Atractomorpha* Saussure, 1862, *Poekilocerus* Serville, 1831 and 11 species i-e: *Poekilocerus pictus , Chrotogonus brachypterus, Chrotogonus homalodemus, Chrotogonus oxypterus, Chrotogonus trachypterus, Tenuitarsus orientalis, Pyrgomorpha bispinosa, Pyrgomorpha conica, Pyrgomorpha inaequalipennis, Atractomorpha acutipennis,* and *Atractomorpha crenulata.* The current study focused on conventional morphological features together with a thorough study of genital structures of Pyrgomorphidae for a clear understanding of the purpose of morphological characters. In addition to this, taxonomic keys are also prepared for easily identification the Pyrgomorphidae species.

ENT-28

Understanding the Role of Environment in Sandfly Population Fluctuations

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Sandfly belong to the order Diptera and it's becoming a threat for the mankind. More than 1000 species of sandflies has been documented till so far. Among them only, *Phlebotomus* and *Sergentomyia* genera has been recorded to be problematic in terms of disease transmission which is Leishmaniasis. However, disease spread is mostly dependent on the environmental changes. Among the factors, biotic and abiotic factors play an important role in favouring the sandfly population. Thus, to access it, study was designed. Fixed and non-fixed sites were selected to maximise the collection and to collect the samples A4-sized sticky traps were used. Results depicted that, *Phlebotomus alexandr*i showed positive correlation with the temperature while the *Phlebotomus major* showed negative correlation with the temperature. This study will help the concerned departments in the management of sandflies.

ENT-29

Description of New Records on *Blauta cribraria* (Germar, 1844) (Coleoptera: Elateridae: Cardiophorinae) from Sindh Pakistan

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The research was carried out in (2018-2020) from the Ghotki district of Sindh Pakistan. In addition, this studies indicated that the population of new recorded species were considerably different on its geographical distribution of click bettles (Elateridae) fauna of different districts. Identification of new recorded species has been done based on the taxonomical characteristics such as external morphology and male genitalial structures. *Blauta cribraria* near to *Blauta falli*, resembled to in the redish brownish body coloration black in *Blauta cribraria* but in *Blauta falli* dense punctuation on pronotum, but slightly differences, pubescence smaller mandibles. Ventral carina with prosternal spine, scutellum and metacoxal plate with a tooth, rostrum circular and genitalial bases have a small variations in space of aedeagus median lobe.

SECTION – IV

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

PAR-1

New record of *Protospirura siamensis* Ribas, 2012 (Nematoda: Spiruridae) recovered from Rat 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. Rodents are the most widely distributed and the largest group of small mammals worldwide and constitute one fourth of the total mammalian species of Pakistan. Rat and Mice are naturally omnivorous scavenger. During the present investigation, total of 51 Rat (28) and Mice (23) were dissected for the presence of helminthic infection. Among nematodes, the most prevalent species was *Protospirura siamensis* Ribas, 2012 reported for the first time from Pakistan. Previously this species is recorded from South- East Asia from the hosts *Bandicota, Berylmys, Chiropodomys, Hapalomys, Leopoldamys, Maxomys, Mus, Niviventer* and *Rattus.*

PAR-2

Hymenolepis diminuta Rudolphi, 1819 (Hymenolepididae: Cyclophyllidea) of House Rat *Rattus rattus* from district Hyderabad, Sindh, Pakistan

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In continuation of the ongoing NRPU research project No. 9412 funded by HEC, Islamabad, a total of 72 house rats were examined for the collection of helminths. Out of these, only 31 house rats were infected with 134 specimens of a cestode *H. diminuta* Rudolphi, 1819. On the basis of morphological features like body shape and size, unarmed suckers, segments broader than long, three oval shaped testes separated by ovary, cirrus sac smooth, long and anterior slightly curved, ovary multilobed and round, vitelline gland present above the ovary at middle of the mature proglottids, unilateral pore present and eggs oval or round in shape. The present specimens are identified as *H. diminuta* Rudolphi, 1819. However, present species is recorded for the first time from Hyderabad, hence, making it as new locality.

PAR-3

Fish parasites in aquaculture with changes in climate

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Fish lice are among brachyuran crustaceans, fish lice are the animals reported to parasitize both marine and freshwater fishes. Climatic changes are affecting the attacks and making aquaculture more challenging. *Argulus* spp may be a chief hazard to fish wellbeing, as substantial invasions can be a reason of significant injury and mortality. In addition, fish lice are commonly known to be the reason for other fish infections. Different fish species in different environmental conditions and aquarium were selected to find out the effect of environmental conditions on parasites and hosts. During different rounds, Argulus spp was poised from the caudal and anal fins of aquarium fishes including goldfish (Carassius auratus).These goldfish may be asymptomatic, and no surplus cases may be celebrated after manual removal of the lice. As soon as any Argulus animals are recognized, control, management and cure may be recommended because contagions can intensify promptly. Currently, there are no FDA-approved medications for the control and handling of this parasite, but numerous compounds and medicines as well as organophosphates and diflubenzuron have been used with achievement. The transmission and isolation of inward bound fish is the best way to avoid an admission of Argulus swarm.

PAR-4

Prevalence of Ticks and Mites Infestation in Livestock and Drug's Efficacy against Them in District Dera Ismail Khan, KPK, Pakistan

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The current study aimed to determine the ticks and mites Infestation in livestock and drug efficacy against them in Dera Ismail Khan, Khyber Pakhtunkhwa, Pakistan. In this study, a total of 957 samples in which 375(39.19%) cows and 582 (60.1%) buffalos were examined. Total 794 species of ticks and mites were observed in which ticks were 582 (73.3%) and 212 (26.7%) were mites, which causes Infestation on cow and buffalo bodies. The overall infection percentage of male Sample was 38.42%, while the femaleswere 41.87%. The drug's efficacy is also noted by applying drugs on animal's bodies. Ticks and mites were present more on the udder part, perineum, the lower abdomen, genital areas, and ears of the animal body. In addition, we identify the species (Tropilaelaps spp, Haemaphysalis spp, Amblyomma spp, Mesostigmata spp, and Tropilaelaps spp. It was concluded that the drug trichlorfon 50 ml, when applied on cow and buffalo body surface, has highly effective against ticks and mite's treatment compared to kerosene plus sour oil 100ml.

PAR-5

Evaluation of nematicidal effects of *Cannabis sativa* L. and *Zanthoxylum alatum* Roxb against root-knot nematodes, *Meloidogyne incognita*

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In view of the recently increased interest in developing plant origin nematicides as a surrogate to chemical nematicides, the present study was carried out to assess the nematicidal potential of two antagonistic plants *Cannabis sativa* L. (Cannabaceae) and *Zanthoxylum alatum* Roxb. (Rutaceae) against the most devastating root-knot nematode, *Meloidogyne incognita* responsible for colossal yield losses in cucumber. The leaves of *C. sativa* and *Z. alatum* were incorporated in the soil at the rate of 0, 2, 4, 6, 8, 10 and 20 g per kg of soil. After decomposition, cucumber (cv. Royal Sluis) seeds were sown and inoculated with 2000 s stage juveniles of *M. incognita* ten days after emergence. Data on growth variables and nematode infestations were recorded after six weeks of inoculation. Both the plants significantly reduced nematode infestations and enhanced plant growth criteria compared to the untreated check. The reductions in number of galls, egg masses, nematode fecundity and build up caused by *C. sativa* were significantly higher as compared to *Z. alatum*. Maximum reductions in these variables were recorded with 20 g dosage. The addition of C. sativa and Z. alatum to the soil as organic amendment can work very well as nematicides and can be successfully used for controlling root-knot nematodes replacing traditional chemical treatments and avoiding environmental pollution.*Email: kianizmr@gmail.com*

PAR-6

Interaction between *Meloidogyne javanica* and *Ralstonia solanacearum* in Chili

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The information on the interaction between root-knot nematodes and bacterial wilt is lacking in chili, therefore, in the present study, effects of Meloidogyne javanica and Ralstonia solanacearum were studied on chili singly and in combinations. Significant effects of M. javanica and R. solanacearum and their interaction were observed in case of shoot and root lengths and weights of chili. The mean lengths and weights of shoot and root varied significantly as a result of both the pathogens applied singly and in combinations. The reductions in these parameters were significantly higher when both the pathogens were applied simultaneously as compared to their sole applications. Similarly, at higher inoculum densities, the reductions were the maximum in all these parameters. Significant variations were observed in number of galls and egg masses per root system in response to both the pathogens applied individually and in combinations. Maximum numbers of galls and egg masses were observed where nematode was applied alone. Significant reductions in galls and egg masses were recorded where nematode and the bacterium were applied in combinations. At higher densities of both the pathogens, the reductions in these parameters were the maximum. The first wilt appearance was observed after 8 days in the treatment where both the pathogens were applied at their highest densities. The treatments where bacterium was applied individually at different densities, wilt took maximum days to appear as compared to the treatments where bacterium and nematodes were applied in combinations. Similarly, the incidence of bacterial wilt was lower where the nematode was absent. Minimum wilt incidence was recorded at the lowest density of R. solanacearum. The wilt incidence increased significantly when nematode was inoculated along with the bacterium and maximum incidence was recorded where both the pathogens were applied at their highest densities.

PAR-7

Bioefficacy of *Trichoderma* Species against Javanese Root-Knot Nematode, *Meloidogyne javanica*, in Green Gram

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Root-knot nematodes are mainly controlled by using synthetic nematicides, but their excessive use is prohibited due to associated health hazards which demand for suitable alternatives. The overreliance on nematicides can be curtailed by using biological control agents possessing nematicidal or nematostatic properties. Therefore, in the present study, effectiveness of seven indigenous species of *Trichoderma* were tested for their ability to suppress the population of Javanese root-knot nematode, *Meloidogyne javanica*, and improve growth variables of green gram. All the *Trichoderma* species resulted in an increase in shoot and root lengths and shoot weight while a decrease was observed in root weight. Maximum increase in shoot length (45.5%) was found in case of *T. harzianum* followed by *T. hamatum* and *T. viride* whereas the increase was the minimum where *T. pseudokoningii* and *T. koningii* were applied. Similarly, maximum increase in shoot weight was recorded with *T. viride* (56.1%) followed by *T. harzianum* (55%) and the minimum with *T. pseudokoningii*. As regards root length, it was the maximum in treatments with *T. hamatum* (46.2%) and *T. harzianum* (45.1%) and minimum with those where *T. koningii* and *T. pseudokoningii* were applied. Contrarily, maximum reduction in root weight was observed in treatments where *T. harzianum* (37.8%) and *T. viride* (35.8%) were applied while *T. koningii* and *T. pseudokoningii* resulted in minimum decrease. All the *Trichoderma* species significantly caused reductions in the number of galls and eggs and reproductive factor of the nematode over control. Maximum reduction in numbers of galls and eggs were observed with *T. viride* (49 and 53%) followed by *T. harzianum* (46 and 53%) while the minimum reduction was recorded with *T. pseudokoningii* followed by *T. atroviride*. Likewise, *T. viride* caused the maximum reduction in reproductive factor of *M. javanica* (81%) followed by *T. harzianum* (78%) and *T. asperellum* (75%). On the other hand, the minimum reductions in reproductive factor were observed with *T. pseudokoningii* and *T. koningii*.

PAR-8

Morphology and Ectoparasites of Broiler and Jungle Fowl Chickens (Genus *Gallus*) from District Jamshoro and Hyderabad, Sindh Pakistan

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The comparative input of poultry to total animal protein production in the world is increasing; especially increase in developing countries like Pakistan. Many types and species of ectoparasites (Lice, Mites, Fleas, Ticks etc) and endoparasites (cestodes, nematodes, trematodes etc) are known to infect chickens; which is the major cause of reduction of chickens. This research was based on morphology and ectoparasites of broiler and jungle fowl chicken of (Genus *Gallus*), from two Districts of Sindh which was carried out in the year 2020 to 2021. Total 25 poultry farms were visited and 200 specimens of ectoparasites were collected. While taxonomic work in progress. Prevalence of ectoparasites in the both species will be known after the identification of parasites.

PAR-9

Parasitological Manifestation of Coccidiosis in Captive Birds and Broiler Chickens

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Coccidiosis is an intestinal infection which is commonly known as bloody diarrhea, caused by intracellular protozoan parasite of *Eimeria* species of Kingdom Protozoa, Phylum Apicomplexa, Class Coccidia, Order Eucoccidioridae, Family Eimeridae, Genus Eimeria. *Eimeria* species are host specific. coccidiosis is abundently found in captive birds due to contaminated feed and fur. Coccidiosis is sub-clinically found almost in all samples. The current research was aimed to find out the prevalence of coccidiosis infection in Captive Birds and Broiler Chicks in Lahore division. Fecal samples of chicken, pigeons, ducks, peacocks, partridges and pheasants were collected from Lahore Zoo, Tollinton Market, Data Darbar Market, different pluck shops and domesticated birds. 206 Chicken, 122 pigeon, 78 duck, 21 peacock, 102 petridge and 96 pheasant fecal samples were collected during rainy season. 123 chicken (59.70%), 105 pigeon (86.06%), 11 ducks(14.10%), 2 peacock(9.52%), 17 partridges(16.67%) and 19 pheasant(19.79%) samples were positive. The samples were tested by direct smear method and simple flotation method. It was observed that the infection was present sub-clinically in the birds of zoo while the infection was found abundantly in pigeons and layers hens in local markets where the birds were filled in small spaced cages crowdedly. It was also observed that due to lack of sanitary care the feed and water were highly contaminated with feces. The coccidial infection spreads due to overcrowding, contamination, high temperature and humidity. According to our research findings the infection was most abundantly found in Data Darbar and Tollinton Market due to lack of proper health care.

PAR-10

Study on Seasonal Prevalence of Helminths in *Cyprinus Carpio* from Chilya Fish Hatchery, Thatta, Sindh, Pakistan

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This study was conducted to assess the prevalence of helminth parasites in *Cyprinus carpio* at Chilya, Fish Hatchery, Thatta. Sindh from February 2019 to January 2020. A total of 107 samples of *Cyprinus carpio* were tested during the research and helminths were found in 17 out of 107. Various helminths groups were identified including trematode and acanthocephalan. Other helminths groups, such as cestodes and nematodes were not noted. These helminths infected the gut of *Cyprinus carpio* including trematode and acanthocephalan. No additional organs were found to be infected with helminths parasites. Helminths prevalence were documented as 41% in September, 40% in August, 36% in October, 33% in June, September (30.76%) and April (25%).During September and October, the helminthes were most abundant, with no infections documented in January, February, March, July, November, or December. Helminths were found in this study throughout specific months of the year.

SECTION - V

FISHERIES, ECOLOGY, WILDLIFE, FRESHWATER BIOLOGY, MARINE BIOLOGY

1. FRESHWATER BIOLOGY AND FISHERIES

2. MARINE BIOLOGY

3. PALAEONTOLOGY

4. WILDLIFE, DIVERSITY AND CONSERVATION

5. BIODIVERSITY, ECOLOGY

1. FRESHWATER BIOLOGY AND FISHERIES

FEWFM-1

Study of Share of Visceral Mass in Total Biomass, Length-Weight Relationship and Total Lipids in Rohu (*Labeo rohita*) Cultured Under High Stocking Density Conditions of In-Pond Raceway System

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In-pond Raceway (IPRS) is a recent technology introduced for first the time in Pakistan (2019) in order to increase aquaculture production. IPRS is the combination of raceway technology, cage culture, recirculating aquaculture and pond culture. Introduction to IPRS in countries like Pakistan where water shortage is a main issue would be a revolutionary step. High stocking density in IPRS may cause stress in fish and affect growth, immunity and survival. Present study aims at investigating the effect of high stocking density on body length, body weight, length-weight relationship (LWR), condition factor, hepatosomatic index (HSI), viscerosomatic index (VSI) and lipid content. It will provide a baseline data for future studies on IPRS in Pakistan. In present study, there were total 8,000 rohu (initial wt. 250.00 ± 7.5). The trail period is from August till November, 2020. Samples of five fish were collected after the time interval of 30 days and 50 at the time of harvesting (30 November). After sampling the growth parameters (Total body length, Total body weight, Condition factor and HSI) length-weight relationship, viscerosomatic index (VSI) and lipid content were analyzed. Total body length (cm) of Rohu was observed within the range of 35.28 ± 0.34 – 38.79 ± 0.94 cm, Total body weight (g) was observed within the range of 826.00 ± 77.99 – 987.00 ± 63.31 g, Condition factor was observed within the range of 1.51 ± 0.09 – 2.06 ± 0.26 %, Hepatosomatic index was observed within the range of 1.01 ± 0.00 – 1.28 ± 0.07 %. Viscerosomatic index was observed as 2.00 ± 0.13 – 6.75 ± 0.13 %. Regression coefficient (R^2) value of Length-weight relationship was 0.466 while value of coefficient b was 1.139. In conclusion, high stocking density in IPRS did not affect the growth of Rohu.

FEWFM-2

Share of Visceral Mass in Total Biomass, Length-Weight Relationship and Total Lipids in Grass Carp (*Ctenopharyndodon idella)*, Cultured Under High Stocking Density Conditions of In-Pond Raceway System

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In-pond Raceways (IPRS) is a recent technology introduced for first time in Pakistan (2019) in order to increase aquaculture production. IPRS is the combination of raceway technology, cage culture, recirculating aquaculture and pond culture. Introduction to IPRS in countries like Pakistan where water shortage is a main issue would be a revolutionary step. High stocking density in IPRS may cause stress in fish and affect growth, immunity and survival. Present study aims at investigating the effect of high stocking density on body length, body weight, length-weight relationship (LWR), condition factor, Hepatosomatic index (HSI), Viscerosomatic Index (VSI), and lipid content. It will provide a baseline data for future studies on IPRS in Pakistan. In present study, there were total 6,000 Grass Carp (*Ctenopharyndodon idella*) (initial wt.= 70.00 ±2.0). The trail period is from August till November, 2020.Samples of five fish were collected after the time interval of 30 days and 50 at the time of harvesting (30 November). After sampling the growth parameters (Total body length, Total body weight, Condition factor and HSI) length-weight relationship, Viscerosomatic index (VSI %) and lipid content were analyzed. Total body length (cm) of Grass Crap increased from 25.20 ± 1.2 – 30.62 ± 0.98 cm, Total body weight (g) increased from 502.0 ± 117.54 – 806.67 ± 63.79 g, Condition factor increased from 2.14 ± 0.18 – 3.00 ± 0.30 %, Hepatosomatic index increased from 1.59 ± 0.14 – 2.58 ± 0.24 %. Viscerosomatic index was

observed as 6.06 ± 0.23 -13.43 ± 0.23 %. Regression coefficient (R^2) value of Length-weight relationship was 0.534 which showed positive relationship between them. In conclusion, high stocking density in IPRS did not affect the growth in Grass Carp.

FEWFM-3

Prevalence of metazoan parasites of freshwater Tire-Track eel *Mastacembelus armatus* from district Sanghar, Sindh Pakistan

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To determine the prevalence of metazoan parasites of freshwater Tire-Track eel *Mastacembelus armatus*, a total of 35 hosts were collected from the district Sanghar and brought to the Parasitology laboratory of Department of Zoology, University of Sindh, Jamshoro. Gut contents revealed the prevalence (82.86%) of metazoans in host fishes. Among them, the maximum prevalence (45.95%) was recorded for the Ergasilus, followed by cestodes (40.54%) and nematodes (13.51%). None of the host was found harboring trematodes and acanthocephalan.

FEWFM-4

Effect of high stocking density on *Labeo rohita* nutritional quality maintained through in-pond raceway system

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In-pond raceway system (IPRS) is one of the sustainable and modern technology adopted in different countries that effectively increase fish production fulfilling dietary protein requirement. It was introduced in Pakistan for the first time in 2019. A total of 8,500 fingerlings of *Labeo rohita* (250.00 ± 1.20 g) were stocked in each raceway in a water volume of 220 m^3. For comparative study, 3,500 fingerlings (250.00 ± 1.20 g) were also stocked in each earthen pond with a land area of 6167m^3. Stocking was done in replicates both in raceways and earthen pond. Fish samples were collected from both groups on monthly basis from June till November, 2019 to study the difference in fish nutritional quality reared at two different densities. Fish growth rate increased in both raceways and earthen ponds i.e.,1070 and 1090 g respectively at the time of harvesting. Feed conversion ratio was 1.90 in both groups. Mean survival rate was 99 % and no sign of any disease was observed in both groups. Fish nutritional quality was in desirable range in raceways. Crude protein in fish muscle ranged from 20.91±1.29 to 21.60 ±1.34 and there was no significant reduction as biomass was high. Fat contents was up to nutritional requirements of an adult human. High levels of polyunsaturated fatty acids (n-3 and n-6) such as eicosadienoic acid and decosahexanoic acid in fish muscles show that muscle quality is improved despite the high stocking density. Ten essential amino acids were determined among which lysine and leucine were most abundant. Among nine non-essential amino acids, glutamic acid was in high proportion. The results prove the efficiency of IPRS with improved production, growth rate, FCR, survival rates and nutritional quality of fish muscle.

FEWFM-5

Study of profile of fatty acids and proximate composition in *Tilapia* (*Oreochromis niloticus*) by using in-pond raceway system

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Fish production would be enhanced in order to meet desired protein requirement. Production can be improved by adopting modern technologies. In- pond raceway system (IPRS) is the most modern and innovative technology in

which high biomass would be reared to gain high yield. In 2019 this sustainable technology was introduced in Pakistan. Tilapia (*Oreochromis niloticus*) were stocked in raceways in replicates (initial weight= 32.00 ± 1.20 g) at high stocking density (16,500) in 220 m^3 water area. Fingerlings were stocked in earthern pond were taken as control group in replicates at stocking density of 4,500 in 6167 m^3 land area. Monthly sampling was done from June till November, 2019 from both raceways and control groups to examine the proximate composition and fatty acid profile in fish muscles. There was increased in the growth rate of fish in both raceways and control groups 769.50 ± 51.43 g and 787.50 ± 42.86 g, respectively. Feed conversion ratio measured in raceways and control groups is 1.25 and 1.24, respectively. No sign of disease was observed in both groups. Mortality rate in both groups is less than 1%. The level of crude protein was in the desire range of (18.15±1.34 - 20.00±1.34 %). The lipid content in fish muscles were also up to the desired range of 15.08 – 15.88 g in raceways and 16.00 – 17.20 g in control groups. High level of polyunsaturated acids (n-3 and n-6) especially eicosadienoic acid and decosahexanoic acid were found in raceways stocked under high density. It is concluded that IPRS is sustainable technology to obtain high yield from small area as the quality of fish did not alter due to high biomass.

FEWFM-6

Study of Profile of Fatty Acids and Proximate Composition in *Tilapia* (*Oreochromis niloticus*) by using in-Pond Raceway System

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Fish production would be enhanced in order to meet desired protein requirement. Production can be improved by adopting modern technologies. In- pond raceway system (IPRS) is the most modern and innovative technology in which high biomass would be reared to gain high yield. In 2019 this sustainable technology was introduced in Pakistan. Tilapia (*Oreochromis niloticus*) were stocked in raceways in replicates (initial weight= 32.00 ± 1.20 g) at high stocking density (16,500) in 220 m^3 water area. Fingerlings were stocked in earthern pond were taken as control group in replicates at stocking density of 4,500 in 6167 m^3 land area. Monthly sampling was done from June till November, 2019 from both raceways and control groups to examine the proximate composition and fatty acid profile in fish muscles. There was increased in the growth rate of fish in both raceways and control groups 769.50 ± 51.43 g and 787.50 ± 42.86 g, respectively. Feed conversion ratio measured in raceways and control groups is 1.25 and 1.24, respectively. No sign of disease was observed in both groups. Mortality rate in both groups is less than 1%. The level of crude protein was in the desire range of (18.15±1.34 - 20.00±1.34 %). The lipid content in fish muscles were also up to the desired range of 15.08 – 15.88 g in raceways and 16.00 – 17.20 g in control groups. High level of polyunsaturated acids (n-3 and n-6) especially eicosadienoic acid and decosahexanoic acid were found in raceways stocked under high density. It is concluded that IPRS is sustainable technology to obtain high yield from small area as the quality of fish did not alter due to high biomass.

FEWFM-7

Study of Growth Parameters and Amino Acid Profile of *Tilapia* (*Oreochromis niloticus)* Cultured in In-pond raceways System

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In-pond raceway system (IPRS) is an innovative technology for sustainable aquaculture production by effectively increasing production, reducing pollution, improving feed and pond management. Fingerlings of Tilapia (*Oreochromis niloticus*) (n = 16,500, initial weight =32.00 ± 1.26 g) were stocked in two raceways. Fingerlings (n =

3000, initial weight = 32.00 ± 1.26 g) were also stocked in two earthen ponds to be studied as control. Average final weight achieved in raceways and control groups was 769.50 ± 51.43 g and 787.50 ± 42.86 g, respectively. In raceways, higher values of condition factor (2.80 %) were noted in June and November. Average feed conversion ratio observed in raceways and control groups were 1.25 % and 1.24 %, respectively. The highest value of specific growth rate was observed in June and it remained within the range of 0.30 ± 0.14–0.68 ± 0.02% over the study period. A significant difference (P < 0.05) was noted between amino acid profile in control and raceways. Highest concentration of leucine, lysine, threonine and arginine were observed in IPRS. Among non-essential amino acids, glutamic acid was found to be the highest both in raceways and control groups. Total sulfur amino acids were determined to be within the range of 29.72 ± 0.25–32.23 ± 0.1 mg/gcp in both groups over the study period. Total non-essential amino acids were noted be higher than total essential amino acids throughout the study period. Overall survival rate of tilapia was observed 99 % in both groups. It can be suggested that negative effects of high stocking density were not observed in tilapia when cultured, using IPRS technology.

FEWFM-8

Preparation of Low Cost Fish Feed by Partial Replacement of Fish Meal with Copra Meal for Improvement of *Catla catla* Fingerling's Performance

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Different types of plant based alternatives were used to cope with high cost and availability of fish meal in aquaculture industry. Present experimental work was done to determine the effects of low cost feed prepared by using coconut meal based diets on overall performance of *Catla catla* fingerlings. Six experimental diets (0, 10, 20, 30, 40 and 50% replacement of fish meal) were prepared using copra meal as an alternative feed ingredient. Fingerlings were fed twice a day at 4% of their live wet body weight and feces from each tank were collected and were stored for chemical analysis for estimation of nutrient digestibility and mineral absorption. According to results it was observed that, coconut meal can replace fish meal from 10-20% and showed highest performance. Maximum nutrient digestibility (crude protein; 69.29%, crude fat; 69.14% and gross energy; 67 kcal/g) and mineral absorption (Ca; 74%, Na; 71%, K; 75%, P; 76% and Fe; 77%) was found in fish fed at 10% replacement of fish meal by following 20% replacement. Further increase in replacement levels resulted in poor digestibility in fish. So, it was cleared form the results that we can add copra meal at 10-20% in feed by replacing fish meal for making a cost effective and environment friendly fish feed.

FEWFM-9

Partial Replacement of Fish Meal with Locally Available Black Seeds (*Nigella sativa*) for rohu (*Labeo rohita)* Fingerlings

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The effect of black seed meal based diet was investigated on the growth performance, nutrient digestibility, mineral absorption and hematological parameters of *Labeo rohita* fingerlings over the time period of ninety days. Six experimental diets were formulated by using black seed meal (0, 10, 20, 30, 40 & 50% by replacing fish meal) and feed pellets were formed.

Fingerlings were given their respective diets two times in 24 hours at 4% level of body weight and feces sample was taken and preserved. According to results of present research, it was revealed that rohu fingerlings showed significant improvement when black seed meal was incorporated in fish diet at the level of 10 and 20%. Maximum weight gain (17.21g), weight gain percent (241%), specific growth rate (1.36) and best feed conversion ratio (1.31) were observed in fish fed on 20% of BSM. In the same way, highest digestibility of nutrients (crude fat, 72%; crude protein, 73% & gross energy, 69.51 kcal/g) and hematological parameters i.e. RBC ($2.72\times10^{6}mm^{-3}$), Ht (35%) and Hb (8.10g/100ml) had their maximum values at 20% of BSM. Maximum level of mineral absorption of K (75%), Ca (71%), P (73%) and Na (73%) were also recorded at experimental diet III (20% of BSM). On the basis of these results, it was concluded that maximum of nutrients and minerals were absorbed in fish body at 20% of BSM improving growth and overall performance of fingerlings by decreasing discharge into water that will ultimately decrease water pollution.

FEWFM-10

A Preliminary Study on Ichthyofaunal Diversity of Mir Kalam Dam, North Waziristan

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In the present study, Mir Kalam Dam in North Waziristan was explored for the first time to identify its ichthyodiversity. The study lasted for nine months, from February to October 2018 during which a total of 550 fish specimens were collected and identified as 11 species, belonging to three orders, three families, and nine genera. Among them Family Cyprinidae was the most speciose and the richest Family, represented by nine species i.e. *Cyprinus carpio, Carassius auratus, Crossocheilus diplocheilus, Tor macrolepis, Puntius waageni, Aspidoparia morar, Barillius pakistanicus, Barillius vagra* and *Barillius bendelisis*. The remaining two families were represented by only one species each. Family Siluridae was represented by *Ompak pabda* and Family Chandidae by *Chanda nama*. The most abundant fish in the Dam was *Cyprinus carpio* (26.18%) while the least abundant fish species were *Tor marcolepis* and *Barillius bendelisis* (0.36%) each. Results show that 27% species found are edible whereas the rest of the small fish species are important members of the food chains present in the dam. Hence it can be concluded that the water of Mir Kalam Dam is productive and new species might be introduced in the Dam to provide economic support to the people of the area. Moreover, it is recommended that awareness projects should be conducted in North Waziristan for the ichthyo education in local people.

FEWFM-11

Development and Sensory Evaluation of Ready to Cook Fish Crackers Made From *Labeo rohita* Meat and Different Starch Sources

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Fish crackers are foods which contain comminuted fish and are classified as “half products” or “intermediate products”. Most of the snacks available in the market are mainly based on cereals, which are high in calorie and low in protein content. For this reason, snacks like fish crackers with high protein content was thought to be developed for nutritional enrichment especially for chlidren. Different starch flours like rice, sago and tapioca, as a functional ingredient, were used to prepare fish cracker at 65:35 % ratio. The crackers (rice - C1, tapioca - C2 and sago C-3) were subjected to analyses for proximate as well as comparative physicochemical and sensory evaluation so as to determine the nutritive value and its quality attributes for general acceptance. Dried cracker had a moisture content of 9 to 11%, protein

content of 20 to 25% whereas, lipid content found low but it significantly increased after frying due to oil absorption. Nutritionally all the treatments were at par with each other. However, maximum linear expansion was observed in tapioca based fish crackers was observed highest. Water absorption index (WAI) decreased while water solubility index (WSI) increased for tapioca based fish cracker. Maximum lightness and lower redness as well as yellowness was noticed with sago based fish cracker after frying. Fish crackers incorporated with tapioca starch had a maximum score for the sensory aspect of crispiness (4.7), texture (4.6), odour (3.8) taste (4.0) and overall acceptability (4.2). Storage tests showed increase in peroxide and flavonoid values and decrease in phenolic and antioxidant contents within prolong storage period.

FEWFM-12

Development of Inovative Ready to Cook and Ready to Eat *Labeo Rohita* Sausages and Effects of Physiochemical Sensory and Storage Properties

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This study investigated sensory, proximate and storage properties of fish sausage made by three different cooking methods. Ready to cook and ready to eat fish sausages were developed using different cooking methods like boiling, smoking and frying. Fish mince (1Kg) was mixed with different spices by mixing crushed ice to form emulsified mixture. Mixed ingredients were placed and packed in casing and boiled at 100℃ for 90 minutes, cooled in crushed ice, casing and packing was done. Fresh sausage were boiled and grouped as T_1. T_2 group include fried sausages and were shallow fried at 100℃ for 10 minutes. Smoked sausage were smoked for 30 minutes at 75℃ (T_3). The sensory, proximate, physical quality and storage properties of these groups were compared with each other. Sensory evaluation showed best result for fried sausage than boiled and smoked. Proximate analysis showed high protein in smoked group while high fat in fried sausage than others. The storage parameter pH, antioxidant activity, flavonoid content and phenolic content of smoked sausages were high that indicate the long shelf life of smoked sausage than boiled and fried. Fried sausage had greater amount of fat that result in higher peroxide value that increase the oxidation of food. So, present study conducted showed that smoked sausage had long shelf life and aroma than fried and boiled sausage due to the presence of phenolic compound that maintain the shelf life of food. Sausage produced by different cooking methods are stored at 0, 10 and 20 days showed that the quality of fish sausage was not affected. Protein enriched ready to cook and ready to eat sausages can be beneficial for improving protein deficiency.

FEWFM-13

Assessment of Molasses Supplemented Feed Effects on the Growth and Survival Rate of Indian Major Carp (*Labeo rohita)*

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The melting of sugar cane or sugar beets into sugar produced a sticky dark by-product which is called molasses. Molasses can serve as an outstanding source of fiber and minerals, it can be cost effective ingredient for animal feed. Moreover, molasses can enhance animal feed consumption and palatability. Fish is an excellent source of animal protein and good fat, its demand is increasing day by day. Currently, a lot of research had been done on fish feed additives that helped in increasing the fish growth and production. *Labio rohita* (fingerlings) is highly nutritious and commercial demanding fish in Pakistan. Therefore, the current research study was planned in order to assess the impact of molasses supplemented feed on the growth and survival rate of *Labeo rohita*. In the experiment, four kind of feeds were formulated by mixing 0, 3, 6 and 9% molasses/100g commercially available fish feed. After 28 days length gain (TLG), net body weight (NWG), feed conversion ratio (FCR), specific growth rate (SGR),

net weight gain percentage (NWG), protein efficiency ratio (PER) and feed intake were examined / recorded. The results revealed that fish treated with 3% molasses/100g fish feed shown significant increase in TLG and NWG, as compared to control and other formulated diets. In addition, other growth parameters were also showed significant improvement with the same dosage feed. It could be concluded that molasses serves as potential feed supplement in fish feed to improve its growth and production but it could only be possible with more research on the composition of molasses and different concentrations in fish feed for different species.

FEWFM-14

Spawning Periodicity of Catfish, *Ompok pabda* (Hamilton- 1822) from River Indus, Sindh; Pakistan

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The spawning periodicity of *Ompok pabda* from Indus River was elucidated on monthly basis for collection during February 2017 to January 2018. The measurement of egg size, somatic index of gonads and productive potential (fecundity) was considered of the fish under study. Size of the egg was found increasing from March (0.81 mm) to May (1.05 mm) with one spawning peak in May. Somatic index percentage of gonads in both sex also noted increasing simultaneously (0.95% in March and (1.2% in May) for male and (3.18% in March) and (5.1% in May) for female. The value of both factors reflects that the fish possess only one spawning season during the year in the month of May. The enumeration of fecundity was based upon ten mature fish ranging from 15.5 to 30.0 cm in length and from 18.18 to 148.0g in weight. High potential of eggs production i.e. (1020 eggs) was recorded from fish with 30.0cm and 148.0 g in length and weight. The low fecundity (300 eggs) was counted from fish of 15.5cm in length and 18.8g in weight. Production potential (fecundity) and its association with other factors like total length of fish, weight of fish, weight and length of gonad were enumerated and the fecundity found to be dependent with gonad weight as compared to other factors.

FEWFM-15

Increasing the Digestibility of Corncob as Feed Ingredient by Urea Treatment for Grass Carp (*Ctenopharyngodon Idella*)

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The present study was conducted to determine the effect of corn cob treated with different levels of urea as feed for *Ctenopharyngodon idella* fingerlings. Four experimental feeds were prepared by treating corncob with graded levels of urea 0%, 2%, 4% and 6% respectively. Grass carp (*Ctenopharyngodon Idella*) fingerlings were fed with urea treated corncob containing for 90 days at 3% body weight. The fingerlings were divided into four treatment groups (T0, T1, T2, T3) each treatment having three replicates. After the completion of feeding trial growth parameters were analyzed and significantly increased final weight, weight gain, weight gain % was observed in T1 (2% Urea) than other treatments. Feed intake was improved by treating corncob with urea and significant maximum feed intake was seen in as T1 (45.04) was statistically significant ($P<0.05$) as compared to other treated groups. SGR and FCR showed significant ($P<0.05$) difference in the groups and better values were observed in T1 (2% Urea). Survival rate remained same in the experimental groups and showed non-significant ($P>0.05$) difference. Whole body proximate composition of Grass carp showed significant ($P<0.05$) difference as crude protein and

dry matter and ash was high in T1. Hematological analysis showed significant (P<0.05) results of Hb, HCT and WBC, T1 showed higher Hb value. While RBC showed statistically non-significant (p>0.05) results. Nutrient digestibility improved by treating corncob with urea as better results were found in treated groups as compared to the control group moreover significantly (P<0.05) higher ADC ($_{protein}$) and ADC ($_{fat}$) was found in T1 (2% Urea) except ADC ($_{dry\ matter}$). Intestinal digestive enzyme activity of amylase increased in the treated groups and showed statistically significant (p<0.05) results. Lipase and protease showed non-significant (p>0.05) results in control and urea treated groups. Physico-chemical parameters of water remained same throughout the experiment and showed statistically non-significant (p<0.05) difference. It can be concluded that urea treated corncob can be used as effective feed ingredient in the feed for grass carp.

FEWFM-16

Diversity and Distribution of Pony Fishes (*Teleostei: Perciformes leiognathidae*) in the Waters of Sonmiani's Bay Balochistan

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Leiognathidae species are commonly known as pony fish or slip mouths, the name derived from their highly protractible mouth, which protracts either dorso-rostrally, rostrally, or ventro-rostrally. They are small bioluminescent, schooling fishes, commonly found near-shore and estuarine in Indo-Pacific waters. They are mostly silvery in colour, size is generally small, and have compressed body. Eye moderate to large, preceded by a short, sub nosed snout. Leiognathidae represented with total 10 generas and 51 species. Among the ten generas of pony fishes (Perciformes: Leignathidae) Gazza Ruppell, 1835 is the only genus characterized that is having canine teeth anteriorly in jaw. The present study was carried out for one year, from October 2020 to September 2021 in Sonmiani bay Balochistan. These fishes were caught using gill net and beach seine during monthly regular collection. The seasonal variation were observed in the diversity and abundance through the year The most abundant species such as (*Photopectoralis aureus, Nuchequula blochii, Aurigequula fasciata, Photopectoralis bindus* and *Nuchequula gerreoides*) were found during pre-monsoon while least number of species were studied during North East monsoon that were *Leiognathus equula* and *Nuchequula gerreoides*. *Secutor interruptus* was the most abundant species as collected during high tide of southwest season whereas, the *Nuchequula gerreoides* was the only species found in high abundance during the three season except NE monsoon.

2. MARINE BIOLOGY

FEWFM-17

Diversity, Abundance, Zonal Distribution and Seasonal Occurrence of Intertidal Macro-Fauna at Ormara West Bay, Balochistan

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The seasonal variation in diversity, distribution and abundance of intertidal macrofauna was studied in relation to physico-chemical parameters of water at sandy intertidal beach of Ormara West Bay, Balochistan. Samples were collected quarterly through quadrate methods during Autumn Inter Monsoon (AIM), North-East Monsoon (NEM), Spring Inter Monsoon (SIM), and Southwest Monsoon (SWM) seasons from two zones i.e. Low Tidal zone (LTZ; minimum exposed area) and High Tidal Zone (HTZ; maximum exposed area). In the present study 81 species were recorded and identified in five groups, i.e. Gastropods (41 spp), Bivalves (29 spp), Polychaeta (8 spp), Cnidarians (1 sp.), Scaphopoda (1 sp.), and Echinodermata (1 sp). Among these, Gastropoda and Bivalvia were the most dominant groups. A total of 41 species of gastropods belonging to 25 genera and 23 families were recorded from the high and low tidal zone. At both tidal zone genus *Strioterebrum* dominated during SIM followed by genus *Bullia* (SWM at low tidal zone) and genus *Oliva* in (AIM) and *Cerithium* (NEM) at high tidal zone. The 29 bivalve species, reported here from low and high tidal zones, were distributed in 15 genera and 11 families. The genus *Tellina* was most dominating during all seasons and tidal levels. Among all species, *Tellina arsinoesis* was the most abundant species followed by *Vepricardium asiaticus*, *Mactra aequisulcata*, and *Didimacar tenebrica.* The highest value for gastropods diversity, for example, Shannon Index was observed during NEM season, whereas Simpson's diversity was higher during NEM and AIM at both LTZ and HTZ. Distinct seasonal variation in air and water temperatures was recorded with the highest temperature during SWM and lowest during NEM, respectively reverse is true in the case of salinity. The maximum values of pH were observed in SIM. The highest concentration of DO was noted during SWM and lowest during NEM seasons. The concentration of nutrient ions appeared to fluctuate seasonally i.e. ammonium ions had the highest value during SIM, nitrate and nitrite ions during SWM and phosphate ions during AIM. The present study provides reference point on seasonal variation in macrofaunal diversity with relation to physicochemical parameters of water for the first time from an exposed sandy beach at Ormara West Bay, Balochistan. The species composition and abundance showed the significant impact of monsoon on macrofaunal diversity and abundance at studied beaches.

FEWFM-18

Seasonal Variation in Community Composition of Meso-Zooplankton Associated with Marine Sponge *Liosina paradoxa* Thiele, 1899 at Mangrove Forest Karachi, Pakistan

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Marine sponge harbors highly diversified communities in mangrove forest of tropical and sub-tropical regions. *Liosina paradoxa* is the only species of marine sponge which was reported recently for the first time from mangrove forest at Karachi, Pakistan. The sponge samples were taken from pneumatophore of *Avicennia marina*. These sponges were collected from four transects during

pre-monsoon, monsoon and post monsoon period. In this investigation meso-zooplankton community associated with sponge (*Liosina paradoxa*) was assessed. A total of 29 species (840 individuals) of six taxonomic assemblages included dominating community of Nematoda (40.60%) followed by Crustacea (37.74) and Polychaeta (19.64%) whereas, other minor groups as Platyhelminthes (1.3%), Hemichordata (0.48%) and Rotifera (0.24%) were found with lower diversity. Among nematodes, the most abundant species was *Paracanthonchus* sp. followed by *Paracyatholaimus* sp. and *Eleutherolaimus inglisi*. Crustaceans was the second large abundant group including *Oithona* sp. and cypris larvae of *Balanus* sp. found in all transects. Among polychaetes, *Sphaerosyllis* sp. was the most dominant species in all transects. In case of minor groups, *Lehardyia* sp. (Platyhelminthes) was dominating and found in all transects while rotifers and hemichordates found in less number. According to diversity indices, species richness (Margalef and Menhinick) and Shannon-Weiner index was maximum during post monsoon (R1 = 0.535; R2 = 0.242; *H'* = 1.140, respectively), while Simpson index was highest during monsoon (λ = 0.665). Dominance and evenness was observed maximum during pre-monsoon (D = 0.374) and post monsoon (J' = 0.782), respectively. Further studies are needed to observe and understand the dynamics of meso-zooplankton inhabitant of different niches at mangrove forest along Pakistan coast.

FEWFM-19

Comparative Analysis of Otolith Morpho Characters for Eight Species of Clupeidae Found in Different Coastal Waters of Pakistan

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The polycarbonate structures of Otoliths of teleost fishes are composed mainly of aragonite, present in the inner ear in three pairs called sagitta, asteriscus and lapillus. In general, the otolith size and shape differ among species, among populations and within each species. These variations are influenced during development by both genetic and environmental factors and explore taxonomic variations. Objective of this study was to establish the identification features of otolith description and provide an ease to differentiate in closely resembling species. Eight species (*Nematolosa nasus, Nematolosa Arabica, Hilsa Keele, Tenulosa ilisha, Sardinella longiceps, Anodontostoma chacunda, Sardinella melastoma, Tenulosa toil* and *Sardinella melastoma*) of clupeidae were examined as otolith shape descriptions and morphometric (length, height, and weight) comparison from Sindh and Balochistan coast of Pakistan. The ontogenetic differences in otolith shapes have been analyzed through multiple χ^2 tests (significance 0.05) and it revealed morphological variations in rostrum, marginal structures, features of crista and Otolith length (OL): otolith height (OH), arm length (AL): Rostrum length (RL) ratios. Overall, this study shows that these morphological features of otolith can be used in the discrimination of clupeid species.

FEWFM-20

Identification and Morphometry of *Striatobalanus tenuis* (Balanoidea) Collected from Intertidal Zone of Rocky Shore Karachi

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The present study was designed to identify the morphometric relationship of species *striatobalanus tenusis* and to quantify traits of evolutionary significance by detecting changes in shape and function or evolutionary relationship. The specimens of *Striatobalanus tenuis* were collected from Sandspit and Buleiji. *S. tenusis* is deep sea specie (300-400 m) which is found from different gastropods shells like *Murex, Neverita didyma*. This species has been identified on the basis of size shape and number of calcareous plates surrounded by its body. The shell composed of six plates, conical, white orfice deeply toothed. Scutum

triangular strongly sculptured on dorsal surface, Tergum, triangular with long and narrow spur. For morphometric relationship size among species has been expressed in terms of basal diameter of shell was measured, which was variable in response of width of carinal plates. The minimum size of basal disc was 0.9 cm and the maximum size was 1.9 cm in the collected samples. This parameter has continued to be used as an estimate of size. The length and width of carinal and rostral plates has also been measured. These morphometric measurements revealed the significant differentiation and accurate measurements between species.

FEWFM-21

Protein Variation through SDS PAGE Analyses among the Two Species of Brittle Star (*Ecinodermata: ophiuroidea*) Found along the Coast of Pakistan

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The class Ophiuroidea is one of the largest group of individuals among the phylum Echinodermata with 2,096 recognized species. Morphologically, the typical body plan is composed of a pentagonal to round central disk and five arms that sharply head off from the disk. However, some species exhibit six, seven, or up to ten arms which can branch once or many times. The electrophoresis of enzymes on starch or polyacrylamide gels provides a powerful test of the validity of presumed species and also some preliminary estimation of protein of different weight. The two species (*Ophioneries dubia* and *Macrophiothrix aspidota*) of brittle stars were selected for the initial screening of general proteins, with known weight marker, using Sodium dodecyl sulfate (SDS) PAGE with Commassie blue stain. The specimens were collected from the Buleji coastal area. The individual species were varied according to disc diameter and arm size as disc diameter size ranged from 3 mm to 15 mm for *Ophioneries dubia* and 5mm to 24 mm for *Macrophiothrix aspidota.* The relative mobility of variable number of bands was calculated for both the species. The use of SDS PAGE vertical electrophoresis *provides the preliminary identification and discrimination of protein* on the bases of molecular weight. This selective basic data information will be helpful for further advanced studies.

FEWFM-22

Some Preliminary Observation about the Presence of Microplastic in the Gut Content of Four Species of Mangrove Crabs

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Microplastic are tiny particles of plastic that produces by commercial product as well as breakdown of larger plastic molecules into smaller numerous and cannot be recycled and none can be recycled more than few times. This deadly fusion had made plastic global environmental adversity with catastrophic consequences for human and animals. The mangrove crabs are essential component of marine ecosystem and characterize a type of food that can be eaten easily by other sea food animals and humans Inspite of a current catastrophic issue no information is available from the gut content of crab species and microplastic accumulation in different tissues of crabs. In this study, the abundance and accumulation of microplastic in different tissues guts and gills of four species of mangrove crabs (*Deltuca urvillei, Metopograpsus thukuhar, Macrophthalmus pectinipes* and *Austruca iranica*) through overnight digestion process. After the digestion and filtration the sample was observed and observed through a stereomicroscope with charged coupled device (CCD) camera. The abundance of microplastic in the gut and gills of the different crab species was assessed and it was observed that the abundance of microplastic in the gut was significantly higher than the gills. Different morphotypes of microplastic were observed in crab samples mainly includes microbeads and fibers.

FEWFM-23

Population Genetic Structure of Mud Crab, *Scylla olivacea* from Pakistan/Northern Arabian Sea

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Large marine ecosystems (LMEs) are regions of the world's oceans, including coastal areas from river basins and estuaries to the borders of continental shelves. Productivity in LME protected areas is comparatively higher than the open ocean, the 66 LMEs produce about 80% of global annual marine fishery biomass. The Arabian Sea ranked 32 on a global measure of LMEs. *Scylla olivacea* (mud crab) is a significant reserve of aquaculture and commercial fishery in the (NAS) Northern Arabian Sea. The mt-DNA variations in *S. olivacea* (n14) were estimated from Sandspit back waters and Korangi creek mangrove areas populations from Pakistan. The present study based on Cytochrome Oxidase (COI) and 16S rRNA genes, high haplotype (*Hd* 1, *Hd* 0.978) and low nucleotide diversity (*PI* 0.04, *PI* 0.10) was observed in the populations of *S. olivacea* respectively. The neutrality tests (Fu`s F`sand Tajima`s) were non-significant, although mismatch analysis revealed the potential population expansion event occurred through Gene flow. Additionally a phylogeography analysis of *S. olivacea* based on the COI was estimated based on sequences obtained from GenBank (n99) fromIWP. Out of all sequences n113 (14 from Pakistan and 99 from Genbank), different COI haplotypes were identified. The AMOVA indicated the phylogeographic regional partition and genetic structure in IWP. In the current study, the partial sequences of the COI genes offerdirection with the evaluation of the genetic structure, phylogeography and genetic relationship of *S. olivacea* in the IWP region.

FEWFM-24

Some Metric Studies in four Species of Sea Anemone (*Cnidaria: Anthozoa: Actiniaria*) from Manora Coast Karachi, Pakistan

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Cnidaria are the sixth most diverse marine phylum in the world, where's the order Actiniaria commonly referred to as sea anemones a small, moderately diverse order, due to the intricacy of identification of sea anemones, this order has remained some unidentified species. Currently, over 1340 anemone species have been described throughout the world. Sea anemone inhabit on many organisms species i.e. fishes, sponges, algae, seaweed and provide food to many marine animals, they are highly successful in an ecological intelligence, an important part of the marine ecosystem. Four species of sea anemones (Cnidaria: Anthozoa: Actiniaria) were recorded during the survey of intertidal and subtidal rocky and sandy shores in Manora (Karachi, Pakistan). Identification was done on the basisof Morphological features and morphometric measurements. A total four species including *Bnudosoma sp. Diaduminatus lineatus, Actina aquina, Pseudectina flagilefera* were collected out of which three are previously reported and one is under taxonomic identification. Morphometric study from of 189 specimens of four species was performed in which column length, column width, diameter of oral disc was performed along with the density of an individual specie on known stratum, was also observed. The oral disc diameter was greater in *Pseudectina flagilefera* and was smallest in *Actina aquina.* Polyacrylamide gel electrophoresis was also performed to differentiate the species at molecular level and the result support the morphological findings.

FEWFM-25

Molecular and Systematic Identification of New Record of *Metapenaeopsis stridulans* (Decapoda: Penaeidae) Alcock, 1905 in Pakistani waters

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Within Penaeidae, *Metapenaeopsis* is the most diverse genus and *M. stridulans* is the only species which is confirmed from molecular and systematic identification. The traditional taxonomic identification revealed unsymmetrical petasma as a major identification tool while stridulating organ constituted a strongly supported feature. However, the morphological differences in *Metapenaeopsis* shrimps do not vary much, which make discrimination a bit tricky. In this study, the DNA barcoding and phylogenetic analyses used to examine taxonomy and phylogeny of genus *Metapenaeopsis* based on mitochondrial (COI) genes. In the present evolutionary analyses, which is done using MEGA 6 and the history were deduced using the Neighbor Joining (NJ) method. The phylogenetic neighbors based on the blast similarity sequences search between 88% plus. The evolutionary distances were calculated using the Maximum Likelihood method with the units of the number of base substitutions per site. The phylogenetic tree was constructed with the available sequences of Taiwan, China and Korea. Major clusters were parted, where the main cluster clasping species which found near Taiwan and China. Taiwan's *Metapenaeopsis* showed much phylogenetic relatedness to the Pakistani species.

FEWFM-26

Shell Associated Crabs (Hermit crab), Distinctive Morphometry and its Preference along the Coast of Pakistan

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Hermit crabs have the world wide distribution in Marine environments. Among them, the Diogenidae and Paguridae are the most common families throughout the coastline of Pakistan. A total of 2149 individuals were collected from the intertidal water mark of three respective coasts i.e., Rocky, Muddy, and Sandy. Morphological and metric studies have been conducted between the hermit crabs and its host gastropod shell. Individuals were categorized according to size, sex and shell occupation. Crabs were measured according to Total length (TL), Cephalothoracic shield length (CSL), width (CSW), Chela length (CL), width (CW), and weight of crab with and without shell. Whereas, the shells were measured according to Total length (TL), width, aperture length (AL), width and shell weight (SW). For morphometric analysis; Total length of crab used as independent variable. Results reveal the significant relationship of total length between the two families; Diogenidae and Paguridae ($P>0.05$). Among 2149 hermit crabs, 93% individuals belonged to Diogenidae acquiring 93% whereas, Paguridae acquired only 6.9%. Total 26 families of shells found hosting the hermits, among them Muricidae, Turbinidae, and Certhiidae found dominant in the utilization by hermit crabs. The Sex ratio showed the dominance total males (N = 1390) with 64.68% dominated in respective coasts while female s(non-ovigerous = 667) with 31.03% and females (ovigerous = 92) with 4.28%. High number of used shell species utilization by smaller individual crabs indicated that occupation is influenced by the shell availability, while larger individuals demonstrate more specialized and particular occupation.

FEWFM-27

Comparative Morphology and Morphometric Relationship between Otolith and Body Size of Two Commercial Species of Family Sciaenidae

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The genus Otolithes is a group of marine teleost fishes from the family Sciaenidae, which are commonly called croaker or drum fish and characterized by having two exposed canines in each jaw, from which it derives the common name 'tiger tooth croaker'. The species level identification of some species of Sciaenidae family is difficult due to their morphological similarities and they are identified by the study of morphological variation of otolith, gills and shape of swim bladder. This study was designed to observe and compare the body structure and otolith shape of two (*Otolithes ruber* and *Otolithes cuvieri)* commercial species of sciaenidae and the relationship between the otolith size and body size of these species. In present study it was found that the *Otolithes ruber* differ from the *Otolithes cuvieri*by having a shorter head depth, more gill raker numbers at the lower limb of the first gill arch, and more numerous swim-bladder appendage pairs. The Sagitta of both species was oval in shape, pointed downward but the otolith of *Otolithes ruber*is slightly tapered as compared to *Otolithes cuvieri*. The linear relationship between body size and weight of both species with their otolith size and mass shows strong correlation between fish length, otolith length and width, The Positive similarly ($P<0.05$) was observed between fish weight with Otolith mass and it was also concluded that the Otolith size directly related and depend on the fish size and fish weight.

FEWFM-28

Microzooplankton as Indicator of Water Quality in Marine Environment

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Microzooplankton are heterotrophic and mixotrophic plankton, they play pivotal role in marine environment. They are the main primary consumers of phytoplankton. Planktons are used as bio indicator of pollution in marine environment, as they are susceptible to slight change in physical and chemical variation in marine ecosystem. Marine pollution due to anthropogenic activities and climate change induces negative effects on plankton abundance and biodiversity in marine ecosystem. Sea water samples were collected on board using Niskin bottles from the coastal waters of Pakistan monthly for a period of one year, abundance and diversity of microzooplankton were recorded employing standard methods. In our study 131 species of microzooplankton from the coast of Pakistan were identified. The highest abundance was recorded from station three which was near industrial area suggesting industrial activity affected microzooplankton. During the south west monsoon we examined the highest richness and abundance of microzooplankton in Baluchistan coast.

FEWFM-29

Zooplankton Composition, Diversity and Abundance in Sandspit, Northern Arabian Sea

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Zooplanktons are heterotrophic plankton, range from 20 and 2000 µm in size, are weak swimmers and drift in water column of ocean, seas or fresh water bodies. The abundance of zooplankton and their biodiversity is linked to the health of marine ecosystems. The abundance and distribution of zooplankton are influenced by hydrographic condition and they have been suggested as good biological indicator species. Triplicate samples were collected monthly for a period of one year from Sandspit using zooplankton net, spatial distribution, abundance and diversity of zooplankton were recorded employing standard methods. The zooplankton abundance and diversity shows variations with different season and varied from near shore and offshore waters. The highest percent abundance recorded in Sandspit was of Bristle worm than Foraminifera and third abundance was of Calanoid Copepod. Pollutants are known to reduce species diversity and increase population of tolerant species. The four seasons influence changes in physiological and chemical condition of marine waters determined species composition and distribution of zooplankton.

FEWFM-30

Diversity and Distribution of *Noctiluca Scintillans (Green Tide)* in the Coast of Karachi

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The recent study based on annual distribution of Dinophycaea from Northern Arabian Sea, Karachi (Sandspit). Sea water was collected using Niskin water sampler from two stations for water quality and nutrients analysis. *Noctiluca scintillans* (dinoflagellate) is cosmopolitan in distribution and occurs in coastal environment. It is omnivorous, symbiotic and feed on planktons, eggs of fish and detritus. Maximum number of *Noctiluca* was observed 65360 cell/L in August than 10040 cell/L in December and 1620 cell/L in January. Among toxic species of dinoflagellates many genra were observed such as *Ceratium spp. (12), Dinophysis spp. (3), Gyrodinium spp. (2), Protoperidium spp. (15), Prorocentrum spp.(6)* and *Gonyaulax spp. (4).* The dinoflagellates are present as primary producers in marine water and produce bloom when population explosion occurs due to salinity, temperature, excessive nutrients and anthropogenic activities. Some organisms produce toxins that affect filter feeding animals such as clams, oysters, mussels and crustaceans. Red tide caused fish mortality, affect fishery resources, biodiversity and threat to the marine environment.The increased frequency of algal blooms in the coastal areas worldwide is mainly due to human activities. As algal blooms cause hazardous impacts on coastal areas, economies and public health, so Government should develop strategies for controlling pollution.

3. PALAEONTOLOGY

FEWFM-31

Tragoportax punjabicus (Artiodactyla: Bovidae) from the Dhok Pathan Formation of Middle Siwalik, Pakistan

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New fossils of *Tragoportax punjabicus* have been recorded from the Dhok Pathan Formation, District Chakwal, Punjab, Pakistan. The *Tragoportax punjabicus* are medium-sized bovids having moderately hypsodont dentition with rugose enamel. The upper molars are quadrate in shape with less prominent styles and median ribs as compared to other genera of family Bovidae. The anterior median rib is stronger than the posterior rib. The entostyles are present on all molars. The *Tragoportax* originated during the middle Miocene and was heavily diversified during the late Miocene and finely got through extinction in the late Pliocene. Most of these species belong to the herbivore guild. This evidence proved that the Middle Siwalik environment was wet and humid with increase precipitation. So, their habitats were ranging from grassland to forests.

FEWFM-32

New remains of *Dorcatherium* (tragulidae) from Middle Miocene of Chakwal, Pakistan

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In current study, the new dental material collected from three sites of Chinji Formation, are described and discussed. The recovered material includes the cheek teeth including deciduous as well as permanent. The morphology and size of studied specimens here match with two *Dorcatherium* species *D. minus* and *D. majus.* The aim of study is to enhance knowledge on middle Miocene *Dorcatherium* specially to document the deciduous premolar of *Dorcatherium* which are least known.

FEWFM-33

Siamotragulus from the Chinji Formation of the Chabbar Syedan, Jhelum, Punjab, Pakistan

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Chabbar Syedan is a small village situated at the base of the Bakrala ridge, Jhelum, Punjab, Pakistan. The outcrops of this village represent the Chinji Formation by lithology and faunal elements. Field campaigns from 2016 to 2019 in these outcrops resulted in the collection of some good specimens including the artiodactyls and perissodactyls. Fossil remains of family Tragulidae are also present. Though small in number but indicate the presence of genus *Siamotragulus*. *Siamotragulus* dental remains have not been described from the Siwaliks. Two specimens are extremely small in size and these may represent a new species. A detailed analysis of these specimens in progress.

FEWFM-34

Chalicoth ere (Chalicotheriidae: Perissodactyla) from Potwar Plateau, Northern Pakistan: Rare Findings

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Chalicotheres are rare throughout the world and the same is applicable to these clawed herbivores in the Siwaliks. Eight new dental remains have been described from four localities of the Chinji Formation (14-11 Ma), Lower Siwaliks of Pakistan. The new specimens are attributed to *Anisodon salinus*, previously known as *Chalicotherium salinum*. The specimens are significant not only because of their rarity but also because of what they add to information about the morphological and metrical values of this species. The phylogenetic status of the Siwalik species is still debated and still requires a detailed analysis.

FEWFM-35

Tetraconodon and *Sivachoerus* (Suidae) from Potwar Plateau, northern Pakistan

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Rare tetraconodonts, *Tetraconodon magnus* and *Sivachoerus prior* are ascribed in this article. *Tetraconodon* is believed to be occurred in the Upper Dhok Pathan and Tatrot formations of the Siwalik Group. However, the specimens described here from the mid Dhok Pathan Formation are important in relieving the long-held notion of the previous researchers. Similarly, *Sivachoerus prior* appeared earlier than it was thought previously.

4. WILDLIFE, DIVERSITY AND CONSERVATION

FEWFM-36

Ecological Causes of the Decline of White-backed and the Red-headed Vultures in Sindh Province

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Five species of vultures in Sindh prefer to eat meat from the dead livestock. The White-backed Vulture, Red-headed Vulture and Long-billed Vulture are sedentary species, while the Eurasian Griffon Vulture and the Cinereous Vulture are winter visitors. The carcasses of the domestic livestock, which have residual drug 'Diclofenac' left in their meat, during the treatment of their sickness, cause mortality of these vultures, as this drug is toxic to them. It is still in use, despite the ban on its sale. These vultures are extinct in the province, except in the south-eastern areas. A declined population of White-backed Vulture, Red-headed Vulture and the Long-billed Vulture, still breeds in the south-eastern Sindh. The Long-billed Vulture is a cliff breeder and it breeds on the cliffs of Karoonjhar Hills, Nagarparkar. The White-backed Vultures and the Red-headed Vultures are tree breeders. These still survive in south-eastern Sindh, because of the nonavailability of veterinary treatment of sick livestock in the desert. Same is the case across the border fence, in India, where more cattle stray in the desert and are not treated, if sick. The dead animals in this area, had no Diclofenac shots and so, there is no mortality of vultures from this cause. The White-backed Vultures and the Red-headed Vultures do not get suitable breeding trees for the reason that a vast number of trees are with their branches lopped, on which vultures cannot make their nests or even roost for the night. An annually lopped tree remains useless for vulture nesting. Sometimes vultures have to make nests on fabricated high tension electric towers. Considerable number of trees are lopped to provide fodder for the goats and sheep herds. Prosopis cineraria is most abundant and preferred fodder tree in the area and the vultures commonly nest in it. The leaves and soft branches are also sold in the market as fodder, during the drought seasons. Trees have to be lopped, because the domestic livestock herds have overgrazed or over-browsed the Thar Desert Habitats. Vegetation palatability and quantity eaten by individual goats and cattle was experimentally determined. The carrying capacity of the habitats, where domestic livestock grazed or browsed was measured. Population estimates of the free grazing domestic livestock were made. It was also found that the livestock has to travel longer distances from their night-stay enclosures, to fill their stomachs in the degraded habitats of Thar desert. Less nutrition and long distance traveling in the mornings, evenings and during foraging, keep them hungry and weak. As a result, these fetch low price for the herder communities. Most herders purchase fodder trees seasonally for lopping. That gives a negative impact to the tree nesting vultures. The soft parts of the bodies of the livestock, such as ears and between the legs are infested with hard ticks. Their night roosting enclosures also had a number of soft ticks hidden in the sandy floor, which sucked their nutrition at night. These parasites not only further weaken the animals but also cause various diseases and thus cause more mortalities, bringing poverty for the herder communities. The herders never remove the hard ticks or clean sand from the night-enclosures. The awareness level of the communities is very poor. They remain illiterate. Their population growth is steep high. Each teenager male has to have a herd of livestock for grazing, to live. These interlinked factors, brought decline of the vultures. For the recovery of tree-nesting vultures, some suitable trees were purchased to save these from being lopped. The vultures started nesting on these trees. Thus, the ecology-based conservation measures worked.

FEWFM-37

Food Contents Analysis of Waterfowls Passing Through Indus River at Taunsa, South Punjab, Pakistan

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A study was conducted to investigate the food contents of migrating waterfowl in Bet Makwal Kalan near Head Taunsa Barrage, along the River Indus passage, South Punjab, Pakistan. A sum of 459 gizzard samples was collected, during their fall migration, relating to 10 waterfowl species i.e. Northern Pintail (n=56), Eurasian Wigeon (n=17), Garganay (n=07), Mallard (n=02), Northern Shoveler (n=22), Common Teal (n=129), Gadwall (n=158), Tufted Duck (n=04), Common Pochard (n=29) and Ferruginous Duck (n=34). The waterfowl species preferred to consume plants over animals as food during winter migration, while passing at Taunsa. Food analysis showed that all ten bird species ingested seeds abundantly. Two plant species (*Naias marina* and *Potamogeton pusillus*) were consistently among the most consumed seeds in six species of ducks including Eurasian Wigeon, Garganey, Mallard, Gadwall, Tufted Duck and Common Pochard, out of ten species. Whereas, the seeds of *Potamogeton pectinatus* and *Poligonum spp*. were found abundant in the diet of four ducks' species, i.e., Northern Pintail, Northern Shoveler, Common Teal, and Ferruginous Duck. In animals, mollusks and crustacean were well represented in gizzard samples. Additionally, study highlights the importance of vegetation in wetland ecosystem.

FEWFM-38

GIS Based Evaluation of Population Density and Diversity of Birds of Prey of District Muzaffargarh, Punjab Pakistan

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Diversity and estimation of populations of raptors were carried out in District Muzaffargarh (South Punjab, Pakistan) during January-March 2021, using belt transect (5 × 0.1Km) technique. We recorded 447 raptors, belonging to 10 species falling in 2 families (Accipitridae and Pandionidae) with a density of 34.38birds/Km^2. Values of dominance (0.185), Simpson 0.818, Shannon Wiener 2.00, and evenness (0.567) were calculated, suggesting an even distribution of the species Black Kite (*Milvus migrans*; relative abundance, RA 0.082) was most abundant species, flowed by Shikra (*Accipiter badius*; RA 0.038), Marsh Harrier (*Circus aeruginosus*; RA 0.0336), Black Shoulder Kite (*Elanus caeruleus*; RA 0.0537), Honey Buzzard (*Pernis ptilorhynchus*; RA 0.0201), and Brahminy's Kite (*Haliastur indus*; RA 0.0157). Other five species (Steppe Eagle, *Aquila nipalensis*; Common Buzzard, *Buteo buteo*; Long Legged Buzzard, *Buteo rufinus*; White Eyed Buzzard, *Butastur teesa*; and Osprey, *Pandion haliaetus*) were rare (RA 0.0022).

FEWFM-39

Feeding ecology, Threats and Conservation management of Kalij Pheasant (*Lophura leucomelanos*) in Azad Jammu and Kashmir, Pakistan

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Pheasants are bioindicators of our ecosystem and their population is declining. We investigated diet composition and threats to kalij pheasant *Lophura leucomelanos* to prepare conservation and management strategies in Azad Jammu and Kashmir, Pakistan. The diet analysis was done through crop contents of kalij pheasants, threats were assessed through field surveys, communities meeting, and data from 250 questionnaires during April 2020 and March 2021. Based on analysis of threats data, conservation management strategies are recommended. The diet analysis shows that mostly the kalij consumes plant matter as the major diet. We recovered 45 plant species in major, minor, and trace forms which consisted of seeds, leaves, flowers, fruits, rhizomes, and bulbs. Invertebrates including ants, insects, larvae, and grit were also recorded. According to respondents the highest sighting (62.4%) of kalij pheasant was recorded from the forest, followed by cultivated land (20.4%). Major threats to kalij pheasant include forest fire (41.6%), followed by hunting (27.2%), habitat destruction (18.8%), and natural predators (12.4%). The hunting (n=142) of kalij and hunting index (0.855) was recorded during the study period. The maximum hunting was in the evening (54.23%, n=77) followed by night (28.87%, n=41) and the main purpose was food. Stealing of eggs and chicks capturing was recorded from many sites. As per respondents, local community is also concerned about the conservation of this species. Development of more protected areas for conservation, awareness education, implementation of wildlife laws, patrolling of officials in the breeding season, and long-term monitoring plan can help in the conservation of kalij pheasant.

FEWFM-40

Morphology and Distribution of *Columba livia* (Gmelin, 1789) and *Streptopelia decaoctao* (Frivaldszky, 1838) in District Mirpurkhas, Sindh, Pakistan

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The *Columba livia* and *Streptopelia decaoctao* are the members of order columbiformes and family columbidae. They have very adaptive nature. These species are commonly seen everywhere. A study was proposed to determine the morphology and distribution of the *C. livia* (rock pigeon) and *S. decaoctao* (eurasian collared dove) in different areas of district Mirpurkhas as they are important for food value, educational value, pollination, agriculture value and ecosystem value. For the collection of data, field surveys were carried out from January, 2021 to July, 2021 for observing for the observation of species in question using binoculars and DSLR cameras. The morphological characteristics and variations were recorded and species were identified using identification keys and taxonomic literature. Morphological characteristics of *C. livia* were recorded as body coloration was dark grey, green purple shade on neck. Iris color was orange, red and dark brown, bill color was dark grayish while feet color was pink to red. The morphometry of *C.livia* was recorded as: body weight 316.8±39.7g (grams), body length 10.4±0.5in (inches), tail length 4.3±0.2in, wingspan length 13.2±0.6in, beak length 1.7±0.1cm (centimeter). *S.decaoctao* body was pinkish grey to buff grey. On nape a half collar ring was present in black with white edged. Iris color was deep red and pupil black. Bill color was black while feet color was dark purplish to brown. The morphometric parameters of S.decaoctao were recorded as followed: body weight 144.8±6.7g, body length 10.4±0.2in, tail length 4.6±0.1in, wingspan length 7.1±0.4in, beak length 1.4±0.1cm. Present study recorded the distribution of *C.livia*, in urban and suburban areas, whereas the populations of *S. decaoctao* were

recorded from rural areas especially in agricultural habitats. Population density of *C. livia* was founded denser than population status of *S. decaoctao*.

FEWFM-41

Morphometry and Conservation Status of *Anas platyrhynchos* (Linnaeus, 1758) of Hamal Lake, Sindh, Pakistan

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Hamal Lake, one of Pakistan's largest freshwater lakes, is a wildlife sanctuary that provides shelter to a variety of not only resident but Siberian migratory birds such as ducks, flamingos, geese, coots, egrets, shorebirds, herons, cormorants, ibises as well. Present study was proposed to examine morphology and various threats that *Anas platyrhynchos* (mallard duck) face in the aquatic ecosystem of Hamal Lake. The taxonomic and ecologic status of *A. platyrhynchos* was ascertained through deep study of their morphological and environmental characteristics. Species was identified via morphology and literature review, while ecological conditions was analyzed thorough observations carried out during field surveys. Various threats such as habitat destruction, hunting**,** and anthropogenic encroachment were recorded. The morphometric of female specimens of *A. platyrhynchos* was recorded as: body weight (g) 999.5 ± 163.9, Body length (in) 19.9 ± 1.92, Tail length (in) 2.5 ± 0.6, wingspan (in) 20.2 ± 1.1, while morphometry of male specimens of *A. platyrhynchos* was recorded as: body weight (g) 909.7 ± 222.5 , Body length (in) 20.4 ± 1.5 , Tail length (in) 2.6 ± 0.5, wingspan (in) 20.3 ± 1.17. Minor morphological variation was record between male and female of species in question, whereas no any major morpho-taxonomic variation existed. The conservation status of *A. platyrhynchos* was observed very poor in the wildlife sanctuary as there was no implementation of conservation actions for saving wildlife. Hunting and poaching were observed common, meanwhile freshwater habitat was also recorded to be degraded through massive pollution created by local people. It was observed that a large number of ducks were captured from the Hamal lake for illegal trade that occurs openly in various markets of Qambar Shahdadkot.

FEWFM-42

Taxonomic and Genetic Relationship of Five Species of Corvidae (Aves: Passeriformes) Based on Mitochondrial Coi Gene Sequence from Pakistan

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The corvidae (Aves: Passeriformes) is a morphologically diverse family of birds. It is globally, well identified by DNA barcoding but in Pakistan their genetic identification and relationship estimation based on mitochondrial COI gene (cytochrome c oxidase subunit I) is under study. In current study, aim was to identify collected samples genetically and re-establish genetic relationship among them for this purpose five species of family corvidae (*Corvus splendens, Corvus corax, Corvus macrorhynchos Urocissa flavirostris* and, *Dendrocitta vagabunda*) were collected from different regions of Pakistan. Samples were barcoded and genetic relationship was established using different methods (Neighbour joining, Maximum Likelihood, Minimum Evolution, Maximum parsimony and UPGMA in MEGA7. The pairwise distance showed minimum value (0.041) between *Corvus splendens* and *Corvus macrorhynchos* and highest (0.165) between *Corvus splendens* and *Dendrocitta vagabonda* indicating less genetic distance among species of same genera and more among species of other genera with overall 0.122 average distance calculated at 1000 bootstrap repetitions. Reconstructed Phylogenetic trees has discriminated all five species into two distinct clades, one comprising Urocissa and Dendrocitta

genus with one species each and the other with three species of corvus genus. This baseline study will provide data for geographic studies on birds in future. It has also proved barcoding as an effective molecular tool for species genetic identification and phylogenetic relationship inference.

FEWFM-43

Estimation of Heavy Metals in Feathers of Migratory Waterfowl

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Samples of breast feathers were collected from three sites Chashma Barrage, Taunsa Barrage and Trimmu Barrage to estimate the concentrations of heavy metals (Cu, Ni, Cd, Fe & Zn). Breast feathers of two waterfowl species, *Anascrecca* (Common Teal) and *Marecastrepera* (Gadwall) were collected from hunters who granted from wildlife department to hunt migratory birds under special shooting permit. Samples were collected during two different time intervals October-November and March-April.Heating drying oven (IM-30) having an air circulation system was used to dry the breast feather samples at the temperature of 60°C for 48 h. Breast feathers show better indication of degree of metal exposure than other feathers and organs. Acid digestion of prepared samples was performed in the mixture of hydrogen peroxide (H_2O_2) and warm nitric acid (HNO_3) by using magnetic hot plate. Atomic Absorption Spectroscopy (AAS) was used to analyze the digested samples of breast feathers. Slightly difference was found in the heavy metal concentrations in the breast feather samples collected from three sites. Distribution pattern of these heavy metals was as: Fe > Zn > Cu > Ni > Cd in both species of waterfowl. Results of this study showed heavy metal contamination in the breast feathers of waterfowl. Higher level of metal concentrations indicated heavy metal contamination at three study sites in the Punjab Pakistan. Higher level of heavy metal contaminants might be due to few possible reasons such a local contamination source and accumulation of heavy metals in the diet of foraging waterfowl birds at different localities. Heavy metal concentrations are relatively serious and should be a cause of concern.

FEWFM-44

Habitat Selection of Common Moorhen (*Gallinula chloropus*) during Breeding in Impounded Marsh Wetlands in District Bahawalpur, Punjab

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This study has provided basic insight in to the habitat selection of common Moorhen during breeding in the area of Bahawalpur at different locations. First of all vegetation survey was conducted and the flora species of *Acacia nilotica, Prosopis juliflora, Dalbergia sissoo, Typha elephantiana, Cynodon dactylon, Saccharum bengalensis, Solanum nigrum, Calotropis procera, Phoenix dactylifera* and *Zizyphus numularia* were recorded which were most commonly present in the habitat of moorhen. *Typha elephantiana* was the most abundant and preferred habitat for moorhen during breeding season. Moorhen nests were searched through visiting all possible sites and monitoring the activities of the adults at dawn and dusk. Moorhen only used the microsites to build nests on the branches of trees or emergent vegetation bended on water up to 3-5 feet above the water level. These birds used foliage of *Dalbergia sissoo, Prosopis juliflora* and *Acacia nilotica* and other nearby vegetation as hide. Soil and water samples were also analyzed for selected habitat of moorhen. Data obtained is a major addition in existing meager information on common Moorhen, its habitat use, breeding biology preferred by this species in its habitat.

FEWFM-45

Morphometric Variation of Spiny Tailed Lizard (*Saara Hardwickii*) from Cholistan Desert, Punjab, Pakistan

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This study has provided the data on morphometric of spiny tailed lizard (*Saara hardwickii*) in the area of lesser Cholistan desert, Punjab, Pakistan. Adult spiny tailed lizards were collected from poachers with the help of Punjab wildlife department, Pakistan. In Cholistan, these lizards are often illegally collected and sold in various parts of the country for their use in medicine and for making oil from its fat, for which poachers claim that; it is effective in joint pain relief and provides strength to the male sex organ. They were captured in the season of early winter. Among them 9 were male and 8 were female. Total body mass (g) were recorded (Female=142-182g to Male=200-371g). Total body length (BL) (range in male 160-200mm and female was 120-170mm) was also measured. Snout vent length (SVL) was measured for all spiny tailed lizards (range 120-150mm in male and110-130mm in female). Tail length (TL) was noted (range 130-190mm in male and 140-160mm in female) and spines mark on the tail were also counted which were 25-31 in male and 21-25 in female. All measure was made by using digital LCD verneir caliper and weighing balance (SK-5KModel) having range of 1g to 5kg. Comparison between male and female morphometric was made using the Analysis of Variance (ANOVA). The *f*-ratio value is 21.4353. The *p*-value is .000327. The result is significant at $p < .05$. Detail study is required on ecology of spiny tailed lizard for its conservation in lesser Cholistan desert; one of main area of its distribution in Pakistan.

FEWFM-46

Behavior and Feeding Activities of Wild Animals in Bahawalpur Zoo, Punjab, Pakistan

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Current study was conducted on behavior and feeding activities of wild animals present in Bahawalpur Zoo. The main objective of the study was to analyze the effect of captivity on the feeding and behavior activities of wild animals present at zoo. Activities like active, passive and abnormal were observed during the study. Observations were taken on morning and evening basis specially at the time on which diet was provided, amount of diet, food presentation and dispersal ways, animal's preference for food, induction of novel objects, presence of any feeding enrichment technique, hygienic conditions regarding food given and enclosures. Various stereotypic behaviors have been reported like self-aggression, head tossing and pacing. Such types of behavior were most commonly observed in Lion and Puma. Baldness and head tossing in one of the bears was observed that is the result of poor animal welfare. Unhygienic conditions in lion's enclosures were also observed. Food provided to the animals like Desert cat, Jackal, Asiatic cheetah, Indian wolf and Puma is less than the per day caloric requirement of the animals. Habitat management, feeding enrichment and the proper medications would be the best solutions to improve habituation under captivity. It will also increase the rate of reproduction in animals.

FEWFM-47

Abundance Estimation and Factors Affecting Occurrence of Narrow-mouthed Frogs in Subtropical Scrub Forest, Pakistan

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The family Microhylidae (Gunter, 1858) is a well-defined monophyletic group of diminutive frogs. In Pakistan, the family is represented by two species: *Uperodon systoma* and *Microhyla nilphamariensis*. Although these two frog species are listed as Least Concern in the IUCN red list of threatened species, the former is recognized as rare in Pakistan. When a species is not detected at certain locations, it can indicate that the species may be truly absent or that it was not detected despite concerted efforts which could pose a potential serious issue for any conservation efforts (MacKenzie et al. 2002, Pollock et al. 2002). We carried out the present study to estimate abundance and to determine if the likelihood of occurrence of the Balloon Frog (*Uperodon systoma*) and Ant Frog (*Microhyla nilphamariensis*) was influenced by the site and survey covariates using binomial logistic regression in a subtropical scrub forest (Rawalpindi-Islamabad, Pakistan). Despite our best efforts, Balloon Frogs could not be detected from any site. A total of 37 individuals of Ant Frog were detected from the selected sites (33%). The Ant Frog was recorded from five of 16 (naïve occupancy 31%) selected sites of Islamabad Capital Territory and three of the eight sites (37%) of Rawalpindi Tehsil. The model yielded non-significant results for the Ant Frog, and correctly classified 87.5% of the cases (presence=75%, absence=93%). Our findings could be used to update the conservation status of the studied species.

5. BIODIVERSITY, ECOLOGY

FEWFM-48

Co-Relation of Herpetofaunal Diversity with Wild Flora of Nalla Cane in Bagh, Azad Kashmir

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The population dynamic Herpetofauna fauna are indication of environmental pollution and also indicate the health of terrestrial ecosystem. The population of herpetofauna is under threat due to various habitat degradation elements. The present study is designed with objective to record base line data of herpeto fauna with their aquatic vegetation. The study was conducted from 20 January to 20 September 2019 in three areas (Shujabad, Gehal, and Mohri Ferman Shah) of district Bagh, Azad Jammu and Kashmir. The study records three species of amphibians (Himalayan toad, Hazara toad, Kashmir frog) and status of reported species are abundant while among serpentine fauna (Oriental rat snake, Buff striped keel back, Indian cobra, Himalayan Pit-viper, Caspian cobra).The reported Indian cobra, Caspian cobra are endangered species while rest of serpentine are abundant in status and distribution. Among lizards, three species are reported (Laudaka agrorensis, and Oriental garden lizard are abundantly distributed. The major type of vegetation was also reported (30 species of plants) in the sampled area. The vegetation was sampled through quadrate method and a total of 15 quadrates were taken in whole of study area. The PCA (principal component analysis) was applied to find correlation of habitat and species by Xl. State (version 4.1). The Himalayan toad, Hazara toad, Kashmir frog are in close habitat association while three species Indian cobra, Himalayan Pit-viper, Caspian cobra, vary in habitat use according to results of PCA. The hierarchical clustering results 3 clusters on habitat similarity of amphibians, serpentine and lizards communities. The study provide baseline data for future research studies to find population dynamics of amphibians and reptiles.

FEWFM-49

Diversity Estimation and Spatial Distribution Pattern of Mammalian Fauna in Murree Kotli –Sattian Kahuta National Park

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Biodiversity is distributed unevenly across spatial and temporal scales on earth. Knowledge about species diversity, distribution and activity pattern is essential for management and conservation actions. The study of species diversity is prerequisite to understand the health of an ecosystem. Presence/absence data obtained through latest rising and professional scientific technique is low-cost and their use is irritating. The current research was conducted to enlist the mammalian diversity of Murree Kotli Sattian Kahuta National Park, Pakistan, from 24 August 2020 to 30 July 2021. Camera traps were installed 19 locations within selected grids and remained active for 254 trap nights. Results obtained from primary and secondary data revealed the presence of 32 species of Mammals Viz, Barking Deer, Grey Goral, Leopard Cat, Jungle Cat, Kashmir Or Hill Fox (*Vulpes Vulpes*), Asian Palm Civet (*Paradoxurus Hermaphroditus*), Wild Boar (*Sus Scrofa*), Asiatic Jackal (*Canis Aureus*), Rhesus Monkey (*Macaca Mulatta*), Common Leopard (*Panthera Pardus*), Small Indian Civet (*Viverricula Indica*), Leopard Cat (*Prionailurus Bengalensis*) and Indian Crested Porcupine (*Hystrix Indica*). The highest photo-capture events were recorded for Kashmir or hill fox followed by leopard and Asiatic jackal. The species which frequently shared the habitat were Kashmir or hill fox and leopard, at same station moderately captured wild boar. The leopard cat, Asiatic jackal, rhesus monkey, small Indian civet and Asian palm civet intermittently shared the habitat. This will help to understand sympatric relationship and resource

competition among various species. ArcGIS software was used to develop maps of spatial distribution pattern of recorded mammalian species from the study area. We also investigated the human and mammalian funna interaction in the study area. Common leopard, Rhesus monkey, Wild boar, Indian crested porcupine, Bats species were identified as the possible problems of animals in the study area. Leopard and other predator's species like fox and jackals are responsible for the attacks on livestock and poultry while wild boar, rehashes monkey and porcupine were responsible for crop damages in the area, incidence of leopard attacks on local people were also reported in the study. Majority of local community is against the presence of problems animals in the study area. The study reports show great ecological potential and an immense challenge in the form of dependency, as well as diversity of the area in the form of species richness, and utilization of park resources by the native community. We recommend an extensive camera trapping to understand the habitat use and resource competition among the mammalian species of Murree KotliSattian Kahuta National Park.

FEWFM-50

Status of *Chelonia mydas* (Green Sea Turtle) and Habitat at Hawke's Bay, Karachi, Sindh, Pakistan

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Chelonia mydas (green sea turtle) is among the five turtle species that exist in Pakistan and it is listed as endangered species in IUCN red list. Considering their endangered status, present study was proposed to record current status of *Chelonia mydas* as well as its main habitat "Hawke's bay" at Karachi. Several surveys were carried out in between sunset to late night from August to November for observing the nesting condition of green sea turtles and rate of pollution along their habitat. The nesting behaviour was recorded during night only, however status of nests and habitat was observed during both day and night. Information about habitat of *Chelonia mydas* (green sea turtles) was also collected from the Turtle conservation unit. The results showed that green sea turtle faces wide variety of problems such as high rate of pollution, existence of large number of predators, human encroachment and disturbance at Hawke's bay Karachi. Feeding on plastic materials was observed as one of the main causes of their deaths. Sea turtle were observed to get choked to death due to consuming plastic bags and water bottle caps. Numerous nests of green sea turtles were found deteriorated by the predators like dogs, crows, skunks etc. Due to lack of conservation efforts, the green sea turtles were observed facing the loss of habitat and climate change as well. Green sea turtle was observed being affected by the large number of light plastic and other marine debris at Hawke's' bay. Besides that, sound pollution, thermal pollution and chemical pollution also threat to marine life as well the terrestrial life of turtle at the beach. Therefore, there is need of increasing the awareness among local communities about the importance of green sea turtle as they are easily susceptible to anthropogenic activities at every stage of their life. In this context, it is very important to implement strict conservation rules for the conservation of nests and the juveniles of green sea turtles. Implementing the conservation efforts and educating the local people are the serious urge for the conservation of green sea turtles at Hawke's bay.

FEWFM-51

Morphology and Distribution of *Treron phoenicoptera* (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 (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. Distribution of *T. phoenicoptera* was recorded rare in Sindh province of Pakistan.

FEWFM-52

Quantification of Microplastics in an Aquatic Food Chain

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Today Microplastics (MPs) are one of the potential threats and emerging environmental pollutant. In last few years, significant research has been done on fresh water microplastics. Although various studies have reported microplastic pollution in rivers of different countries, still numbers are marginal as compared to studies done in marine water bodies. In this study MPs quantification was done in two fresh water bodies i.e. River Ravi (Testing environment) and a university pond (Controlled environment) to trace MPs along the food chain including biotic and abiotic components. Samples were taken from air, water, sediments, planktons, fish and avian specimens from both water bodies. Higher MPs were found in all samples taken from river Ravi ranging from 3.0 $\pm$ 1.58 MPs items in water to 15.20 $\pm$ 3.35 MP items in air as compared to 2.8 $\pm$ 1.79 MPs in water to 11.20 $\pm$ 1.89 MP items in University pound respectively. The mean value of MP items in the GIT of all species was higher (5.05 + 2.25) as compared to the respiratory tract (1.57 + 1.3) suggesting ingestion as main mode of exposure. However, this mode of exposure needs to be further investigated along with other exposure routes.

FEWFM-53

Insets; the Saviour of Ecosystems against Polystyrene

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The planet Earth is getting polluted day by day. Among all the pollutants, polystyrene is the most important. Use of polystyrene in appliances, automotives, medical and electronic industry is crucial. Studies have declared that polystyrene or Styrofoam is safe for use in contact with food. Food packaging industry totally relies on it because of its non-conducting property for heat. Due to this, freshness of food lasts for longer periods. Along with all these benefits, Styrofoam has also a non degradable attitude. Even temperature at 80 °C doesn't affect it at all. This behavior of Styrofoam makes it a problem for the environment. So, we are in dire need to solve this problem of degrading it. For that, Mother Nature comes to our help. Scientists have proved that there are many insect species that can degrade this nasty material effectively. Among those species, wax moth (*Galleria mellonella*), mealworms (*Tenebrio molitor*), lesser mealworms (*Alphitobius diaperinus*), confused floor beetle (*Tribolium confusum*), super worm (Zophobas *morio)* and many other members of family Tenebrionidae of order Coleoptera. Different studies has shown that when larvae of wax moth was left with the polystyrene, worm holes started to appeared in that Styrofoam just after 40 minutes. Talking about the mealworms, Styrofoam was effectively degraded by its larvae under 24 hours and when compared to those larvae which were fed with normal diet, both did equally well. Another study showed that 100 larvae of *T. molitor* can eat upto 34-39 mg of Styrofoam a day. This is a very pleasant news for the environmentalists because Styrofoam is polluting the environment especially the beaches and shores. Another member of the Tenebrionidae i.e. *Alphitobius diaperinus* also have ability to degrade the packing and utensil polystyrene. However, there is much more work needed to be done on tenebrione beetles to explore more insects that can degrade this non degradable product. After degrading the Polystyrene, these insects larvae especially mealworms can also be fed to the poultry. So, these insects serves two purposes, degrading the non degradable and as a feed for our food i.e. poultry. Hence, insects saved the day, again.

SECTION – VI

POSTER SESSION

POSTER-1

Assessment of Various Plants Extracts to Control the Sucking Pest Jassid (*Amrasca Spp*) on Brinjal (*Solanum melongena*) Crop

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In this experiment the main purpose is to screen out the bio-pesticides which is safe for human health and environment. In this experiment different biopesticde were used to control the jassid. The data were recorded after the 24 hours, 48 hours, 72 hrs and 7 days of treatment application. The RCBD (Randomized complete block design) with three replicates were used. The extracts of different biopesticde were used with the 18 % solution. The different treatments, Neem seeds, Alovera extract, Moringa leaves Extracts, Ginger Extracts, Lemon seed extracts, Eucalyptus. The minimum populations were recorded 0.98/leaf against Neem Extracts and highest populations were recorded on the Moringa leaves extracts which was 4.5/leaf. The biopesticides Eucalyptus and Ginger showed good results. The result showed that Neem extract is better with minimum post treatment infestation for field application. The means were compared by Duncan's Multiple Range Test (DMRT) at P = 0.05. IBM.

POSTER-2

Investigating the Diversity of Terrestrial Snail and their Helminth Parasites in Tehsil Timergara District Dir Lower

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Snails are invertebrate belong to phylum Mollusca of the kingdom Animalia. The Molluscs are the second largest group of organisms. The snails are cosmopolitan and live in a variety of habitats such as terrestrial, freshwater and marine water. Their diversity, distribution and their effect on other organisms are not much explored in Tehsil Timergara District Dir lower. For this purpose, the present study was conducted to explore the diversity of snail and determine the helminthic parasite for which the snail act host. Snails were collected from different localities such as side of rivers, green grasses, maize fields, tomato fields, and from small plants. A total of 366 specimens were collected and preserved in 80% of ethanol in Forensic Research lab, University of Swat. For the presence of helminths parasites both water and snail alimentary canal were observed under light microscope. The snail species were identified according to the taxonomic keys. DNA was extracted from the foot muscles and alimentary canal of snail by using PCI protocol. *Oxichilus alliarius, Bulimulus guadalapensis, Trochulus striolatus and Helicellia itala* were identified. The highest population of *Oxichilus alliaruis* which is (110) and lowest population of *Helicellia itala* which is (74).

POSTER-3

Investigation of Diversity of Chakoor Partridge (*Alectoris Chukar*) in Tehsil Babozai District Swat

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Birds are warm blooded animals and their body are covered with dense feather. These feathers act as a morphological tool which are the main character that can distinguish from the other group of animals. The skin color of the bird is often pale pink or bluish pink and thin equal to the mammals. Chakoor are the non-migratory bird which are belong to the order Galliformes family of Phasianidae and sub family Phasianoidea. Mainly the chakoor partridge *(Alectoris chukar*) have 16 sub species, 7 hybrid and 24 are sub breed which are present all over the world. In Pakistan their occurrence is throughout the country, including Sindh, Baluchistan, Khyber Pakhtoonkhwa, FATA, and Gilgit Baltistan. Chakoor is a small sized gamebird which are present in a high altitude from the sea level about 1000m to 4500m on hilly rock mountains. The feather sample were identified on the basis of morphology comparing with the other mammals. On the basis of DNA barcoding is to find out the exact identity of plant and animal samples. For the first time the DNA used as a marker for the identification of the species by Paul Hebert and colleague. To investigate the dentification of chakoor partridge *(Alectoris Chukar)* in Tehsil Babozai of district Swat. On the basis of morphological character, we successfully identified the Alectoris chukar by microscopy observing the feather which are compare to the mammalian hair. The DNA were extracted from the 15-feather sample by using PCI method.

POSTER-4

Insects as Eco-friendly and Sustainable Animal Feed

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Global population growth, urbanization, rising income, changes in consumption patterns, lifestyles, food preferences, rising demand for animal products, and a lack of conventional feed components all contribute to the quest for alternative protein sources for animal feed. Insect feed has minimal land and water needs and a high feed conversion efficiency into insect biomass. Insect methods of production minimize dependency on traditional feed sources while bringing valuable ingredients back into the food chain from organic waste materials, agriculture, the food industry, and other sectors. High nutritional value, feed efficiency, and reproductive capacity are all advantages of utilizing insects for livestock feed. There is a broad variety of appropriate insects, such as black army fly larvae, house fly maggots, mealworms, silkworms, locusts, grasshoppers, and crickets. Black soldier fly larvae are thought to have the highest feed potential since their dry weight contains up to 50% crude protein (CP), up to 35% lipids, and an amino acid profile. Insect feed is a sustainable alternative to traditional feed since insects are raised on waste streams and may provide a diverse source of revenue. Insects used in the feed may help developing nations solve socio-economic and environmental problems, aligning with the United Nations' Sustainable Development Goals. Smallholder insect farmers have good possibilities to enhance production, improve their livelihood, and contribute to food security and a circular economy with modest initial capital inputs.

POSTER-5

Greening the desert: A safe haven for bird communities at a desert island of the United Arab Emirates

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Land-use change, such as afforestation, in various parts of the world has increased to combat desertification and habitat loss. In the United Arab Emirates, extensive afforestation efforts are dedicated from decades to improve the climatic conditions and improve the carbon sequestration. Sir Bani Yas Island was declared as wildlife reserve in 1971, and an extensive afforestation project was launched to improve this desert island. With plantation of approximately two million trees and various pastures, the island started receiving more number of bird species. This study was premediated to assess the effects of afforestation on the diversity and abundance of avifauna of the island. We compared the reports from institutional and online databases for historical diversity. From 2014-2018, the bird diversity and abundance was studied using line transect method, through stratified random sampling design, in four habitat types, i.e. planted forest, pastures, mountains and coastline. The data was subjected to Shannon-Weiner Diversity Index, Sorenson's Diversity Index, Bray-Curtis Cluster Analysis, Whittaker's beta diversity, and Chi-square Goodness of Fit Test. A total of 164 bird species were recorded from 2014-2018, belonging to 19 bird orders and 46 families. The highest number of species were recorded from the order Passeriformes with a 38.41 % of all species, followed by Charadriiformes with 29.27 %. The birds were categorised into seven feeding guilds. The highest number of species were insectivorous (35.84 %), followed by carnivorous (25.66 %), grainivorous (17.26 %), omnivorous (15.93 %), frugivorous (4.42 %), piscivorous (0.44 %), and nectivorous (0.44 %). There was a significant difference in bird diversity over the period of four decades (χ^2 = 198.73, df = 3, P < 0.001). Sorenson's diversity index suggested high diversity of species among various habitat types. Pastures had highest bird diversity followed by forests, coastline, and mountains according to Shannon-Weiner diversity index. The study concludes that afforestation had a significant positive impact on bird diversity and is effective intervention to improve ecological health.

POSTER-6

Prey Preference and hunting behaviour of Arabian Striped Hyaena (*Hyaena hyaena sultana*) at Sir Bani Yas Island, United Arab Emirates

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The Arabian striped hyaena (*Hyaena hyaena sultana*) are nocturnal carnivores of Hyaenidae family with five subspecies based on geographical variations and are listed as near threatened (NT) under IUCN Red List of Threatened Species. Sir Bani Yas Island in UAE is home to 13 individuals of Arabian striped hyaena. Sir Bani Yas Island has 41 square kilometres protected Wildlife Park, inhabited by approximately 16000 animals belonging to 32 species of various herbivores, carnivores, reptiles, and birds. Striped hyaena is reported mainly as scavenger but occasionally hunt prey up to the size of a barbary sheep (*Ammotragus lervia*). In the current study, we aimed to record the prey preference of Arabian striped hyaena when abundant prey population and variety is available in space limited wildlife reserve. The data on prey species, sex, age, degree of consumption, date and time of kill, and kill location was collected between 2014 and 2016, through direct and indirect observations. The most abundant prey species was Arabian sand gazelle (*Gazelle subgutturosa marica*) comprising about 79 % of all predated species, followed by 6 % each for both blackbuck (*Antilope cervicapra*) and mountain gazelle (*Gazella gazella cora*), axis deer (*Axis axis*) 5 %, and 2 % each for barbary sheep and Arabian tahr (*Arabitragus jayakari*). Arabian striped hyaena predated more males (55 %) compared to females (45%). Most of the kills were recorded during the early morning (56 %) followed by 21 % at night, 13 % during the afternoon, and 10 % in the evening. Moreover, adult prey was preferred by Arabian striped hyaena (89 %) as compared to sub-adult (6 %) and juveniles (5 %). The preliminary results of the current study suggest that Arabian striped hyaena prefer to hunt if there are abundance and diversity of prey species around them.

POSTER-7

Physiological Responses of Caffeine on Smooth Muscle: A Study on Reptile Uromastix *Hardwickii*

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Caffeine, a metabolic stimulant provides useful information on sarcoplasmic reticulum's properties in a muscle tissue. Intestinal segment ileum, from different classes of vertebrates has been studied for the functional differences using Caffeine as a pharmacological tool. This study was designed to determine the effect of caffeine concentration on the mechanical response of smooth muscle (ileum) from Uromastix and Rabbit. Present investigation is a continuation of previous studies carried out by the author. Temperature controlled bathing using isolated organ bath assembly with isometric transducer was employed to conduct the experiments. Mechanical records in response to varying concentrations (0.5mM – 10mM) of caffeine were obtained digitally using Power Lab, from the of ileum Uromastix and Rabbit. A gradual decrease in basal tone of non rhythmic ileum from Uromastix was observed using low to high caffeine concentration. While spontaneously rhythmic active ileum of Rabbit, showed a gradual decrease in its active tension when applied with high caffeine concentration and vice versa. In the light of above investigation it is concluded that caffeine may not necessarily induce tension development in reptilian model. Further, in mammalian tissues the concentration of caffeine does play an important role in its mechanical response.

SECTION – VII

PLENARY LECTURE

PLENARY LECTURE-1

DIVERSITY, SPECIATION MECHANISMS AND THE SPECIES CONCEPT IN *PARAMECIUM* (CILIOPHORA)

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The species concept remains debated in modern zoology, and, in particular, in protistology. The overview on Paramecium as a model for species concept will be provided. Paramecium is one of the best studied genera of ciliates including fourteen valid morphological species. Most of these species are subdivided into reproductively isolated groups, the so called syngens. In last twenty years many Paramecium species have been re-described or discovered, including several new morphological and cryptic species. The hidden Paramecium diversity provides a perfect example that both morphological similarity or plasticity can be misleading in species identification, and molecular data are not always reliable by themselves. Ciliates serve as an remarkable example of the group where speciation is actively ongoing, and even within Paramecium there are several mechanisms driving initial speciation.

PLENARY LECTURE-2

THE EFFECT OF EXTENDING LIGHT PERIOD IN FISH CULTURE

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In this century, It is essential that people are fed with the right protein sources for their health and for the continuation of their future generations. In this respect, as a source of animal protein, all aquaculture species, especially fish, have a significant importance. Nowadays, as the natural water resources are decreasing day by day and the need for animal protein is increasing due to the increasing population. In this point, aquaculture play an important role and It is a good alternative to meeting the need for fresh fish. The total world aquaculture is approximately 171 million tons (170,995,437 tons, excluding aquatic plants). Approximately 80 million tons (80.071.894 tons) and marine and inland water fish (51.368.288 tons) contribute to this amount through aquaculture. Aquaculture has been declared by FAO as the fastest growing food production sector in the world. It is estimated that fish production will continue to increase around 10% every year in the next 10 years. The share of aquaculture in Turkey´s total production is in Turkey 43.83%. Trout (39,6%), sea bream (22,09%), sea bass (36,15%) and carp are the most cultivated species in our country. These species; suitable for successful aquaculture applications. In addition, production success is higher compared to other fish species. Therefore, more research is being done on these species. Studies are generally concentrated around feeding, disease and breeding studies. Some strategies are being developed in order to reach the market size of the fishes grown in the shortest time and to produce them at the lowest cost. For example, there are applications made by changing environmental conditions. In addition to changes in water quality such as temperature,

salinity, pH, O2, adaptations to structural areas such as lattice or concrete pond have been investigated. The results of all these studies show that there are species-specific answers. Light has an effect according to the species and characteristics of living organisms on regulating the feed intake, migration time, gonadal stimulation, ovulation, growth, coloration and especially the respiration of aquatic organisms. Parameters such as temperature and nutrients, which include environmental factors, show more or less changes annually, while changes in natural light remain the same every year. Natural light changes regularly depending on the latitude, day, month and season. Natural or artificial light, which has a wide working area, has been the subject of great interest and research on various fish species cultivated by many researchers. Recent research has focused on observing response to lighting as stress, physiological status, behavior and growth performance of farm fish. In this presentation, the effects of artificial lighting and light time increase on the development and feed evaluation of some species will be examined.

PLENARY LECTURE-3

SOME INNOVATIVE TECHNOLOGIES IN AQUACULTURE WITH RESPECT TO FISH FEEDS AND CAGE FARMING

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Technological changes are changing the life of the people very quickly. Industrial changes and technological changes together are directing the way of production. In a World with smart Technologies and artificial intelligence, it is expected that many people will change their professions. People will mater on specific topics and will not work 40 hours in a week, only 30 hours will be enough for everything. In the same way aquaculture production volume is getting more and more in volume by both introducing new species, genetical improvements, and introducing new Technologies to fish farms and research environments, such as using innovative methods for production fish feeds or remote tracking and observing devices in a fully controlled farm. The relation of aquaculturally improvements to Industry 4.0 or Society 5.0 is due to its unique property being both social and science discipline. Since aquaculture deals with live material for human consumption. Some of the new technologies introduced directly or indirectly to aquaculture production will be highlighted for feed preparation, individual fish farming, and cage farming aspects.

PLENARY LECTURE-4

TICK CONTROL: CONVENTIONAL STRATEGIES AND NOVEL APPROACHES

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Ticks, both soft and hard are the utmost important ectoparasites of livestock in tropical and sub-tropical countries of the world. They are blamed for severe financial losses both through the direct effects as blood-sucking and indirectly as vectors of diversified pathogens and toxins. Worldwide losses due to disease s transmitted by ticks and the costs of tick control have been estimated to be in the range of several billion annually. The importance of ticks is principally due to the ability to transmit a wide spectrum of pathogenic micro-organisms, such as protozoa, rickettsiae, spirochetes and viruses. In Pakistan, tick-borne protozoan disease s (e.g. Theileriosis and Babesiosis and Anaplasmosis) are the main health and management problems of domestic ruminants. Various control methods have certain limitations and in certain cases, the result on tick control are not encouraging. Therefore, local remedies, such as the use of ethnobotanical products are considered as suitable and safe replacement of tick control. This presentation is aimed at reviewing various methodologies with focus on the potential of local remedies towards tick control.

PLENARY LECTURE-5

PARASITIC INFESTATION IN FANCY BIRDS: AN EPIDEMIOLOGICAL SURVEY IN PUNJAB

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There are different fancy birds i.e. pheasants, partridges, quails, ducks, Parrots, pigeons, geese and doves that are reared for an ornamental purpose as well as pet, sports, meat, recreational, teaching of taxidermy, biological and medical experimentations. They are domesticated all around the globe in the villages, towns and cities. Effective management, health care and nutrition are necessary for the welfare of these species. Birds could be parasitized by a wide variety of endo-parasites i.e. nematodes, trematodes, cestodes, acanthocephalans, and protozoa. Severe infections of these endo-parasites in birds significantly cause droopiness, loss of weight and diarrhea. These parasites consume nutrients and vitamins resulting the decreased feed utilization, intestinal obstruction and toxins production in the host. So, parasites are the main cause of serious health issues or even deaths that are newly kept in the captivity or adopted into new environment. Parasites were identified through the feces by simple laboratory methods. Prevalence of the doves positive for the coccidiosis zin Jhang was found (240/320) 75% and for *Capillaria* was (80/320) 25%% in Jhang. No Mixed infection (*Eimeria* spp. + *Capillaria* spp.) prevalence was identified in doves. EPG counted through

McMaster slide for the Coccidia was 700, while the EPG for *Capillaria* was 850 in Jhang of dove birds. The incidence of the cockatiels birds positive for the coccidiosis in Layyah found was (120/170) 70.5% and for *Capillaria* was (30/120) 17.6% while, mixed infection (*Eimeria* spp. + *Capillaria* spp.) prevalence was (20/120) 11.7%. The incidence of budgerigars Layyah parrots observed was (80/90) 89% for coccidiosis and for *Capillaria* was (10/90) 11% and no mixed infection (*Eimeria* spp. + *Capillaria* spp.) was reported. Prevalence of the cockatiel and budgerigar identified for the parasite diagnosis in Jhang; both showed positive for the coccidian only and the prevalence of coccidiosis in cockatiels was (210/210) 100% and in the budgerigars was (120/120) 100%. EPG counted through McMaster slide for the Coccidia was 750, while the EPG for *Capillaria* was 700 in both cases of cockatiels and budgerigars of Layyah and EPG counted through McMaster slide for the Coccidia was 750 in both cases of cockatiels and budgerigars of Jhang. EPG count for the coccidian in both species of parrots was same in the both districts that showed very weak burden of the parasites. The prevalence of the Pigeons bird positive for the coccidiosis in Muzaffargarh was found 70.7% and for *Capillaria* was 15.7% in Muzaffargarh and the mixed infection prevalence was 13.4%. EPG counted for the Coccidia in Muzaffargarh was 750, while the EPG for *Capillaria* in Muzaffargarh was 700 in pigeons. No parasite was identified in (400) quail species from the Layyah district. This study represented that Coccidia and *Capillaria* were the most prevalent parasites found in the pigeons, doves and parrots species (cockatiels and budgerigars) in all the studied districts, but no parasite was found in the quails of Layyah district. This study recommends for the proper management and care of these birds' species in the studied districts to get risk of these parasitic infections to prevail these towards the other livestock populations and humans.

PLENARY LECTURE-6

FUNCTIONAL CHARACTERIZATION OF FATTY ACID DESATURASES (FADS2) IN COMMON CARP (CYPRINUS CARPIO): INSIGHTS INTO CATALYZING EFFICIENCY BASED ON IN VITRO, IN VIVO AND DOCKING SIMULATIONS

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Long-chain polyunsaturated fatty acids (LC-PUFA), especially the n-3 polyunsaturated fatty acids, are essential compounds that important in numerous metabolic and physiological processes ensuring normal cellular function for vertebrate including fish. Common carp is cultured commercially worldwide, and it can be able to conversion dietary C18 precursor fatty acids to arachidonic acid (ARA), EPA, and DHA, likewise other carp species. cDNAs for two fads had been identified in common carp. We presented a comprehensive investigation of the function of common carp two fads genes, fads2a and fads2b combining docking simulation, in vivo, in vitro. The accurate of enzyme activity, conversion ratio, spatial express pattern, and promoter region activity were studied in this study. We identified Δ5/6 activity for these two genes, fads2a and fads2b, combing predication of protein modeling and verification of recombination yeast expression system. Moreover, we estimate the conversion ratio of common carp fads2a and fads2b by overexpressing system in zebrafish. Taken together with the study of express pattern of these two genes, we explore the two genes molecular mechanisms.

PLENARY LECTURE-7

HISTORICAL SWARMING OF LOCUST IN PAKISTAN: CAUSES AND CONTROL STRATEGIES

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Recent plague hit Pakistan for the first time in more than two decades and cause million rupees damage to economy. It is considered as big historical disaster to the agriculture and livestock. They are exceptional in mobility that's why a swarm of desert locust crossed Balochistan's desert area of Cholistan, Rahim Yar Khan, Bahawalpur, Thar Desert, Mirpurkhas, Umerkot, Nara Desert, Khairpur and Sukkur to the Indian border in single flight. Locusts remain a major food security challenge today throughout the world. Locusts, which caused a significant damage to Pakistan's agriculture back in the 1950s, 1960s and 1990s have once again swarmed a huge areas in Pakistan actually unusual, rains throughout Pakistan provided them a favourable environment, which aggravated this situation. Swarms of locusts are landing on vast fields of cotton, wheat, sugarcane and other standing crops in fertile parts of lower Sindh and Balochistan. It is estimated that million acres fertile land was badly affected by this sudden eruption although, earlier plagues persist for shorter time periods but recent plagues is largest one started from May 2019 and continued till November 2019. The desert locust eats a wide variety of crops and other plants, including a broad assortment vegetable and cereal crops, banana, citrus, groundnuts, fruit trees, and many others. Due to its vast reach and significance to agriculture, this species is often considered the most dangerous migratory pest in the world. Schistocerca

gregaria is multivoltine, with up to 3 generations per season under favorable conditions. Typically, it takes several years for outbreaks to develop into a plague, but plagues can subside within 6 months. Locusts can travel 150 km in a day and typically migrate between seasonal breeding areas. Heavy rains can allow for population buildup within the recession zone. As vegetation rescinds, locusts aggregate, which can lead to gregarization. But no detail study was available on exact causes of swarm and its managements from this region yet. The purpose of this study was: 1. Investigation on origin of swarming 2. Breeding zones of S. gregaria in Pakistan along with its occurrence and seasonal distribution 3. Examination of environmental factors that affect phase change, along with the wider impact of land use and management strategies that may unwittingly create environments conducive to outbreaks 4. Estimation of crops losses and its negative impact on food security in the region. Beside this, reproductive activities viz: copulation, oviposition, hatching, nymphal development, fecundity, fertility in solitarious and gregarious phases was also compared. I examine that solitarious phase locusts tend to be inactive and avoid each other, while gregarious phase individuals are more active and typically orient toward one another and consume the equivalent of their body weight (2 g (0.07 oz)) each day in green vegetation. Mostly the aerial operation was undertaken against this attack in Balochistan and some parts of Sindh but unfortunately situation in many areas is still depraved and out of control. Present study recommends that monitoring of Desert locust will be made possible through remote sensing, GPS, GIS, and Satellite data. Further, well-coordinated efforts such as: cultivation of nitrogen low plantation, cultural and physical operation and utilization of biocontrol agents against locust at regular bases are needed in order to avoid the production of swarming in future.

PLENARY LECTURE-8

Microbacterium sp. Strain 1S1 Resistance Strategies against Metals: A Feasible Approach for Environmental Clean-up

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Microbacterium sp. strain 1S1, tolerated arsenite and arsenate upto 75 and 520 mM, was isolated from industrial wastewater. Metal uptake and surface adsorption into the bacterial cells challenged with 15 mM arsenite were confirmed by SEM, EDX, and FTIR analyses. Reduced and oxidized glutathione ratio, non-protein thiols and catalase were increased upto 40.0, 78.50, and 240 % under metal exposure. The bacterial cells were able to oxidize 98% arsenite after 96 h of incubation at lab scale while inactivated biomass removed 99%/10 h arsenite from the medium. The genes for arsenic oxidation *aioB* (arsenite oxidase smaller subunit) along with *MoeB* (molybdopterin biosynthesis protein) and *erpA* gene (Fe-S cluster insertion protein) were found on the chromosomal DNA of the strain. The 5 *ArsC* genes, one *Acr3*, 2 thioredoxin reductase (*txrA, txrB*), 3 arsenic regulatory genes (*arsR1, arsR2*), 4 phosphate transporting genes (*psts, pstC, pstA, pstB*), and one *arsB* gene which encode arsenite efflux pump were found on chromosomal DNA indicating that resistance could be ascribed to As-efflux system. MS analysis revealed that 24 proteins expressed while 42 proteins were suppressed when cells were challenged with 15 mM arsenite. Presence of multiple resistance strategies and highest arsenic oxidizing potential make strain 1S1 an impending foundation for green chemistry to exterminate environmental arsenite.

PLENARY LECTURE-9

EPITHELIAL – MESENCHYMAL TRANSITION: EFFECT OF METFORMIN CHLORIDE

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Glucose starvation is long being studied for its potential to control cancer metastasis. A decade ago the drugs interfering the glucose metabolism started gaining attention for their anti-cancer properties and metformin is one of them. Metformin chloride is a common antidiabetic drug. Different studies have used different concentrations on a variety of cancer cells. Our study mainly focuses on its effect on epithelial to mesenchymal transition gene markers and inducers in various cancer cell lines. For that purpose different nontoxic concentrations (0.01 M, 0.05 M) to intermediate (0.1 M) and toxic concentrations (0.2 M, 0.5M) of this drug were prepared to be used against different cancer cell lines including SF767, HCT-116, MDA-MB231, and MCF7 along with normal Human Umbilical Cord Stem cells as control. In our study through various biochemical assays and gene expression studies, we found that the usual lower concentrations are not only less effective in an in-vitro model compared to higher dosages but can also increase cancer proliferation and upregulate the metastatic markers by activating STAT3 signaling rather than inhibiting it.

PLENARY LECTURE-10

ZOONOTIC AND ZOOANTHROPONOTIC POTENTIAL OF SARS-COV-2.

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Transmission of a pathogen from animal-to-human (zoonosis) and human-to-animal (zooanthroponosis) are currently leading threats for both veterinary and human public health. These threats can be testified by the fact that ~60% of emerging infectious diseases are of zoonotic origin and ~70% of these originate from wildlife. The importance of studying zoonotic and zooanthroponotic diseases is further highlighted by the emergence of multiple variants of SARS-CoV-2. A range of animal species have been verified for SARS-COV-2 and other zoonotic infections either in vitro or in vivo. However, molecular bases of such broad host spectrum of these infections remained elusive. In this lecture, I will layout key features of SARS-COV-2 that make the virus living example of zoonotic and zooanthroponotic pathogen.