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President
Prof. Y. K. Khillare



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President: Prof. Y. K. Khillare

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99th Indian Science Congress
January 3-7, 2012, Bhubaneswar

I

PRESIDENTIAL ADDRESS

President: Prof. Y K Khillare

Sustainable development of fisheries and livestock for food security

Prof. Y K Khillare*

Respected dais, Invited speakers, Award winners, Senior researchers, Professors, Heads of the different Academic Departments and Research Institutions, dignitaries sitting on dais and off the dais, Research students and Friends,

It is memorable day and event for me to stand before you and also a matter of immense pleasure to share my views in context to the theme of the section of 99th Indian science congress here in august gathering at KIIT, Bhubaneshwar. Orissa [Odisha].

In our country, only because of population explosion and unplanned exploration of resources within availability, to feed a common man, lead to a problem like malnutrition and ill health in child and growing age populations. And hence, food security problem has risen up as severe problem for conserving fisheries and live stock and health of Indians.

Population growth, increasing affluence and changing dietary habits have led to rapid rise in global demand for food, and a report of FAO (2009) forecasts the need to increase food production by over 40% by 2030 and over 70% by 2050

Aquaculturists have proven their abilities with very innovative ideas and new technologies over the past fifty years where new production methods and species for farming are developed.

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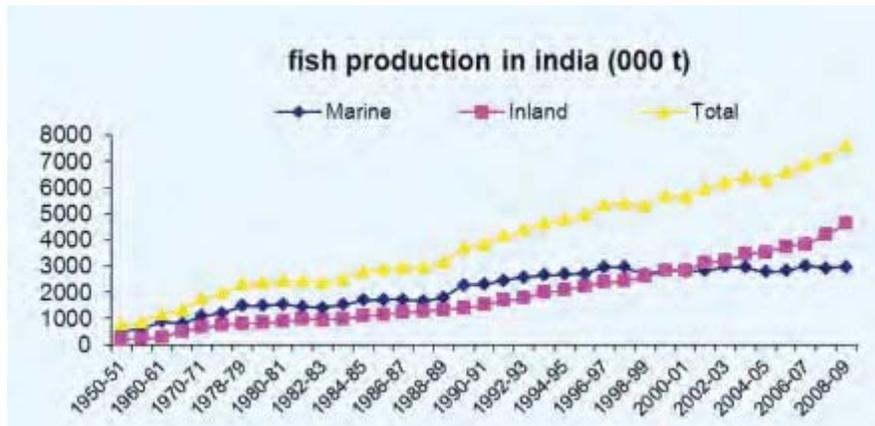


Fig 1. Trends in marine and inland fish production in India. (Vision, CIFA,2009).

New technologies are now needed to boost production, protect fragile environment and supply the highest quality product. It is fair to say that the easy gains in production increase have now been made and to increase production in the next decade and a half to 70 million tonnes or beyond, will require a major new improvement in technology.

What is Food security?

Food security happens when all people at all times have access to enough food that is affordable, safe and healthy , culturally acceptable, meets specific dietary needs, obtained in a dignified manner, produced in ways that are environmentally sound and socially justified.

Food security is built on three pillars like, 1.] Food availability, 2.] Food access and 3.] Food use.

The Food and Agriculture Organization of the United Nations (FAO) defines food security as “access by all people at all times to the food needed for a healthy and active life” (FAO 2000a)

However, achieving food security necessitates that food be available on a regular basis and that all those people in need of it can obtain it. The biosafety issues should be emphasized, development and promotion of biotechnology that conserve the environment. There is need to understand technical and other constraints, applicability and use of research results in the development of strategies to overcome these challenges.

The National Food Security Act, 2010

India's Department of Food and Public Distribution has released a draft of the National Food Security Bill on its [website](#) and is encouraging the public to comment and make suggestions by the end of September 2010.

“To provide for food and nutritional security, in human life cycle approach, by ensuring access to adequate quantity of quality food at affordable prices, for people to live a life with dignity and for matters connected therewith or incidental thereto” .In total, draft Bill promises to provide subsidized food grains to 75 percent of the rural population, 46 percent of which will be the priority households, and 50 percent of the urban population, including 28 percent in the priority category.

Food availability is a necessary condition for food security. India is more or less self sufficient in cereals but deficit in pulses and oil seeds. Due to changes in consumption patterns, demand for fruits, vegetables, dairy, meat, poultry, and fishery products has been increasing. There is a need to increase crop diversification and improve allied activities India has many policies and programmes. However, food insecurity and malnutrition continue to be high. The problem is with both design and implementation of the programmes. The focus of reforms can now be shifted to more efficient delivery systems of public services. It has been recognized that better governance is very important for effective functioning of food-based programmes. Social mobilization, community participation and decentralized approach are necessary in this context. It may,

however, to be noted that governance has to be contextualized in relation to the socio-economic environment. Appropriate institutions are needed for better implementation of policies and programmes. For example, rural institutions in areas like land, water, marketing of agricultural and non-agricultural products, credit, technology, and infrastructure are needed for better governance. Similarly, people-centric programmes and institutions are needed for better implementation of social protection schemes. A self-help group approach for livelihoods is relatively successful. For example, small and marginal farmers can get better services if they are organized through collectives like self-help groups or cooperatives. Finally, the 'rights approach' plays an important role in improving implementation of development programmes.

According to Food and Agriculture Organization (FAO), food security exists when all people, at all times, have physical and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life. Food security has three components, viz., availability, access, and absorption (nutrition). The three are interconnected. Many studies have shown that improvement in nutrition is important, even for increase in productivity of workers. Thus, food security has intrinsic (for its own sake) as well as instrumental (for increasing productivity) value.

Per capita Availability and Deficit of Milk, Egg and Meat

Food Item	Per capita availability	ICMR dietary guidelines for Indians	Per capita deficit
Milk	216grams/day	300 milli litre/day	34 grams/day
Egg	30 eggs/annum	180 eggs/annum	150 eggs/annum
Meat	3.24 kg/annum	10.95 kg/annum	7.71 kg/annum

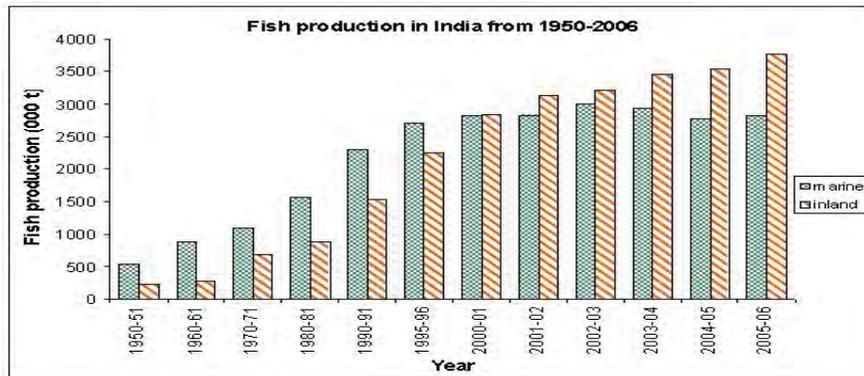
Source: GOI (2003)

Similarly, The growth rate of commercial broiler chickens has increased from a 1.70 kg bird grown for 59 days in 1970 to a 2.02 kg bird grown in 40 days today, as shown in Table 4. This could not have been possible without the continued improvement in genetics, disease control, management and nutrition over the years.

Despite the lack of information concerning the role of rural aquaculture, there is one sure benefit of consuming fish, and that is the nutritional and health benefit to be gained from its valuable nutrient content; food fish having a nutrient profile superior to all terrestrial meats, being an excellent source of high quality animal protein and highly digestible energy, as well as an extremely rich source of omega-3 polyunsaturated fatty acids (PUFAs), fat-soluble vitamins (A, D and E) and water-soluble vitamins (B complex), and minerals (calcium, phosphorus, iron, iodine and selenium). In fact, if there is a single food that could be used to address all of the different malnutritional disorders listed at the start of this paper, it is fish - the staple animal protein.

Aquaculture:

With water resources in terms of 29,000 km of rivers, 3.15 million hectares of reservoirs, 2.35 million hectares of ponds and tanks and 0.2 million hectares of floodplain wetlands, the potential production levels are estimated at over 6.57 mmt annually. The inland-sector, which has a growth rate of 6 per cent, contributes around 55 per cent of it. Hence, with immense possibilities for both open water fisheries and fresh water aquaculture, India ranks second only to Japan in inland sector fish production. Out of which, carp contributes as much as 87 per cent of the total aquaculture production.



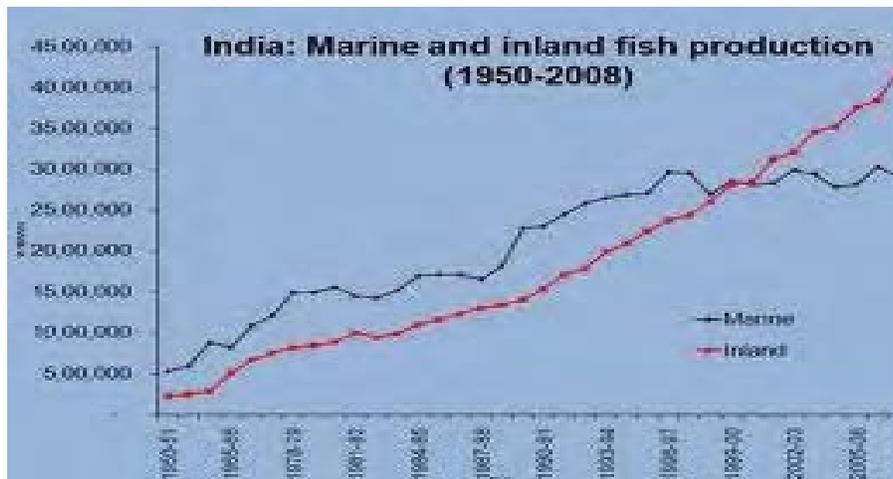
(Source: Economic Survey, 2007 and ICAR, 2006 and www.vuatkerala.org)

Global aquaculture remains the fastest growing food industry with growth since 1970 of 8.8% per annum. This growth compares with 1.2% and 2.8% for capture fisheries and terrestrial farmed meat production respectively. Total global aquaculture production reached 59.4 million tonnes in 2004, worth an estimated US\$ 70.3 billion, including 46 million tonnes of aquaculture product consumed for food. Global demand for seafood has continued to rise, fuelled by global population growth and an increase in per capita consumption due to increasing protein consumption in many developing countries and an increase in relative preference for seafood protein in many developed countries.

Global population was estimated at 6.72 billion in -November 2008 and, while growth has halved from the peak in around 1963, it is predicted to reach 9 billion by 2040. Seafood consumption has increased to 16.6 kg/person/yr, the highest on record. To cater for global demands in 2020, an estimated 70 million tonnes of seafood will be required from aquaculture (FAO, 2007). The massive production increase (from approximately 1 million tonnes in 1950's to 59.4 million tonnes in 2004) arose from increases in the area under culture and the number of species cultured and from a shift in the reliance on natural feeds to the greater use of formulated feeds that supplied increasingly amounts of the species requirements.

Improvements in other aspects of husbandry, such as health management, and better technology, such as cage and tank systems, also contributed

The culture of carp was originally restricted to the home range of each species, where fry (seed) could be caught from the rivers and stocked in ponds. A study of how water temperatures, changes in day length and other factors affected the reproductive cycle of fish subsequently led to the ability to breed carp far from their native waters and where the natural conditions would not normally allow breeding. Manipulation of water temperatures and day length remains important in the successful hatchery production of many farmed species to this day. As hormones became identified and their action understood in higher vertebrates, fish farmers began to experiment too, with extracts of hormone producing organs in fish, and found that egg development and spawning could be promoted in many species by the injection of hormone extracts from pituitary gland. These techniques are used today in the production of fish like carp, salmon and bream. Oysters and other molluscs are brought to produce eggs by manipulating water temperatures and shrimp are made to develop their ovaries by removing a gland that produces an inhibitory hormone, sited in the eyestalk. Hormones are also used in processes like the sex-reversal of tilapia to produce all-male populations that give better production. There is a short period in the early life of the fish when their sex is not fully determined and feeding them with a hormone treated feed can push them to develop male characteristics. In shrimp farms, specially designed matting materials that stand upright on pond bottoms, with a structure that promotes the growth of the small animals and plants that the shrimp can thrive on, have recently been developed and shown to boost production.



Aquaculture has lagged behind agriculture in applying genetic improvement techniques but this is a rapidly changing field. We present chapters that detail advances in genetic improvement for finfish, shrimp and molluscs, controlling reproduction and gender and sterility and genomics. Stress and disease accompany intensive animal production for all species and managing health is a fundamental requirement for all aquaculture producers. We are regularly discovering new diseases for aquatic animals but fortunately we are also developing new treatments and therapies.

An analysis of past advances in aquaculture gives optimism for the future. While the challenges are great, the adoption of new technology will facilitate rapid future increases in production. The potential of genetic improvement is still largely untapped, new health management strategies will reduce production costs and while there are considerable constraints with the supply of feed ingredients, advances in our understanding of nutritional requirements will improve feed efficiency. New production systems will also allow production to increase and take production closer to the market for high value species. The world is facing increasing challenges with food security and aquatic protein will continue to play a major role in both the developing and developed world. Aquaculture is critical for the future supply of seafood and other aquatic products.

Fish as nutritional food source

Globally, more “food fish” is consumed on a per capita basis than any other type of meat or animal protein (16.0 kg per capita supply in 1998, up from 12.5 kg in 1984), followed by pig meat (14.9 kg in 1998), poultry meat (10.1 kg in 1998), beef and veal (9.8 kg in 1998), eggs (7.8 kg in 1998) and mutton and goat (1.9 kg in 1998) (FAOSTAT, 2000). Although developing countries produced over two-thirds of total food fish supply in 1998, per capita supply was highest in developed countries (23.2 kg in 1998, down from 25.6 kg in 1984), followed by developing countries (14.0 kg, up from 8.0 kg) and LIFDCs (13.6 kg, up from 6.9 kg). By region, per capita supply was highest in Oceania (20.2 kg, down from 21.3 kg), followed by Europe (19.7 kg, up from 17.8 kg), Asia (17.6 kg, up from 10.5 kg), North and Central America (16.8 kg, up from 16.6 kg), South America (9.8 kg, up from 7.9 kg), and Africa (7.0 kg in 1998, down from 8.1 kg in 1984) (FAOSTAT, 2000). In terms of animal protein supply, food fish represented 16.5 percent of total supply in 1997 (total global animal protein supply was reported as 27.1 gm per capita in 1997), followed by pig meat (14.7 percent), beef and veal (13.6 percent), and poultry meat (12.5 percent). It is interesting to note here that farmed aquatic meat production in China currently ranks second to pig meat (Figure 8); the per capita availability of food fish in China increasing from 6.3 kg in 1984 to 25.5 kg in 1998 (FAOSTAT, 2000). In general, people living within Asia and Africa (including LIFDCs) are much more dependent on fish as part of their daily diets than people living within most developed countries and other regions of the world.

Technology advancement in aquaculture

Aquaculture and raring of livestock are income-generating activities. However, rapid sector growth has, in some instances, outstripped planning and regulatory activities. As a result, many areas have seen a regulatory rebound, with disproportionate requirements as resource use conflicts have occurred, resource scarcities have

become more constraining, and demand for product quality and safety has increased significantly.

Tremendous gains will be possible through improved biotechnology, genetic modification, improved nutrition, probiotics, and disease diagnosis and treatment. However, the problem of consumer resistance to perceived risks stemming from “unnatural” products, ethical problems and fear of unknown technologies will affect potential gain. Environmental and human health issues will slow development or reduce market access. Strategic solutions are required. The biosafety issues should be emphasized, development and promotion of biotechnology that conserve the environment. There is need to understand technical and other constraints, applicability and use of research results in the development of strategies to overcome these challenges.

Aquaculture and in particular, shrimp farming, differs from broiler farming in that the grow out operations are typically located along ocean-front and estuarine areas and are, therefore, under environmental scrutiny. Semi-intensive culture requires large ponds, location on clay soil to reduce seepage, low soil acidity and low land elevation to reduce pumping costs. Problems with pollution and disease have occurred in shrimp culture areas because of concentrated development without coordination and the use of infected post larvae. Improved pond management and development according to plans and guidelines will help the situation. In important culture areas such as Thailand, codes of conduct are being developed for shrimp farming to ensure sustainability and provide for environmental, social and economic benefits for present and future generations. Businesses, organizations and stakeholders involved in the industry are involved in generating, reviewing and commenting on the codes of conduct.

The use of closed bio-secure culture systems with reduced or zero water exchange is an area under intense evaluation at the present time. Such novel production systems have the potential to increase productivity, reduce effluent and control disease. These systems

have already been developed, tested and proven to work on a prototype basis. At the present time however, they are not cost effective on a commercial scale because of high electricity costs necessary to run aerators and pump water through raceways and filters (Leung and Moss, 1999). Further refinement of bio-filters required to clarify water and metabolize nitrogenous wastes, along with improvements in genetics of shrimp, may make bio-secure systems economically viable in the future. This would allow farms to be located some distance away from the ocean and would reduce the incidence of disease. Much like broiler production on litter floors, several crops of shrimp could be grown in the same water, with time allotted for depopulation between grow outs.

Shrimp culture, in contrast to broilers, has much catching up to do in the area of domestication, selective breeding, gene mapping, and biology in general. An excellent review of this topic was recently published by Argue and Alcivar-Warren (1999). At present, shrimp culture depends largely on wild capture of postlarvae or broodstock. This does not allow selection pressure for desired traits and is risky, as diseases may be transmitted. Selection pressure has been found to be effective in improving performance in penaeid shrimp, with heritability for growth rate ranging from 0.34 to 0.98 in *Penaeus vannamei* (Carr et al. 1997), and significant for *P. monodon* (Jarayabhand et al., 1998). Little work has been done in the area of cross-breeding or development of pedigree shrimp. Work at the Oceanic Institute in Hawaii has shown potential for breeding shrimp resistant to Taura syndrome virus (TSV), although it may be more practical to select shrimp for general immune response or osmoregulatory capacity than for a specific disease. Production of specific-pathogen free nauplii has begun at the Oceanic Institute and, although it appears to be an effective way to limit disease transfer, there is concern that such programmes may decrease genetic variation because only a few female shrimp are required to produce large numbers of nauplii.

Biotechnology in fish breeding

Gonadotropin releasing hormone (GnRH) is now the best available biotechnological tool for the induced breeding of fish. GnRH is the key regulator and central initiator of reproductive cascade in all vertebrates (Bhattacharya et al.,2002). Since then only one form of GnRH has been identified in most placental mammals including human beings as the sole neuropeptide causing the release of LH and FSH. However ,in non mammalian species (except guinea pig) twelve GnRH variants have now been structurally elucidated ,among them seven or eight different forms have been isolated from fish species.(Halder et al.,1991). The most recent GnRH purified and characterized was by Carolsfeld et. al.(2000). Depending on the structural variant and their biological activities, number of chemical analogues have seen prepared and one of them is salmon GnRH analogue profusely used now in fish breeding and marked commercially under the name of ‘Ovaprim ‘ throughout the world .

Transgenesis

Transgenesis or transgenics may be defined as the introduction of exogenous gene / DNA into host genome resulting in its stable maintenance, transmission and expression. Although significant progress has been made in several laboratories around the world, there are numerous problems to be resolved before the successful commercialization of the transgenic brood stock for aquaculture. To realize the full potential of the transgenic fish technology in aquaculture, several important scientific break through are required. There include (i) more efficient technologies for mass gene transfer (ii) targeted gene transfer technologies such as embryonic stem cell gene transfer (iii) suitable promoters to direct the expression of transgenes at optimal levels during the desired developmental stages (iv) identified genes of desirable traits for aquaculture and other applications (v) informations on the physiological, nutritional, immunological and environmental factors that maximize the performance of the transgenics of the transgenics and (vi) safety and environmental impacts of transgenic fish.

Chromosome Engineering

Chromosome sex manipulation techniques to induce polyploidy (triploidy and tetraploidy) and uniparental chromosome inheritance (gynogenesis and androgenesis) have been applied extensively in cultured fish species (Pandian and sheela, 1995; Lakra and Das, 1998). Tetraploid breeding lines are of potential benefit to aquaculture, by providing a convenient way to produce large numbers of sterile triploid fish through simple interploidy crosses between tetraploids and diploids (Chourrout et al., 1986).

Cryopreservation of gametes or gene banking

Cryopreservation is a technique, which involve long-term preservation and storage of biological material at a very low temperature usually at -196 0C ,the temperature of liquid nitrogen . The technology of cryopreservation of fish spermatozoa (milt) has been adopted for animal husbandary . The first success in preserving fish sperm at low temperature was reported by Blaxter (1953) who fertilizes Herring (*Clupea herengus*) eggs with frozen thawed semen. The increased application of biotechnological tools can certainly revolutionise our fish farming besides its role in biodiversity conservation. The paper briefly reports the current progress and thrust areas in the transgenesis, chromosome engineering, use of synthetic hormones in fish breeding, biotechnology in health.

DNA Techniques

The field of **genetic biotechnology** similarly ranges from simple techniques such as hybridization, to more complex processes such as the transfer of specific genes between species to create GMOs (Genetically Modified Organisms). Over the years our knowledge of fish breeding requirements has improved and the ability developed to induce breeding artificially, through the use of natural or synthetic hormones and/or environmental manipulations. (For example

changing photoperiod or water temperature can induce some fish to spawn). These have been key factors that have facilitated the application of more advanced biotechnologies. Selective breeding, the maintenance of stocks genetically improved by chromosome manipulation, line crossing, and sex reversal all depend on the controlled breeding of farmed species. These improvements in reproductive technologies have also assisted aquaculturists greatly in their efforts to domesticate aquatic animals. In addition, by making it possible to remove the natural constraints and timing of breeding, farmers are able to mate many more species at times that are most beneficial, and thus help to ensure a steady and consistent supply of fish to the market.

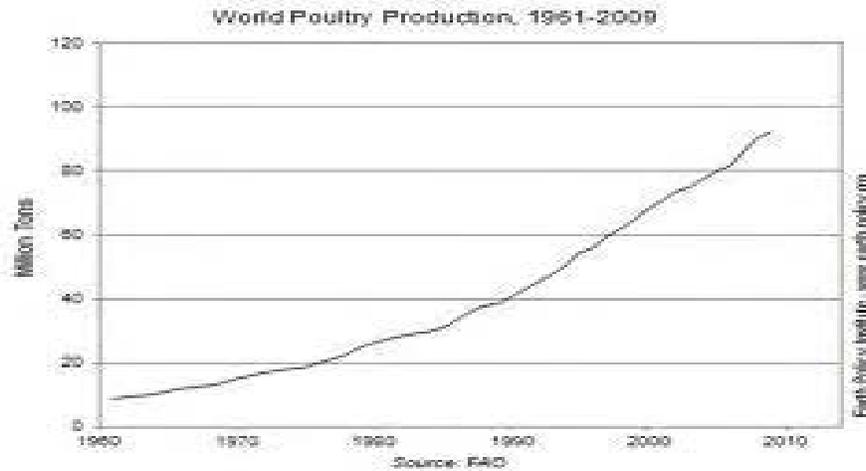
DNA techniques using PCR technology have improved ability to follow generations of shrimp, and work in the area of polyploidy, sex reversal and interspecific hybridisation have shown early promising results (Argue & Alcivar-Warren, 1999). Triploid penaeid shrimp appear to have faster growth, better survival rates and may be sterile, which would protect the investment of breeding companies and the environment by not allowing exotic species to spawn. Breeding and genetics of shrimp is an area where much greater study is warranted.

Live stock

Table 8.12 : Production and per capita availability of milk		
Year	Per capita availability (grams/day)	Production (million tonnes)
1990-91	176	53.9
2000-01	220	80.6
2005-06	241	97.1
2006-07	246	100.9
2007-08	252	104.8
2008-09	258	108.5
2009-10	263	112.5

Source: Department of Animal Husbandry, Dairying and Fisheries.

Similarly, growth rate of commercial broiler chickens has increased from a 1.70 kg bird grown for 59 days in 1970 to a 2.02 kg bird grown in 40 days today, as shown in Table 4. This could not have been possible without the continued improvement in genetics, disease control, management and nutrition over the years.



In the broiler industry, genetic improvement has been responsible for the major increases in growth and improvement in meat quality. Much of the genetic improvement work started in the early days at

academic institutions was taken over by commercial breeder companies. Today the largest four or five major broiler breeding companies are owned or controlled by the major global poultry integrators. Today's modern broiler is a four-way hybrid cross (Boyle, 1999). The pedigree programmes of breeders have evolved into sophisticated breeding schemes which maximize selection intensity and speed while using statistics to make selections. Reproduction, growth, live ability, skeletal integrity, meat yield and feathering have all been considered as important traits. Heritability for growth rate is relatively high at around 0.4, and substantial gains have been realized over the years (Chambers, 1990). More recently, selection for feed conversion has been found to further improve economics and carcass quality (Pym and Nichols, 1979).

Dairy animals

A new breeding technology is set to revolutionize the dairy industry as farmers can now have a hybrid cow capable of producing 60 liters of milk per day. And this will only require only two years using the Embryo Transfer (ET) technology, unlike Artificial Insemination (AI) that requires one to maintain pedigree improvement for up to 15 years to get the desired results. The technology employs use of local breeds as 'surrogate' mothers by implanting embryos sourced from high-yielding cows. This is done after the local cows have been heat-induced with hormones for them to be ready to carry the gestation to term. The high-yielding cows referred to as 'donor cows' are artificially inseminated to produce multiple embryos, which are later harvested after seven days and are ready for implanting in surrogate cows.

Techniques have been developed in recent years for the production of fish and other aquatic products in closed recirculation systems. To make these work, aqua culturists have needed to develop a knowledge of the biological processes operating -- such as how bacteria can be used to neutralize and re-cycle the nitrogenous waste products produced by growing fish -- and how to engineer the systems to meet the biological requirements. Knowledge of bio-

engineering from the waste treatment and water treatment industries has made contributions to the development of closed aquaculture systems and there is probably more that could be usefully transferred from the sewage treatment sector to help solve problems in fish rearing.

Livestock + Fish = big opportunities for the poor

High demand

The increasing demand for animal-source foods in developing countries is a big opportunity for smallholders, who can raise their incomes by meeting that rising demand.

Highly nutritious

Animal-source foods are critical for malnourished people, especially women and children.

Highest value

Meat, milk and fish are generally the highest value agricultural products globally.

Projected increase in demand for animal foods to 2020 (% per year)

	Developed countries	Developing countries
Milk	0.2	1.8
Meat	0.5	1.7
Fish	0.0	0.6
Cereals	0.3	0.4

- Nearly **1 billion (70%)** of the world's 1.4 billion extremely poor people depend on livestock.
- **Two-thirds** of the world's livestock keepers are rural women.
- Over **100 million** landless people keep livestock.
- **400 million** people in Africa and South Asia depend on fish for most of their animal protein.



Many techniques important to the industry are in the health sector. Plating samples of water and tissue on agar plates to test for bacteria and fungi, the use of electron microscopy and DNA based 'probes' to check for viruses, the use of 'probiotics' or 'friendly' bacteria to keep water in good condition, to mention just a few. Then there are fields like cryogenics -- the freezing of eggs, sperm and embryos at ultra low temperatures for storage and use at a later date; the use of anesthetics to calm fish down for live transport (also possible by lowering the temperature); treatments like dipping the shells of freshly caught shrimp in an anti-oxidation mixture to keep them fresh longer. The techniques useful to aquaculture are many and will continue to expand and improve, to help bring more cultured fish to the table.

Conclusions

The challenge for the new millennium should be sustainable aquaculture development and livestock for enhanced food security

and economic development. The envisaged expectations can be achieved.

Since the early practice of capturing and holding animals, aquaculture has become much more sophisticated with most animals being bred in purpose built hatcheries, cultured in ponds, cages or tanks, often with some control over the environment, harvested for a specific market and often processed to add value to the product. The massive production increase (from approximately 1 million tonnes in 1950's to 59.4 million tonnes in 2004) arose from increases in the area under culture and the number of species cultured and from a shift in the reliance on natural feeds to the greater use of formulated feeds that supplied increasingly amounts of the species requirements. Improvements in other aspects of husbandry, such as health management, and better technology, such as cage and tank systems, also contributed

New technology is now needed to boost production, protect fragile environment and supply the highest quality product. It is fair to say that the easy gains in production increase have now been made and to increase production in the next decade and a half to 70 million tonnes or beyond, will require a major new improvement in technology.

Readings

1. Aquaculture Development Beyond 2000: Global Prospects [vision document , CIFA 2010] CIFA, Bhuvaneshwar.
2. FAO. 2000b. Right to food. (<http://www.fao.org/Legal/rtf/rtfood-e.htm>).
3. FAO. 2000c. World food summit.(<http://www.fao.org/wfs/homepage.htm>).
4. FAO.2000d. World food summit plan of action. (<http://www.fao.org/wfs/final/rd-e.htm>)
5. FAO. 2000e. FAO Yearbook. Fisheries statistics: aquaculture production 1998. Vol. 86/2.
6. The National Food Security (Nfs) Act, 2010 ,K. R. Venugopal Ias (Retd)
7. Tacon, A.G.J. & Barg, U.C. 1998. Major challenges to feed development for marine and
8. Tacon, A.G.J. & Barg, U.C. 2001. Responsible aquaculture development for the next millenium.
9. Tacon, A.G.J., Collins, J. & Allan, J. 1997. FAO field project reports on aquaculture: indexed
10. Tacon, A.G.J., Conklin, D.E. & Pruder, G. 1999. Shrimp feeds and feeding: at the crossroads of
11. Thrusfield, M. 1995. Veterinary epidemiology, 2nd edn. Edinburgh, Blackwell Science Ltd.
12. USDA. 1999. Livestock, dairy and poultry situation outlook. Economic Research Service, United
13. WHO. 2000. Malnutrition - the global picture. (<http://www.who.org/nut/welcome.htm>).
14. World Bank. 2000. Poverty. (<http://worldbank.org/poverty/data/trends/index.htm>).
15. Yap, W.G. 2001. Developments in marine and brackishwater fish culture in Southeast Asia.
16. Ye, Y. 1999. Historical consumption and future demand for fish and fishery products:

References :

Argue, B.J. & Alcivar-Warren, A. 1999. Genetics and breeding applied to the penaeid shrimp bibliography, 1996-1995. FAO Fish. Circ., No. 931, 192 pp.

Battacharya S., Dasgupta, S., Datta, M., and Basu, D., 2002. Biotechnology input in fish breeding. Indian journal of biotechnology, 1:29-38.

Blaxter, J., H. S., 1953. Sperm storage and cross fertilization of spring and autumn spawning herring. Nature, London, 172:1189-1190.

Boyle, M.L. III. 1999. Chicken breeding and genetics. In R.A. Bullis & G.D. Pruder, eds.

Carr, W.H., Fjalestad, K.T., Godin, D., Swingle, J., Sweeny J.N. & Gjedrem, T. 1997. Genetic variation in weight and survival in a population of specific pathogen free shrimp, *Penaeus vannamei*. In T.W. Flegel & I.H. MacRae, eds. Diseases in Asian Aquaculture III, p. 265-271. Manila, Philippines. Fish Health Section, Asian Fisheries Society.

Carolsfeld J, Powell, J.K, Park, M, Fisher. W, H Craig A.G, Chang, J.P. River, J.E and Sherwood N.M, 2000, Primary structure and function of three gonadotropin releasing hormone. Endocrinology, 141: 505-512.

Chambers, J.R., 1990. Genetics of growth and meat production in chickens. In R.D. Crawford, Committee on Coordination. Sub-Committee on Nutrition, No. 18, July 1999, 108 pp.

Chourrout, D, Chevassus, B, Krieg F. Happe, G. and Renard P, 1986. Production of second generation triploids and tetraploid rainbow trout by mating tetraploid males and diploid female potentials of tetraploid fish. Theror. Appl. gene, 72:193-206

FAO [2007] Stat. Ser. No. 154. Rome, 169p.

FAO [2007]
Rome, <http://www.fao.org/docrep/w9900e/w9900e01.htm> protein in
diets for shrimp (*Penaeus vannamei*). *Aquaculture*, 87: 53-56.

Halder, S Sen , Bhattachery, S, Ray A.K, Ghosh, Aand jhingran,
A,G, 1991. Induced spawning of IMC and maturation of a perch and
a catfish by murrel gonadotropin releasing hormone , pimozide and
calcium *aquaculture*, 97:373-382.

Jarayabhand, P.S., Uraiwan, S., Klinbunga, S., Tassanakajon, A.,
Srimukda, P., Pattanachan, P., Kent, G. 1995. *Aquaculture and food
security*. Paper presented at the Pacific Congress on Marine.

Lakra,W.S. and Das ,P.,1998.Genetic engineering in aquaculture,
Indian.J.Anim.Sci.,68(8);873-879.

Pym, R.A.E. & Nichols, P.J. 1979. Selection for food conversion in
broilers: direct and correlated responses to selection for body-weight
gain, food consumption and food conversion ration. *Br. Poultry Sci.*
20: 87-97.

99th Indian Science Congress
January 3-7, 2012, Bhubaneswar

II

ABSTRACT

OF

PLATINUM JUBILEE LECTURE

Philosophy and Physiology of the Pineal Gland

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The pineal gland, once tossed as a mysterious unpaired organ of the brain, the 'third eye', the seat of soul, a 'calcified vestigial organ with no functions', subject of medical jokes, now together with its hormone melatonin has been taken seriously by the basic researcher and clinicians during 20th century.

This gland was first reported by Indian Saints in Veda almost 600 BC, then followed by the depictions of great philosopher and scientists like Herophilus, Rene-des-Cartes, Leonardo da Vinci et al. of centuries. Research related to physiology and morphology of pineal gland was less reported in the first two decades after the discovery bovine pineal glands by Aaron Lerner and co-workers in 1958. The secretory compound melatonin was then related to its ability to modulate reproductive physiology in photoperiodically entrained seasonally breeding mammals. The secretion of this tiny gland may well have the same functions in all life forms from unicellular organisms to human.

Melatonin has been found in pineal gland of almost all vertebrates and is secreted in a daily pattern i.e peaks during dark hours and subsides during the hours of daylight. This circadian rhythm led scientists to explore the possibility of a link between melatonin levels and various rhythms of physiological processes such as sleep-wake cycle in order to explain the function of this hormone as a coordinator of internal physiological rhythms. Later melatonin administration confirmed that it modulates circadian rhythm that have useful base for the treatment for jet lag and sleep disorders. Several other physiological actions of melatonin have been reported which includes regulation of reproductive cycles, immunomodulation, signal transduction free radical scavenging,

geroprotection and chemostatic effects are attracting major interest of basic biologists as well as clinicians and has founded a whole new pharmacology which is growing gradually. The complex neuroendocrine-immune system interactions were noted in a number of classical examples of the seasonal breeders which occur amongst the crosstalk of lymphatic tissues (spleen/ thymus / bone marrow) steroids (gonadal/adrenal) and the cytokines. Further, the presence of receptors for melatonin (Mel R) noted on immune cells is of high clinical importance supporting the oncostatic effect of melatonin in human beings. Manipulation of the normal day length to increase or decrease the level of melatonin i.e. phototherapy can help in immunomodulation and oncostatic activities when compared to healthy subjects. Melatonin as a free molecule is having potency to scavenge the free radicals and noted for antioxidant actions.

Some plant tissues contain melatonin and therefore the consumption of such plant product could alter blood melatonin levels and offer antioxidant protection in addition to endogenously produced melatonin. In view of this evidence further research into phytomelatonin may provide valuable information not only as to why melatonin exists in the plant kingdom, but also important comparative information for those with an interest in nutraceuticals and medicinal foodstuffs.

Pineal-melatonin research is truly interdisciplinary, particularly with respect to its central place in biological rhythms. It ranges from molecular biology to psychology and in this way its participants are required to keep their perspectives broad. Further, pineal-melatonin research is enormously exciting, will hopefully be of considerable benefit to humanity.

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III

ABSTRACTS OF

AWARD LECTURES /

YOUNG

SCIENTIST AWARD LECTURE

GOURI GANGULY MEMORIAL AWARD LECTURE

Heterologous expression platforms for making Bluetongue virus recombinant proteins of diagnostic and prophylactic value

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Bluetongue is a serious animal disease caused by double stranded RNA virus called Bluetongue virus (BTV) that belongs to the family *Reoviridae* and genus *orbivirus*. The disease shows high morbidity and mortality mainly in sheep and also in some wild ruminants. BTV is transmitted through biting midges of the genus *Culicoides* and there exists 24 different BTV serotypes. Past serological and virus isolation evidences has indicated the prevalence of all serotypes in India. Hence development of broad spectrum new generation vaccines that can protect against all BTV serotypes is required. Currently available cell culture based inactivated and attenuated vaccines suffer from several drawback and hence recombinant protein based vaccine are advantageous over conventional vaccine types. In this direction, both prokaryotic and eukaryotic systems were validated for their suitability in making recombinant protein/s of Bluetongue virus for prophylactic and diagnostic applications. The outer structural protein of Bluetongue virus (VP2) was successfully expressed in bacteria (*E.coli*), yeast (*Pichia pastoris*) and plant system (peanut). Both bacterially expressed and yeast derived BTVP2 recombinant proteins recognized BTV specific antibodies. In order to check the feasibility of making edible vaccine, the partial BTVP2 gene was cloned into plant transfer vector and transgenic peanut callus expressing the VP2 protein was generated.

Furthermore Virus like particle (VLP) based vaccines of BTV were made by co-expression of four structural proteins (VP2, VP3, VP5 and VP7) using baculovirus expression platform. The recombinant baculovirus generated for making BTV1 and BTV4 VLPs successfully expressed all four structural proteins in the infected insect cells. VLPs were purified from the infected insect cells based on density gradient separation *via* ultra centrifugation and were examined for their morphological characters under Transmission Electron Microscope. After characterization of Bluetongue VLPs, they were successfully tested for their protective efficacy against virulent BTV virus challenge in sheep. Thus the recombinant structural protein of BTV expressed in Yeast, Plant and insect systems have shown new directions in developing advanced, cost effective and improved Bluetongue subunit vaccines for controlling Bluetongue infections in India. The recombinant Bluetongue protein by itself or the antibodies made against them find applications in developing diagnostic assays for detecting Bluetongue infections or disease monitoring and Surveillance studies.

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IV

**ABSTRACTS OF
ORAL/POSTER
PRESENTATIONS**

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ANIMAL SCIENCE (ORAL)

A-O-01

MODULATORY RESPONSE OF LIV.52 ON VANADIUM INTOXICATED RAT LIPOPROTEINS

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Keywords: Vanadium pentaoxide, Lipoproteins, Liv. 52.

The toxicological effect of vanadium pentaoxide to lipoproteins and the possible protective effect of pre and post treatment of Liv. 52 has been evaluated and highlighted. LD₅₀ estimated for vanadium pentaoxide was 69.6 mg/kg. The administered doses of vanadium pentaoxide were LD₅₀/10 for acute and 1/7, 1/14, 1/21 and 1/28 of sublethal dose for subacute (7,14, 21 and 28 ds). Vanadium pentaoxide caused significant increase in lipoproteins (LDL, VLDL) and Cholesterol/ HDL ratio and decrease in HDL. Vanadium pentaoxide causes disturbance in liver functioning which lead to altered cholesterol metabolism. Lipoproteins level has been seen gaining normalcy following pre and post Liv. 52 (0.125 ml/kg b.wt) treatment. Liv. 52 indigenous remedy acts as liver tonic and exhibit hepatoprotective property. Further both pre and post treatment of Liv. 52 modulate vanadium pentaoxide toxicity, however, pretreatment of Liv. 52 exhibit more pronounced effects compared to post treatment.

A-O-02

**SALTICIDES FAUNA FROM G.V.I.S.H. CAMPUS,
AMRAVATI. (M.S)**

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Keywords: spiders, Araneae, Salticide.

The spiders from G.V.I.S.H. Campus, Amravati (M.S.) were surveyed for collection of Salticids during 2009-10, using insect nets, tapping sticks, pitfall trap etc. During the survey 21 species from 11 genera, belonging to family Salticidae were collected from different area of campus. Species richness and diversity was high during the month of September and October, still most of spiders belonging to family Salticidae were observed throughout the survey. Spiders belonging to genus *Euophrys*, *Phidippus* and *Plexipus* were observed throughout the campus and most of the time. One new species form genus *Sassacus* have been recorded during survey.

A-O-03

**BIOACCUMULATION OF METALS ON REEF
ASSOCIATED ORGANISMS OF LAKSHADWEEP
ARCHIPELAGO**

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Keywords: Fish, Shell fish, seaweed, metal accumulation, Agtti
Island.

Tissue samples of marine organisms from the coastal waters of Agatti Island were subjected to analysis of metals (Cadmium, cobalt, copper, iron, magnesium, manganese, nickel and zinc) for the

assessment of the present condition of Island ecosystem and compiling the baseline data for future monitoring with respect of metal accumulation. Tissue samples of fish, and sea weed revealed that the metals have different levels of accumulation. Metal concentrations were more in shell fish and less in finfish. Concentrations of toxic metals such as Cd, Co, Ni and Pb were well below the permissible limits proposed by the World Health Organization.

A-O-04

**EFFECTS OF GINGER AGAINST LINDANE INDUCED
OXIDATIVE STRESS IN RAT BRAIN**

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Keywords: Dichlorvos, Lindane, Ginger, Oxidative stress, Reactive oxygen species.

The aim of this study is to assess the efficacy of ginger against Lindane induced neurotoxicity in rats. Lindane is an organochlorine pesticide used in agriculture, forestry, public health and house hold applications. Oxidative stress due to abnormal production of reactive oxygen species (ROS) is believed to be involved in the toxicities induced by the xenobiotics. Rats were orally given dose of Lindane (1/10 of LD50) for 14 days while posttreatment of ginger enzymes such as superoxide dismutase (SOD), catalase (CAT), reduced glutathione (GSH), as well as the concentration of malondialdehyde (MDA), as an indicator of lipid peroxidation and protein level were measured to evaluate oxidative stress in brain. Lindane administration increased the MDA level while a decrease in the level of SOD, CAT, GSH and protein was reported. Post treatment of ginger decrease the MDA level and increased the level of SOD, CAT, GSH and protein in the brain of rats. Thus, the results suggest that Lindane exposure of rats results in free radical-mediated tissue damage, which was prevented by ginger.

A-O-05

**OVIPOSITION RESPONSE OF DENGUE AND
CHIKUNGUNIA VECTOR TO CERTAIN ARYL
HYDRAZONO ESTERS: A STRUCTURE ACTIVITY
RELATION**

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Keywords: Oviposition, *Aedes albopictus*, *Aedes aegypti*; Aryl
hydrazona ester; stimulant; Deterrent.

Oviposition response of *Aedes albopictus* and *Aedes aegypti* was studied for 13 arylhydrazona ester (AHEs) at 10mg/L in dual choice experiment. Among them AHe-12 elicited increased oviposition with OAI of +0.39 and + 0.48 respectively in both species. The response was further investigated by modifying the structure of AHE-12 with – CH₃ and – C₂H₅ groups. In multiple choice experiment, *Ae. Albopictus* laid 25% more eggs on AHE-12 (EE) treated bowls while AHE-12 (MM) caused 23% reduction whereas *Ae. aegypti* deposited 33% more eggs in AHe-12 (MM) while AHE-12 (EE) induced 23% reduction in oviposition which indicates stimulant and deterrent property of these chemicals.

A-O-06

**C-BANDING EVIDENCE FOR INVERSION
POLYMORPHISM IN COMMON GREEN PIGEON
TRERONE PHOENICOPTERA FROM DIFFERENT
NORTHERN INDIA**

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Keywords: polymorphism, macrochromosome, pericentric inversion, C-binding, metacentric, sutelocentric.

Forty eight birds of common green pigeon *Treron phoenicoptera phoenicoptera* (Latham) collected from different geographical areas like Allahabad (U.P.), Chotanagpur and Singhbhum Division (Jharkhand) and Ganjam district (Odisha) have been subjected to C-binding analysis. The diploid complement comprises of 74 chromosomes which consists seven pairs of macrochromosomes (including the sex chromosomes) and thirty pairs of microchromosomes. The bird was found to be polymorphic for chromosome pairs 1 and 2. The chromosome pair 1 was present either as a metacentric (1^m) or a subtelocentric (1st) condition. Similarly chromosome 2 was also present as either a subtelocentric (1st) or a metacentric (2nd). The polymorphism was also explained on the basis of two independent pericentric inversions involving chromosomes pair 1 and 2. With two chromosomes involved in inversions, ideally there should be nine types of karyomorphs. In the present investigation five different karyomorphs were encountered. All the karyomorphs were subjected to C-binding analysis. All the macrochromosomes have distinct C-bands at the centromere and three band sizes large, medium and small have been categorized purely on visual basis. Intercalary or terminal C-bands have not been observed in any of the macrochromosomes. No variant forms of C-bands have been recorded in the individual examined during the present study. However, the shift in the position of C-bands in the chromosome pair 1 and 2 confirms that an inversion is responsible for the heterozygosity.

A-O-07

**ACUTE TOXICITY AND IMPACT OF NUVAN ON
BIOCHEMICAL CONTENT OF LARVAE OF
CHIRONOMUS TENTANS (DIPTERA: CHIRONOMIDAE)**

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Keywords: *Chironomus tentans*, nuvan toxicity, biochemical content.

Acute toxicity of nuvan to the third instar larvae of freshwater detritivore, *Chironomus tentans* (Meigen) was studied in February 2011 using static renewal bioassay test. Mortality increased with increasing concentration of nuvan. Median Lethal concentration (LC₅₀) value for 96 hr was found to be 0.01705 ppm. To evaluate impact of nuvan on the biochemical content viz., protein, lipid and glucogen in the whole body tissues, the larvae were exposed to sublethal concentration (0.001705ppm) of nuvan for 96 hr. The protein and lipid levels were found to be depleted significantly (p<0.001) where as nonsignificant depletion in the glycongen level observed after pesticide exposure to sublethal concentration over the control. Among biochemical content, maximum decrease was observed in protein, followed by lipid and glycogen.

A-O-08

**HISTOPATHOLOGICAL CHANGES IN TESTES OF
ALBINO RATS EXPOSED TO ARSENIC**

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Keywords: Arsenic, Swiss albino rats, Testicular tissue, histopathology, fertility test, reversibility test.

The present study was designed to investigate the adverse effect of arsenic on testicular tissue of swiss albino male rats. Sodium arsenite was administered to adult male rats by gavage at the doses 1, 2 and 3 mg/kg body weight for 30 days. After the treatment, the testes were removed, weighed and processed for histopathological observation. Sodium arsenite causes remarkable reduction in testicular weight, while the body weight of experimental animals were reduced but not significantly. Histological evaluation revealed dose-dependent, gradual destruction in histoarchitecture of testicular tissue. Sodium arsenite exposure caused complete arrest of spermatogenesis with disfigured seminiferous tubules in the testes. The lumens of the tubules were devoid of spermatids and were in places filled with cellular debris. The germinal epithelium was distorted. At places interstitial odema was also evident. Sertoli and Leydig cells were damaged. Along with structural alterations, fertility rate in experimental animals was significantly decreased as at higher doses i.e. 2 and 3 mg/kg, 100% infertility was observed. After withdrawal of the treatment over a period of 30 days, recovery was observed in low dose groups as few female rats become pregnant. Thus from above result it is concluded that exposure of arsenic causes testicular toxicity in male albino rats.

A-O-09

**SOIL ACARI AS SECONDARY DECOMPOSER IN
RECLAIMED MINE SPOILS: CASE STUDY OF KATHARA
COALFIELD AREA OF JHARKHAND, INDIA**

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Keywords: Reclaimed mine soils, acari, Shannon diversity index, *r*-select species, soil organic carbon, secondary decomposition.

A study was carried out during the year 2007-2009 in the reclaimed mine spoils (RMS) of coalfield area to map the functional role of soil acari (mites). RMS of different ages was selected along with an

adjacent forest floor to compare the findings. Soil was collected from randomized quadrates of 10 meter X 10 meter by soil corer and mites were separated by Berlese –Tullgren funnel in the laboratory. 1699 acari were collected from RMS that belonged to Araneidae, Mesostigmata, Prostigmata, Astigmata, Cryptostigmata and Oribatida, whereas 1020 acari were collected from forest floor that belonged to Araneidae, Mesostigmata and Sarcoptiformes. It was observed that Prostigmata (52%) was dominant in the younger experimental RMS sites and Sarcoptiformes (53%) were dominant in forest. Further, it was noticed that Shannon diversity index of all the experimental area was from 0.5 to 1.5 and forest area had around 2.5. In contrary to observations of other previous findings, soil organic carbon (SOC) had negative correlation with species diversity index in experimental area. Hence, Prostigmata are hard, exploratory and *r*-select species. Their higher numbers in habitats with human interference are indicative that they facilitate secondary decomposition and secondary succession in RMS.

A-O-10

**PHENOTYPIC VARIATION IN NEURONAL SPINES
ENCOUNTERED IN THE APH REGION OF FEMALE
*PSITTACULA KRAMERY***

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Keywords: Parahippocampal region (APH), Spine length, spine head diameter, Fluctuation.

Dorsomedial forebrain (Hippocampus) a narrow curved strip of tissue located on dorsomedial surface of telencephalon in birds has gained a lot of interest from quite long period of time but the information regarding neuronal fluctuation occurring in hippocampus of seasonally breeding birds is very limited. Therefore we have used Glugli-impregnated sections to demonstrate these fluctuations in four types of neurons viz. Multipolar, Pyramidal, Bipolar and Unipolar neurons encountered in female *Psittacula*

krameri. We could observe neuronal plasticity in terms of fluctuations in Dendritic thickness, spine's morphology and spine density in Parahippocampal region (APH), the most prominent field of hippocampus. Hereby we present the seasonal variations occurring in spine's morphology (spine length and spine head diameter) during non-breeding and breeding season in APH region of presently studied bird (*Psittacula krameri*). During breeding period of female *Psittacula krameri* (Oct-Feb) a significant increase in spine length of all type of neurons was observed except for spines present on Unipolar neurons (at 5% level of significance). In the case of spine head diameter only the spines present on basal dendrite of Pyramidal and Bipolar neurons showed significant difference (at 5% level of significance). This increase in spine length and spine head diameter indicates increase efficiency of spines for impulse transmission through synapse during breeding time in female *Psittacula krameri*.

A-O-11

**HIGH PERFORMANCE LIQUID CHROMATOGRAPHY
FOR THE SCREENING OF DRUG (DICLOFENAC)
RESIDUES IN SOME TISSUE OF MICE**

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Keywords: Diclofenac sodium, mice tissue, HPLC.

Diclofenac Sodium is chemically, sodium salt of 2-[(2,6-dichlorophenyl) amino] benzene acetic acid having anti-inflammatory and analgesic properties. The present study was designed with the objectives to standardize the procedure for extraction, detection and quantification of residues of diclofenac sodium in the major tissues viz. Liver, kidney, intestine and the testis of the mice (*Mus musculus*) employing high performance liquid chromatography (HPLC), after oral administration of diclofenac @3mg/kg body weight for consecutive 10 days. The drug was chromatographed on a C-18 column using a mixture of

acetonitrile: water in the ration of (85:15) as mobile phase at a flow rater of 1.0 ml/min of retention time. The recovery percentage of the drug analyzed in the liver, kidney, intestine and in the testis was 85.70%, 67.17%, 58.76% and 67.12% respectively. The results have been discussed.

A-O-12

**A NEW SPECIES OF GENUS PROTEOCEPHALUS
(EUCESTODA: PROTEOCEPHALIDEA), FROM THE HOST
RANA TIGRINA (FROG) AT AHMEDNAGAR DISTRICT
(M.S), INDIA.**

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Keywords: *Proteocephalus shrirampurensis*, Proteocephalidae,
Rana tigrina, *Hoplobatrachus trinus*, cestoda, host.

A new species of *Proteocephalus*, *P. shrirampurensis* n.sp. is reported from the intestine of the host frog *Rana tigrina* (= *Hoplobatrachus tigrinus*) at Ahmednagar District (M.S.) India. The new species differs form all known species of *Proteocephalus* by possessing a large, globular, Scolex. Suckers oval, medium, overlapping, with 5th apical sucker at the apex. Neck short. Mature segment broader than longer, testes oval about 90-100 (92) in number. Ovary, bilobed, near the posterior region. Ootype small rounded pre ovarian, genital pores, just posterior, irregularly alternate.

A-O-13

**TECHNOLOGY MANAGEMENT FOR SUSTAINABLE
DAIRYING IN RURAL SECTOR FOR HEALTH SECURITY**

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Key words: Dairy Producers, Milk production, Rural society, Sustainability, Technology

Dairying has social and economical potential in rural upliftment. Rural sectors require process efficient technologies without increasing pressure on inputs or local resources. Rural based livelihood technologies needs innovations with instrumentalist approach on normative path. Rural society being a self-organizing system is self-controlled within larger scale constraints. Sustainable development which is off-shoot from the concept of appropriate technologies of 1970s has additional ingredient of social factor. Sustainable development in dairying is forward integration of resource, economic and social factors while sustainability of dairying is backward integration of aggregate influence of these components. Social engineering for sustainable development is more than just drawing and spending money on developmental programs. Although milk production in the country increased enormously from 17 (year 1951) to 112 million tons at present, country floundered at improving the native cattle breeds and executing *inter se* mating to maintain half-bred in crossbreeding program. Small holder dairy producers (SDP) can comfortably manage cows yielding 3000 kg/lactation milk yield within the available resources. Improving the native cattle breeds with proper progeny testing program can be helpful in developing suitable cows adjusted to local conditions and resources. Superior germplasm graded/pure Holstein Friesian cows are recommended to large herds supported with scientific knowledge of managing milk yields of even 11000 kg/lactation. Maintaining such dichotomy in dairy production system is necessary to protect SDP and large farms to meet the targeted 180 million tons of milk production by 2021. Increasing rural unemployment, child obesity, squeezed labour

hours and declining physical capabilities in working age groups are some of the social issues which needs to be addressed immediately. Nutrition is no more limited to hunger or requirement. It is perceived as catalyst for better health and productivity. Milk being a wholesome and nutritious drink can be further fortified with pulses to make it a complete diet. Hence, any attempts to improve dairying in rural sector means supporting the rural health mission and increasing health security.

A-O-14

ROLE OF TOLL-LIKE RECEPTOR 5 (TLR5) IN INDUCING INTERLEUKIN-8 AND TNF-B FOLLOWING BACTERIAL INFECTION IN THE INDIAN MAJOR CARP, MRIGAL (*CIRRHINUS MRIGALA*)

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Key words: *Cirrhinus mrigala*; *TLR5*; *MyD88*; *TRAF6*; *IL-8*; *TNF- α* ; *Aeromonas hydrophila* ; *Edwardsiella tarda*

Toll-like receptors (TLRs) are one of the key components of innate immunity. Among various types of TLRs, TLR5 is involved in recognizing bacterial flagellin and after binding, it triggers myeloid differentiation primary response gene 88 (MyD88)-dependent signaling pathway to induce pro-inflammatory cytokines. In this report, the expression profile of TLR5, MyD88 and tumor necrosis factor (TNF) receptor associated factor (TRAF) 6 were analyzed in the Indian major carp (IMC), mrigal (*Cirrhinus mrigala*) which is commercially important fish species in the Indian subcontinent. Ontogeny analysis of TLR5, MyD88 and TRAF6 gene expression by quantitative real-time PCR (Q-RT-PCR) revealed their

constitutive expression in all embryonic developmental stages, and highlighted the importance of TLR5-signaling in embryonic defense system in fish. In healthy fish, TLR5 expression was detected in wide range of organs and tissues, and the highest expression was in liver. Following flagellin stimulation or *Aeromonas hydrophila* and *Edwardsiella tarda* infection, TLR5-signaling was activated resulting in the induction of interleukin (IL)-8 and TNF- α . These findings highlighted the contribution of TLR5 in immune surveillance of various organs and in augmenting innate immunity in fish in response to pathogenic invasion.

A-O-15

**RECENT OBSERVATION ON MALE TAKEOVER IN
BISEXUAL TROOP OF HANUMAN LANGUR,
SEMNOPIHTECUS ENTELLUS AROUND JODHPUR (INDIA)**

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Key words: *Semnopithecus entellus*, resident male change, infanticide, terror strategy.

A case of takeover were observed in a free-living uni-male bisexual troop (B-18) of Hanuman langur (*Semnopithecus entellus*) around Jodhpur, Rajasthan (India). This one- male bisexual troop (comprising 28 members total) was attacked in July 2011 by an all-male band of four adult males. The most potent male of four males took over on July 14, 2011. The youngest infant, about two weeks was fatally wounded by an attack from the new resident male on July 16, 2011. The black coat infant, who was severely injured, died next day. A white coat infant, about six months old was also injured but who survived. The new resident was noted aggressive many of the time after these attacks and observed running behind female carrying white coat infant for about two months. And later in August, 2011 he looked normal. It is presumed that such infanticidal

attacks take place incidentally because of aggression arised and or explained by a power show displayed by the new male to rival males and the troops members let them realize his potentiality (terror strategy). It seems that the earlier given reprodvetive strategy and resource competition hypotheses are do not strong enough.

A-O-16

**ANURAN TAIL REGRESSION AS A MODEL TO STUDY
CELL DEATH DURING DEVELOPMENT.**

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Zoology, Utkal University, Bhubaneswar, Orissa, India.

Keywords: Anura, tail regression, cathepsin D, melanocytes, Polypedates maculatus.

Tail regression is the most spectacular event occurring during anuran metamorphosis and programmed cell death during anuran tail regression is majorly brought about by apoptosis. Tail regression studies in tadpoles of *Polypedates maculatus* emphasize the importance of anuran tail regression as an ideal *in vivo* model to study programmed cell death. Immunohistochemical localization of cathepsin D elaborates its role in the death of epidermal, muscle notochordal cells and blood vessels. Melanocytes have also been shown to be one of the causative agents in degrading tail tissues.

A-O-17

**OBSERVATION ON ECOBEHAVIOUR STUDY OF STRIPED
HYAENA (*HYAENA HYAENA* LINN) IN JODHPUR
RAJASTHAN INDIA**

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Key words: Ecobehaviour, *Hyaena Hyaena*, Jodhpur

Here our study was mainly focus on ecobehaviour study and status of striped Hyaena (*Hyaena hyaena* linn) in Jodhpur which are located in western Rajasthan. In our survey of four month (i.e. January to April, 2011). We encountered and observed Four different sightings of Hyaena. In our survey of winter-2011 around Jodhpur we have observed hyenas on many incidences solitary animal around Jodhpur (Rajasthan). Large carnivores are generally considered to be among animals that are threatened most by human due to habitat degradation. Densities of striped hyenas appear to vary greatly across their range and factors driving this variation are poorly understood because of paucity of rigorous studies. Measuring densities of hyenas under ecologically different conditions would thus help to assess the factors that determine hyena distribution and abundance as well as their ability to survive in human dominated landscapes under severe anthropogenic pressures.

A-O-18

INNATE IMMUNITY IN ANIMALS : AN OVERVIEW

Encily R Martin

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The innate immune system is the only known defense weapons of invertebrates. In higher organisms the innate system plays an instructive role in the acquired immune response. The recognition of non self entity is detected by a limited number of germ line encoded pattern recognition receptor molecular patterns like bacterial and fungal glycoproteins and lipopolysaccharides and intracellular components released through injury or infection. The innate immune system is divided into physical barriers, cellular and humoral components. Humoral parameters include growth inhibitors, various lytic enzymes and components of the complement pathways, agglutinins and precipitins (opsonins, primarily lectins), natural antibodies, cytokines, chemokines and antibacterial peptides. Several external and internal factors can influence the activity of

innate immune parameters. The evolution of innate immune system through the animal kingdom has generated intense interest in recent years. The present work overviews the development of this efficient immune system in organisms through out the animal kingdom.

A-O-19

CYTOGENETIC EFFECTS OF THREE MOSQUITO REPELLENTS IN MICE *IN VIVO* SYSTEM

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Key words- Mosquito Repellents, Rooster, Goodknight, All out, Chromosome aberration, Mice

Mosquito Repellents (MRs) found in the form of coil(Rooster), mat (Goodknight), and liquid(All out) were tested for the induction of bone marrow chromosome aberration in mice *in vivo* system. Animals (5 nos/group) were exposed to the smoke/vapour of different MRs for different hours(6 hrs, 4 hrs and 2 hrs) in an inhalation chamber. Exposed and controlled animals were sacrificed after 24 hrs. Various types of chromosomal aberrations were observed such as chromatid gaps ,breaks, exchanges, chromatid fragments etc. Comparative analysis also done among the three MRs .More chromosomal aberrations were observed in Coil (Rooster).

A-O-20

INTRODUCTION OF *ERI (PHILOSAMIA RICINI)* ECORACES IN ODISHA FOR AUGMENTATION OF SILK PRODUCTION

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Key words: Silk yield, *Philosamia ricini*, ecoraces.

The commercially important yield and developmental traits of Eri silkworm such as the larval and cocoon characteristics, fecundity, mortality and silk production were investigated. Further the performance of rearing; cocoon assessment and grainage performance were studied. Statistical analysis by One-way ANOVA revealed that the silk ratio% of the ecoraces is significantly higher ($p \leq 0.05$) than the presently reared mixed variety of *P. ricini* in the state of Odisha. The generated data suggested that these ecoraces could be used for higher silk yield by the Eri farmers of Odisha.

A-O-21

**HORMONAL PROFILE AND HAEMATOLOGICAL
PARAMETERS IN MALE WISTAR ALBINO RATS
TREATED WITH METHANLOIC EXTRACT OF
PARTHENIUM HYSTEROPHORUS L.**

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KEYWORDS: *Parthenium hysterophorus*, prostate gland, Haematology, oncogenes, dihydrotestosterone.

Haematological values are widely used to determine systemic relationships and physiological adaptations including the assessment of general health condition of animals. Hormonal profile regulates sexual behaviour, growth of the cellular components of tissues and organs. In this study, changes in hormonal and haematological level were assessed in male wistar albino rats treated with methanolic extract of *Parthenium hysterophorus* L. A significant ($p < 0.01$) reduction of 20 % and 40% in total RBC count (6.25 ± 0.025 to $5 \pm 0.5 \times 10^6/\mu\text{L}$) and haemoglobin (17.1 ± 0.1892 to 10.2 ± 0.79 g / dL) respectively was observed due to treatment of methanolic extract over control. Unlike haematological parameters, hormonal profile showed a significant ($p < 0.05$, $p < 0.01$, $p < 0.001$) increase of 40%, 200%, 100% and 45.08% respectively for follicle stimulating hormone, leutinizing hormone, prolactin and testosterone. The reduction of blood parameters might be due to less

haemopoiesis or induction of anemia. The such increase in hormone level has been reported to cause prostate cancer in wistar albino rats.

A-O-22

**COMPARATIVE MORPHOMETRIC STUDY BETWEEN
PSAMMOPHILUS BLANFORDANUS AND *CALOTES
VERSICOLOR***

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Keywords: *Psammophilus blanfordanus* , *Calotes versicolor*,
morphometric

Different morphometric characters of both *Psammophilus blanfordanus* (n=75) and *Calotes versicolor* (n=40) are measured. Comparison between Total length (TL), Snout vent length (SVL), Femur length (FL), Tibio fibula length (TFL) , Foot length (FOL) of both the species found that the size of FL and TFL are more in case of *Psammophilus blanfordanus* where as size of TL and FOL are more in case of *Calotes versicolor* when compared with their respective SVL. Similarly comparison of Head width (HW), Head Length (HL), Snout length (SL), Snout nostril length (SNL), Nostril Eye length (NECL), Inter nasal distance (IND), Eye diameter (ED) of both the species found that the size of HW,SL,NECL and ED are more in case of *Psammophilus blanfordanus* where as size of SNL and IND are more in case of *Calotes versicolor* when compared with their respective HL.

A-O-23

**STUDY ON DIVERSITY, ABUNDANCE AND
SEASONALITY OF BUTTERFLIES (PAPILIONOIDEA) IN
BILASPUR (C.G) CITY.**

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Key Words : Butterflies, Biological Diversity, Papilionoidea,
Transect walk

Survey was conducted in gardens, grove and green patches, of Bilaspur city to record butterfly diversity during June 2009 to May 2011. Transact-walk method was used to sample the butterflies. All the butterflies at the distance of 5 meter from the observer were recorded during the count. Butterflies of the super family, Papilionoidea, were identified using *The Fauna of British India* by Telbot (1986), *Butterflies of the Indian region* by Wynter & Blyth(2009 reprint) and *Indian Butterflies* by Kehimkar (2008). The area were scanned for presence of butterflies belonging to superfamily Papilionoidea during transect walk. Forty-five (45) butterfly species were observed in present investigation. There were Seven species belonging to family Papilionidae; twenty one species belonging to Nymphalidae; seven species belonging to family Pieridae, and ten species of Lycaenidae. Nymphalidae formed the largest group. Abundance and Seasonal variation was also noted. In the present investigation, *Euploea core*, *Danaus chrysippus*, *Papilio demoleus*, *Eurema hecabe*, *Acraea violae*, *Junonia orithiya* were the common species found during the study period.

A-O-24

APPLICATION OF BIOGENIC CARBON-DI-OXIDE FROM YEAST TO TRAP MOSQUITOES IN DIFFERENT ADULT MOSQUITO TRAPS

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Key words : Biogenic CO₂, Mosquito Killing System, Biogent's Sentinel trap, mosquitoes surveillance, arthropod vectors

Proper vector surveillance is required for controlling arthropod vectors like mosquitoes that transmit diseases. Commercial CO₂ cylinders are used in Mosquito Killing System and Biogents Sentinel trap to attract mosquitoes. Refilling of cylinders and transportation to field is a bottle neck. To solve this, we have developed the production of continuous biogenic CO₂ using yeast with simple sugar as a carbon source. Results revealed that, biogenic CO₂ attracted 3 to 6 fold higher mosquitoes as compared to traps without CO₂. This is a simple method, easy to prepare, economical, and can be used in any traps for mosquito surveillance.

A-O-25

EFFICIENT UTILIZATION OF WHEY FOR FOOD SECURITY IN INDIA

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Keywords: Food security, Nutrition, Therapeutic, whey composition, whey products

Food security refers to availability of minimum required quantity of food, containing essential nutrients to nourish the individual, safe to consume from health point of view and available at affordable price

and at the site of consumption, the end user. Food security is one aspect in the India context, which cannot be neglected to a second position in the foreseeable future and this implies that intensive agricultural and agri/sea based production has to be continued at a faster rate by tapping all the resources which considered as food items to feed the soaring Indian population. Despite successes in escalated production of food items, which lead to food security, the food thus produced needs to be a balanced diet to remove the phenomenon of hidden hunger-hunger free-food security. The another aspect of food security is that the food we eat shall be free from pathogens, presence of health hazardous metabolites elaborated during the multiplication of contaminating microflora, residues of contaminant chemicals entered knowingly or unknowingly in the food chain. The price of food cannot be ignored when we talk about food security of India. Because, there is a group of population whose earning is just sufficient to meet out their daily requirements of food in terms of quantity. They are unable to think of quality and safety of food. Therefore, when we talk about the food security, shall not think only in terms of quantity but think of nutrition, safety and prices of food.

Milk, one of the item in the food chain, considered a complete food, if it is drawn hygienically from healthy animals fed with balanced feed, free from pre and post process contamination of hazardous biotic and abiotics ailments. Processing of milk in various form to achieve the pre-determined objectives, such as shelf-life extension, easy handling and transport, development of novel and new products, consumers choice etc., is become a necessity of time. During the processes, while harvesting benefits we loose many things considered to be secondary from monetary but not from food security point of views. Whey is one of them! The simplest definition of whey is the liquid portion of the milk that remains after separation of curd/co-angulated mass, resulted from acid or proteolytic enzyme mediated coagulation of milk. Whey is available in the process of manufacture of coagulated milk products like *Paneer*, *Chhanna*, *Chakka*, cheese casein etc. Whey produced during manufacture of *Paneer*, *Chhana* and *Chakka* is not utilized in human food chain. India's estimated whey production is 15 million tons per year and is mostly drained off in gutter as sewage. Whey is

the important by-product of dairy industry in the manufacture of cheese, casein (Western countries), *Panner*, *Chhana*, *Chakka* (India). In production of coagulated milk products, like *Paneer*, *Chhanna*, *Chakka* etc, about 10-15 per cent of milk is recover as desired products and remaining (85-90%) a by-product known as whey. Such, 85-90 per cent volume of milk, retains about 45-55 percent milk constituents namely whey proteins, lactose minerals, vitamins which are valuable food nutrients.

ANIMAL SCIENCE (POSTER)

A-P-01

EEFFECT OF MANAGEMENT MEASURES ON MILKYIELD AND COMPOSITION OF CROSSBRED COWS UNDER TROPICAL CLIMATIC CONDITIO9NS OF TAMIL NADU

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Key words : Cows, summer, milk yield, low fat, low SNF problem.

India is able to produce milk at competitive prices by virtue of utilizing crop residues for rearing the animals. But, the milk producers are facing “Low fat and low Solids-Fat (SNF)” Problem very frequently especially during summer, in crossbred cows, in southern parts of India. Hence, this suggestive measures trial was taken up. In Namakkal taluk, three blocks were selected where the low fat and SNF problem were indentified. A total of forty five Jersey crossbred dairy cows in early location were divided into 5 groups (T₁- Body surface cooling by water spraying, T₂- Mineral mixture supplementation, T₃- Yeast supplementation, T₄- Sodium bicarbonate supplementation and T₅-Control) comprising of 9 cows in each group. The study revealed that the mean dry matter intake did not differ significantly between the treatment groups as well as between the treatment periods. During the treatment period the milk yield was significantly higher (8.46 ±0.08 liters) in spray cooled cows (T₁) followed by sodium bicarbonate (8.24 ±0.05 liters) and least in yeast (7.65 literes) supplemented cows (T₃)

Both milk fat and SNF per cent in the spray cooled cows (4.23 ± 0.05 and 8.23 ± 0.02) and sodium bicarbonate supplemented cows showed significantly higher values during the treatment period. Among the treatment groups, the spray cooled cows had the highest positive response in milk yield both in the morning (5.03 ± 0.05 liters) and evening (3.42 ± 0.04 liters) followed by sodium bicarbonate (4.96 ± 0.03 and 3.28 ± 0.03 liters) supplemented cows. The yeast supplemented cows had the least positive response (4.58 ± 0.07 and 3.07 ± 0.04 liters). The spray cooled cows recorded the maximum fat percent both in the morning (4.16 ± 0.05) and evening (4.30 ± 0.06) during the treatment period. The mean SNF per cent was also higher in the spray cooled cows (8.23 ± 0.02) and yeast (8.21 ± 0.01) supplemented cows.

A-P-02

ESSENTIAL OILS ARE EFFECTIVE AGAINST STORED GRAIN PESTS

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Key words:essential oils, Insect pest, Insecticidal activity.

The essential oils of (*Aelge mrmeoles*, *Schyzygium*, *Coriarum sativum*, *Citrus reticulate*) show its insecticidal activities such as repellency, toxicity and development inhibitory activities were determined against different stored-frain insect pests. These essential oils showed significant insecticidal activity against stored grain pests *Triblium castaneum*, *Sitophilus oryzae* and *Callosobruchus chimensis*. Since thses plants based insecticides are biodegradable, less toxic to mammals. Their main advantage is that they may be easily and cheaply produced by farmers on small scale industries.

A-P-03

**SOIL ACARI AS SECONDRY DECOMPOSERS IN
RECLAIMED MINE SPOILS : A CASE STUDY OF
KATHARA COALFIELD AREA OF JHARKHAND, INDIA.**

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Keywords: Reclaimed mine sils, acari, Shannon diversity index, r-select species, soil organic carbon, secondary decomposition.

A study was carried out during the year 2007-2009 in the reclaimed mine spoils (RMS) of codified area to map the function role of soil acari (mites.) RMS of different ages was selected along with an adjacent forest floor to compare the findings. Soil was collected from randomized quadrates of 10 meter x 10 meter by soil corer and mites were separated by Berless-Tullgren funnel in the laboratory. 1699 acair were collected from RMS that belonged to Araneidae, Mesostigmata, Prostigmata, Astigmata, Crypto stigmata and Opiolinoides, whereas 120 acari were collected from forest floor that belonged to Araneidae, Mesostigmata and Sarcoptiformes. It was observed that Prostigmata (52%) was dominant in the younger experimental RMS sites and Sarcoptiformes (53%) were dominant in forest. Furher, it ws noticed that Shannon diversity index of all the experimental area was from 0.5 to 1.5 and forest area had around 2.5 In contrary to observations of other previous findings, soil organic carbon (SOC) had negative correlation with species dieversity index in experimental area. Hence, Prostigmata are hard, exploratory and r-select species. Their higher numbers in habitats with human interference are indicative that they facilitate secondary decomposition and secondary succession in RAS.

A-P-04

**AVIAN DIVERSITY OF NIMAGAON KETKI, DIST-PUNE,
MAHARASTRA.**

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Keywords : Avifauna, Nimgaon Ketki, Local, Migratory birds.

The avifauna of Nimgaon ketki,(Pune) is surveyed. Eighty one species belonging to Thirtynine families and Sixteen orders are recorded. Order Passeriformes reports Thirty two, that is the maximum number of species; Coraciiform- six species; Order Galliformes five species; Passeriformes, Columbiformes- four species each; Pelecaniformes- three species whereas Falconiformes, Psittaciformes, Cuculiformes, Piciformes - Two species each, and Gruiformes, Strigiformes, Caprimulgiformes, Apodiformes Contributes single species each. Seventy seven species of birds are found to be local occurring throughout the year, while four species are reported as migratory.

A-P-05

**ANIMAL, VETERINARY AND FISHERY SCIENCE
ANTIFEEDANT ACTIVITY OF CERTAIN PLANT
PRODUCTS AGAINST SAWFLY, *AHALIA PROXIMA*
KLUGENS (TENTHRIDINIDAE : HYMENOPTERA)**

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Key words : *Aframomum melegueta*, *Aplinia galanga*, *Athalia proxima*, AI₅₀ (Median Antifeedancy Index), *Curcuma longa*.

Experiments were conducted to test the antifeedancy of four Zingiberaceous indigenous plant extracts viz., grains of pleasure, *Aframmmum melegueta* Rosc., galangal, *Alpinia galanga* (L.) Willd., turmeric, *Curcuma longa* Linn. and ginger, *Zingiber Officinale* Rose. against 3rd instar. (24h. starved) grubs of *Athalia proxima* Klug. (Hymenoptera : Tenthridinidae) in laboratory. Among these plant extracts, *A melegueta* ($AI_{50} = 0.018$) had highest protective power than others. The sequence of median antifeedancy index (AI_{50}) and protection can be arranged in the following descending order on the basis of their respective AI_{50} values i.e. *A. galanga* (0.432) > *Z. officinale* (0.429) > *C. longa* (0.411), times more protective than *A. melegueta* (0.004), respectively which is taken as unit.

A-P-06

HEM ABSORPTION OF PROPERTY OF AVIAN MYCOPLASMA

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In the present study 30 (thirty), isolates were isolated from 900 live and dead and also in dead in shall embay out of 30 only 6 (six) were for adsorption positive. For the detection of pathogenicity of avian mycoplasma Hemadsorption test (Sato et al 1965, mauchae and Tayler and Rooinson (1968) carried out. This was in accordance with the findings of several other workers like Chu (1958); Yamamoto and Adler (1958).

A-P-07

**ANALYSIS OF KEYSTONE SPECIES OF SOME WILD
SPECIES OF BIRDS AND MAMMALS OF JHARKHAND
PLATEAU (INDIA)**

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Keystone species play important role to flourish many species of Wild birds and mammals in their natural state as well as to other species of the animal kingdom. They belong to plant and animal groups and constitute important food item for some wild birds and mammals. Once in the forested coverage of Jharkhand plateau, the keystone species were quantitatively existing in many varieties, but in few decades back i.e. in very recent past, they are depleted so much so, that they forced many wild birds and mammalian species either to be depleted to a very thin number or to be vanished locally from the scene of forested coverage of the plateau.

The keystone species of wild birds and mammalian species are - *Maduca Indica* L., *Ficus cunia* (Buch., *F. hispida* (Linn. f), *Disopyros melanoxylon* (Linn), *Buchanania lanzan* (Spreng) *Aegel marmelos* (L) Corr., *Trichila conoroides* (Wright and Arn), *Syzizium carophyllifolium* (Lan.), *Terminalia Chebula* (Retz.), and *Ziziphus* spp. etc.

The keystone species of wildcarnivore mammalian species comprises of common *Lepus nigricollis ruficadatus* Geoffry, *Sus Scrofa cristatus* (Wagner), *Tragululus memina* (Erxleben), *Muntiacus mutjack vaginalis* (Boddaert), *Axis axis axis* (Erxleben) *Cervus duvauceli duvaveceli* Cuvier, *Antelop ecervicapara rupicapra* (Miller) and *Bos Gaurus* (Smith).

The presently existing keystone species and wild birds and mammals could only be kept alive in the forested coverage of the plateau for thousand of years to come, if some strict management

and conservation measures be taken at an earliest time by the authorities concerned.

A-P-08

**REHABILITATION OF HOUSE SPARPOW IS POSSIBLE
THROUGH STRAIGHT AND SIMPLE MEASURES.**

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There are about 14-22 species of House Sparrow found in the Indian Subcontinent. *Passer domesticus* is the most abundant in Northern Indian including Haryana and Punjab. In the 1960s, House Sparrow was abundantly available in each and every corner of villages, towns and cities etc. Today, it has been totally wiped out from its very popular places of abundance. Its depletion so alarm number is directly related with whooping failure of its broods. It is also hinting towards the non-availability of nesting places. Infact, the latter is very crucial in diminishing common house sparrow populations across the length and breadth of the Indian Subcontinent. Its restoration is impending. The issue is gigantic. Conversely, its restorative erasures are apparently simple and straight forward. In the first place, the so called "VERANDAS".

A-P-09

**OBSERVATIONS ON THE HIBERNATION AND
AESTIVATION OF THE LAND SNAIL SYAMA SPLENDENS
(HUTTON) (GASTROPODA : STYLOMMATOPHORA :
ARIOPHANTIDAE) - AT JAMMU (J. AND K. STATE) INDIA.**

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Key Words : Syama Splendens (Hutton) - Gastropod mollusc -
Hibernation and Aestivation behavior.

A large number of poikilotherms exhibit the phenomena of aestivation (Summer Sleep) and hibernation (Winter Sleep) to tide over the extremes of Temperature in summer and winter respectively.

Aestivation and hibernation behaviour have been studied in several Gastropod molluscs but there are no such reports available for syama splendens (Hutton) - a common garden pest at Jammu. The present report gives a detailed account of the peculiar hibernation and aestivation behaviour of the snail for the first time.

A-P-10

**NEST BUILDING AND BREEDING BEHAVIOUR IN
PYCNONOTUS
JOCOSUS EMERIA (L) : (THE BENGAL REDWHISKERED
BULBUL).**

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Key words : Nest-building, Breeding-Behavior, mating, Eggs.

Nest building and Breeding behaviour of *Pycnonotus jocosus emeria* (L) was studied in the portico of our residence, where a pair of bird (comprising male and female) built a nest for propagating their progeny. The study was made from mid week of march, 2011 to first week of May, 2011. A total of three eggs were laid down by the female after mating outside the nest in the last week of April and started incubating the eggs. Due to some unavoidable reasons the female could not get hatched the eggs at the eggs fell down on the floor of the portico after a week of incubation. No mating of male and female pair noticed inside the nest. The nest building and breeding behaviour in this bird is unlike the other common birds like *Passer domesticus* (L), *Crovis Splendens Vieillot*, *Pastor Roseus* (L), *Acridotheres tristis* (L) and *Haliaster Indus Indus Bodsart*.

A-P-11

**COLLEMBOLA : AN INDICATOR FOR STATUS OF
HABITATS OF COAL MINE SPOILS OF KATHARA
(JHARKHAND)**

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Key words : Reclaimed mine spoils, Berlese-Tullgren funnel, collembola, diversity index

A study was carried out in the year 2007-2009 in Kathara coalified area (Jharkhand) to map the ecological functions of collembola. Four stands 5, 15, 30 and 50 years old reclaimed mine spoils (RMS) were selected for the study. Soil samples were collected by soil corer from randomized 10 quadrates from each stand at regular interval and collembola were collected by Berlese-Tullgren funnel method in the laboratory from the collected soil. A total of 2597 collembola were collected, which were classified to 23 species belonging to eight different families and three orders - Poduromorpha, Entomobryomorpha and Symphypleona. The Shannon diversity index ranged from 1.76 in Site I to 1.99 in Site IV. It was observed

that the diversity index increased with the available amount of soil organic carbon (SOC) in the RMS. *Neanura* sp and *Sminthurus* sp were only observed in 5 and 15 years old stands.

A-P-13

EFFECT OF PETROLEUM ETHER EXTRACT ONE THE REPRODUCTION OF MALE RATS

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Key Words: *Momordica dioica* Roxb.ex Willd, Testosterone, Testes, Sperm, Body weight, Petroleum ether extract

In this study, effects of petroleum ether extract of fruits of *Momordica dioica* Roxb.ex willd (PEMD) on sexual functions in male rats are observed. To investigate the effects of extract, thirty albino rats of wistar strain were divided in five groups. The first group served as control and received the treatment vehicle, double refined groundnut oil while second group consider as standard testosterone treated group. The petroleum ether extract was administered orally at the dose of 52mg/kg b.w., 100mg/kg b.w. and 200 mg/kg b.w. (p.o.) for third, fourth and fifth groups. After sacrificing the rats organ's weight, body weight, epididymal sperm counts and testosterone level were measured. The treatment caused a significant increase ($P < 0.001$) in the weight of the testes, seminal vesicle, prostate and epididymis. 50mg is the most significantly effective dose among three doses as compare to control group. The results indicate that 50mg/kg b.w. of the petroleum ether extract of *Momordica dioica* possesses androgenic properties and enhances the reproductive functioning of male rats.

A-P-14

**IMPACT OF MORINGA LEAVES ON ERYTHORACYTES
MATURATION IN A MAMMAL CAVIA PROCELLUS.**

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Keywords: Cavia porcellus, Cynocobalamine, Erythrocytes, moringa.

The experimental animal Cavia porcellus was fed experimental diet Maringa leves (40gm/kg body wt/day) for 7, 15,30,45 and 60 days. a linear enhancement in erythrocytes in comparison to the control value ($3.21 \times 10^6 /\text{mm}^3$ and $4.56 \times 10^6 /\text{mm}^3$ respectively. which was proportional to the duration of feeding schedules and ranging from 8.4% to 42%. the increase in erythrocytes was probably due to the presence of some active ingredients such as carotene, cynocobaloamine, and folic and acids. They play a vital role in the maturation and formation of erythrocytes suggesting a very nutrition us food for human beings.

A-P-15

**VARIATIONS IN THE GAMETOGENIC ACTIVITY OF THE
PLANORBID SNAIL INDOPLANORBIS EXUSTUS
(DESHYES) FROM TWO DIFFERENT LOCALITIES OF
THE GODAVARI RIVER NEAR AURANGABAD. (M.S.)**

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(M.S.)

The freshwater planorbid snail, Indoplanorbis exustus, screened histologically for the mapping of gonad from two different localities of the River Godavari. Two localities selected are one at kaigaon (upstream) of Nath Sagar Dam near Aurangabad. Seasonal observatons reveal that during summer season, snails from upstream waters show peak spermatogenic activity which is evidenced by

various stages of sperm development along with numerous sperm bundles and appearance of previtellogenic oocytes within the gonads of upstream water snails get initiated early compared to the snails from downstream waters of the Nath sagar Dam during annual gamatogenic cycle of the snail / exustus. In both the cases followed by female phase maturation of the gonad. The present study throws in the field of reproductive biology of the snail /exustus.

A-P-16

EFFECT OF TEMPERATURE ON THE HATCHING OF THE MEDICALLY IMPORTANT FRESHWATER SNIL SEGMENTINA (POLYPYLIS) TROCHIDEA (BENSON, 1836); GASTROPODA, PULMONATA, PLANORBIDAE.

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Key words :Temperatures; Stress, Hatching success, incubation period, Segmentina trochoidea.

Hatching of eggs of medically important Pulmonete snail, Segmentia (Polypylis) Trochoidea (Benson, 1838); Gastropoda, was studied. Six different temperature Vix. 5⁰C, 10⁰C, 20⁰C, 30⁰C, 40⁰C and 45⁰C, shows significant impact on the hatching success (13.5%, 47.62%, 86.05%,89.4%, 42.92%, and 27.66%) and the incubation period (22± 5.5, 17± 4.5, 9 ±3.25, 7± 1.5, 7± 3.5 and 5 2.1 days). The result of different temperature stress for different time period shows also significant changes in hatching success. So that the at lower temperature stress, when the time increase the hatching success decreases. The result shows temperature stress may be one of the effective meactives control the vector snail.

A-P-17

**BEHAVIOURAL AND PHYSIOLOGICAL RESPONSES OF
SPODOPTERA LITURA (F.) (LEPIDOPTERA :
NOCTUIDAE) LARVAE TO NEEM EXTRACTS UNDER
LABORATORY CONDITIONS.**

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Key words : Neem seed kernel Extracts, Spodoptera litura, antifeedant, leaf dip, no-choice test, choice test, chronic toxicity

The activity of three neem seed kernel extracts, aqueous, methanolic and hexane, against larvae of *Spodoptera litura* Fabr. was examined using leaf dip bioassays. Extracts (4% to 0.5%) were tested for their antifeedant activity against fourth-instar (L4) and sixth-instar (L6) larvae in choice and no-choice bioassays. In a second experiment, the effect of extracts was evaluated by feeding fourth-instar and sixth-instar larvae on treated leaves for 24 h, and then transferring to normal food. survival and deformities of larvae were recorded daily. in non-choice tests, insects were initially repelled by neem extracts before approaching treated leaf discs (choice test) ; no feeding on treated discs was observed. A dose-response relationship was established for all three extracts with respect to antifeedant index (no choice tests) and percentage of larvae pupating. At the highest concentration (4%), antifeedant activity was observed irrespective of the type of extract. Increased larval mortality was also observed at higher concentrations, and no pupation occurred in L4 and L6 larvae at the 4%, antifeedant activity was observed irrespective of the type of extract. Increased larval mortality was also observed at higher concentrations, and no pupation occurred in L4 and L6 larvae at the 4% concentration level. Aqueous and methanolic extract treatments resulted in loss of body setae and anorexia in L5 larvae. Pupae produced in all the treatments exhibited various deformities but the effect was more pronounced in aqueous and methanolic extracts than hexane extract. All three neem

extracts exhibited both behavioural effects and post ingestive chronic toxicity in larvae. Methanolic extract seemed to be the most effective out of three extracts as indicated by the percentage pupation at 0.5% level; hexane extract was the least effective at 1% concentration. The differences in the activity of extracts at different larval stages are discussed.

A-P-18

**EFFECT OF ACUTE AND SUB ACUTE EXPOSURE OF
COCL₂ ON HEPATIC FUNCTIONS OF ALBINO RAT
(*RATTUS NORVEGICUS*)**

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Keywords : CoCl₂, toxicity, bilirubin, hepatosomatic index, oxidative stress, reactive oxygen species, free radicals.

Cobalt Chloride (CoCl₂) when given orally to acutely (1 day) (116.6 mg/kg body weight) and sub-acutely (7, 14, 21, 28 days) (16.65, 8.32, 5.55, 4.16 mg body weight) treated albino rats after LD₅₀ (1166.80 mg/kg body weight) determination, brought about alterations in hepatosomatic index, total hepatic proteins and serum total bilirubin. The toxic state of cobalt is oxidative state or ionic cobalt, the oxidation of cobalt takes place through the transferring the electrons from cobalt atom to molecular oxygen. The toxicity of cobalt induces oxidative stress by generation of free radicals, affects the metabolism of protein in liver, due to this protein deficiency occurs, which causes enhancement in hepatosomatic index after acute and sub-acute treatment of cobalt chloride. This decrease in hepatic proteins may probably be due to disruption of translation process, which leads to decreased protein synthesis in hepatocytes, resulting decline in hepatic proteins. Hepatic phosphatases (ALP and ACP) enzymes augmented significantly after acute and sub-acute CoCl₂ treatment, may probably be due to damage of membrane. the

increase in serum total bilirubin has been assessed to be due to damage of membrane. The increase in serum total bilirubin has been assessed to be due to the release of hemoglobin concentration in large amount from erythrocytes in reticulo endothelial cell by the toxicity of cobalt chloride, which converts into bilirubin in liver from liver bilirubin flows out into the blood stream with the result of which bilirubin rises in serum.

A-P-19

**TITLE OF THE PAPER- THERMOREGULATION IN
DESERT FOX(VULEPES VULPES PUSILLA) IN THE THAR
DESERT OF RAJASTHAN**

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Key Words : Desert fox, thermoregulation, harsh environmental conditions, den, daily activities, coat colour, painting.

Out of three of Red fox present in India, one form is found in western part of the Thar desert having harsh environmental conditions but the foxes manage to survive in such a way as- their dens were found under xerophytes shrubs and in open scrubs, of 4-6 meters depth, forming amiable microclimate. Daily activities and coat colour of desert foxes change according to seasons to avoid extreme conditions of the weather. Besides these, they can also lose excess body heat, by "panting". Thus, they can successfully live in the adverse conditions, which form natural features of the Thar desert.

A-P-20

ISOLATION, IDENTIFICATION AND BIOLOGICAL CHARACTERIZATION OF ACANTHAMOEBA POLYPHAGA FROM SUSPECTED CASES OF EYE PATIENTS AND ITS ELECTRON MICROSCOPY

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Key Words *Acanthamoeba*, Keratitis, Tear drop, Chlorination, Lucknow city.

Between June 2008 to September 2009, corneal scrapings and tear drop of 90 patients with suspected cases of keratitis and eye infection attending the Govt. Hospital and rural areas patients of Lucknow city were positive for *Acanthamoeba* which fulfilled the criteria for suspecting *Acanthamoeba* keratitis. These were distributed among all ages with the maximum numbers in the 20-45 year age they associated with water sports. The predisposing factor found in the study was trauma of varying degrees. The result of present study confirmed that Amphizoic amoebae colonized almost every conceivable aquatic habitat. This is alarming signal that show presence of Amphizoic amoebae. Incidences of infection during warm season have been traced in patients suffering from eye infection. Preventive measures include public awareness and maintenance of water body and adequate chlorination.

A-P-21

**ANNONA SQUAMOSA LEAF EXTRACT INDUCED
ALTERATIONS IN NUCLERIC ACIDS AND PROTEIN
CONTENT OF MUSCA DOMESTICA**

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Key words : Annona squamosa, Musca domestica, botanicals,
DNA, RNA, protein

Uncontrolled use of chemical and synthetic insecticides for the pest control has led to the problem of insect resistance, resurgence and their bioaccumulation at each trophic level. It has, therefore become necessary to identify a safe, ecofriendly and alternate source of insect control. In this regard, botanicals have emerged as an active and potential alternate to these chemicals. To assess the sublethal effect of alcoholic extract of Annona squamosa leaf extract on Musca domestica, its third instar larvae and their effects on DNA, RNA and protein content in the different developmental (larva, pupa and adult) were estimated. Following the exposure at lower concentration, there was decrease in the level of nucleic acids and protein in almost all the stages studied, however the trend of decrease was more pronounced when the larvae were exposed at higher concentration. The effect of the extract persisted in the subsequent stages suggesting towards its residual effect. Maximum reduction of 59% in the DNA content was observed in larval stage. The declining trend in the adult stage followed a change of 44% fall over control in protein content and 17% in RNA respectively. Pupal stage was the least affected stage followed by the extract exposure. The significant decrease in the protein content might be due to its degradation through various metabolic pathways. The DNA and RNA level decreased significantly pointing towards some drastic changes in RNA synthesis machinery and hence at the transcription level. Due to these changes the growth and development of the housefly was duly affected. Hence this extract can be used as an effective bioinsecticide in the housefly control programme.

A-P-22

**A NEW RECORD OF FRESH WATER CILIATE
OXYTRICHA SUBEELUM N.SP.
(PROTOZOA : CILIOPHORA) IN AURANGABAD.**

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Key words : Anals, AZM, Caudals, contractile Vacuoles, Frontals, Ventrals and Macronuclei.

Water samples were collected from fresh water bodies of Aurangabad, Maharashtra, India. *Oxytricha susheelum* n.sp. is first time reported in this region which is short and ellipsoid in shape. It has 8 frontals, 5 Ventrals and 5 anals. Caudal cirri are short and marginal cirri are confluent at the posterior end. Adoral Zone of membranelles (AZM) extends to one-third the body length. There are two large ovoid macronuclei and four to five small spherical contractile vacuoles at the posterior end.

A-P-23

**EVOLUTIONARY PERSPECTIVE OF COOPERATIVE
BEHAVIOUR IN PRIMATES WITH SPECIAL REFERENCE
TO HANUMAN LANGUR, SEMNOPITHECUS ENTELLUS.**

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Keywords : *sempithecus entellus*, Cooperative behaviour, Evolutionary perspective

Biological explanations of cooperation are based on kin altruism, reciprocal altruism, and mutualism, all of which apply to human and nonhuman species alike. But human cooperation is based in part on

capacities that are unique to, or at least much more highly developed in *Homo sapiens*. We seek an explanation of cooperation that works for humans, but does not work for other species, or works substantially less well. Our account is based on plausible evolutionary dynamic involving some combination of genetic and cultural elements, the consistency of which can be demonstrated through formal modeling.

Cooperation among humans is unique in nature, extending to large number of unrelated individuals and taking a vast array of forms. By cooperation we mean an individual and taking a vast array of forms. By cooperation we mean an individual behaviour that incurs personal costs in order to engage in a joint activity that confers benefits exceedin these costs to other members of one's group. Common explanations of cooperation in other species based on genetic relatedness (kin-altruism) and repeated interactions (e.g., reciprocal altruism) certainly apply to cooperation in humans as well. This narrow definition of cooperation excludes mutually beneficial interactions (mutualisms) the evolutionary explanation of which is relatively simple, non-productive forms of altruism (in which the benefit received does not exceed the cost to the altruist), and those lackin the common benefits of joint activity that are characteristic of the behaviorus.

A-P-24

**EFFECT OF PETROLEUM ETHER EXTRACT OF LEAVES
OF LYCOPERSICON ESCULENTUM AGAINST COTTON
APHID APHIS GOSSYPHII GLOVER INFESTING
ABELMOSCHUS ESCULENTUS MOENCH.**

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Keywords : *Lycopersicon esculentum*, insecticidal effect and *Aphis gossypii*

Efficacy of petroleum ether extract of *Lesculentum* leaf as potent aphicide against cotton aphid *Aphis gossypii* was observed for 3rd instar nymphs causing 57.23, 85.53 and 98.77% mortality at 5.0, 6.0 and 7.0% concentration of the extract after 48hrs respectively while 47.16, 75.47 and 88.67% mortality was observed for adult apterous viviparous females of this aphid after the treatment of same concentration and time duration respectively. 100% nymphs and adult females died after 72hrs by a single spray of 7.0% concentration of this extract. LT_{50} values were also recorded as 41.93, 11.03 and 8.88hrs for 3rd instar nymphs and 50.89, 13.71 and 10.90 for adult apterous viviparous females of cotton aphid after the treatment of 5.0, 6.0 and 7.0% concentration of this extract of *L. esculentum*. The fecundity was also affected by the action of this extract significantly. 23.00 and 48.50 youngones were produced in control whereas 8.00 and 10.50 youngones were produced after same time duration after a spray of 7.0% concentration of extract of *L. esculentum* after 24 and 48 hrs.

A-P-25

**CYTOARCHTECTONIC AND NEURONAL STUDY IN
DORSOLATERAL FOREBRAIN OF MALE *EUDYNAMYS
SCHOLPACEUS***

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Keywords : Corticoid complex, intermediate corticoid area, Dorsolateral corticoid area, Pyramidal neurons, *Eudynamys scholopaceus*.

In birds, the dorsolateral forebrain or corticoid complex occupies the dorsolateral surface of the telencephalic pallium. The corticoid complex is formed by progressive replacement of the hyperpallium apicale (HA) and is divided into two subfields : an intermediate corticoid area (CI) and a dorsolateral corticoid area (CDL). The CDL is a thin superficial part of the caudal pallium adjoining the medially situated hippocampal formation, whereas the CI is

demarcated between the CDL and the parahippocampal area of telencephalon. A transition zone, intermediate corticoid area (CI) has been observed medially between HCC and CDL. At the caudal level dorsolateral forebrain is represented by dorsolateral corticoid area (CDL). Dorsolateral corticoid area (CDL) is separated from rest of the telencephalon by the lateral ventricle.

Two staining methods : Cresyl-violet and Golgi-colonnier were employed respectively for cytoarchitectonic and neuronal study in male *Eudynamys scolopaceus* (Koel). In Cresyl violet stained sections CI was differentiated into three layers with medium to large size somata forming a homogenous zone which was clearly distinguished from adjacent neuronal subfields.

By using several parameter like soma size, soma shape, dendritic tree patterns, of Multipolar, Pyramidal and Unipolar. In CI region the percentage of Multipolar and Pyramidal were 70.84% and 29.16% where as in CDL region Multipolar neurons, Pyramidal neurons and Unipolar neurons accounted for 62.50%, 31.25% and 6.25 respectively. The percentage of Multipolar neurons were observed to be maximum in both the fields. It seems that these neurons account for the major portion of neuronal classes observed in CI and CDL region in Male Koel.

A-P-26

**THE RELATIONSHIP BETWEEN THE NEUROSECRETION,
CORPORA ALLATA, AND OOCYTE GROWTH IN
POECILOCERA PICTA (INSECTA : ORTHOPTERA)**

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Keywords : Neurosecretion, *Corpora allata*, Oocyte. *Poecilocera picta*.

The relationship between the neurosecretion and oocyte growth development in *Poecilocera picta* Fab, has been described. The

secretory activity of the 'A' type of neurosecretory cells has been correlated with ovarian development. IN *P. picta* during the first 4 days after emergence the neurosecretory material. When the oocytes are developed the 'A' type cells are with stored neurosecretory material.

The mature males do not appear to accelerate the process of maturation in females. The females which are reared without male or with castrated male also mature at the same time as the females which are reared with male. The corpus allatum also enlarges and decreases at the same period. The number of resorptive bodies is much more in the females which are reared with castrated male or without males. There appears to be some correlation in the secretion of the neurosecretory material, copulation and the appearance of resorptive bodies. The role of the nature male is not only in copulation which very likely allows the cell to synthesize, secrete and release a large amount of neurosecretory material whose discharge in the haemolymph enables a successful development of the oocyte. Corpus allatum appears to be controlled by a precursor from the brain.

A-P-27

**EFFECT OF O. SANCTUM (L) LEAF EXTRACT ON
TESTICULAR TISSUE ASCORBIC ACID IN ARSENITE
EXPOSED ALBINO RATS.**

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Key words : Arsenic Exposure, Testiculat tissiu, Ascorbic acid, Reproductive toxicity, O. Sanctum, Leaf extract.

Possible environmental influence from metallic pollutatns to dietary changes related disturbances in reproductive function in animal and

human population is an issue of sensitive nature globally. High levels of toxicity in the body are an underlying cause of ill health. Recent researches indicate a wide range of herbs that improve the body's ability to remove toxins. In this context, the present proposed work has been undertaken to know the effect of *O. Sanctum* (L) leaf extract on arsenic exposed albino rats.

For this 84 albino rats of body weight (150-200mg) divided into 7 groups each of 12 rats were employed in this investigation.

One group was regarded as control / normal and rest were known as experimental groups. Experimental rat groups were given arsenic trioxide in solution for different dose and duration. Later, 4 rats were killed and after completion of their duration and rest groups were given *O. Sanctum* leaf extract. Testis were removed and ascorbic acid was estimated by the ditrametric method of Haris & Ray (1935) in the testicular tissue homogenates.

When leaf extract of *O. Sanctum* (L) at the dose of 10 ml/kg. body weight were given to different dose and duration, arsenic exposed albino rats till duration of exposure days, a highly significant ($p < 0.01$) decreased level of ascorbic acid in testicular tissue were observed in I, IV and VI experimental rat groups (exposed with 0.5 and 3 mg/ kg. bw. respectively) in comparison to all doses and duration exposed experimental rat groups in which the level of ascorbic acid in testicular tissue showed a highly significant ($p > 0.001$) increased level to their normal / control rat groups. Such findings might be an indication that *O. Sanctum* leaf extract some ingredients which showed protective property against arsenic reproductive toxicity.

A-P-28

EVALUATION OF QUALITY OF BRANDED *LASSI* SOLD IN MARKET

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Keywords : chemical, LAB, Lassi, Market, Quality, Sensory

Lassi refers to ready to serve beverage prepared from dahi, which offers benefits associated with fermented milks. With advancement of technology and modernization of dairy industry, various dairy products are available in market under different brand names; lassi is one of them. Quality of lassi differed due manufacturing technique, ingredients used, consumers liking etc. Therefore no two brands, even two lost within the brand produce identical quality products. However higher degree in sensory acceptability and sufficient population of live LAB are pre-requisite to any fermented milks in general and lassi in particular. With this view, evaluation of quality of branded lassi sold in Ahmednagar market was done in the laboratory, Department of Animal Science and Dairy Science, Post Graduate Institute, MPKV, Rahuri, Conclusions are presented based on results obtained.

The branded lassi sold in market had poor in sensory quality as compared to laboratory made lassi. of course branded lassi were also sensorial acceptable but reduced degree. Freshness of laboratory made lassi might have contributed towards higher sensory scores.

Considerable variation in chemical composition was noticed in the samples of lassi studied under different brands. It was appreciated that acidity of the samples were moderate, acceptable and within the range of 0.74 to $0.77 \pm 0.019\%$ (LA)

Further, it was noted that the branded lassi had contained sufficient population of live LAB ($4-4.333 \times 10^7$ cfu/ml) to exert beneficial effect on consumers as fermented products.

A-P-29

**NUCLEOTIDE SEQUENCE ANALYSIS OF 16S RRNA
MITOCHONDRIAL GENE IN TWO SPECIES OF
CALLOSBRUCHUS (COLEOPTERA : BRUCHIDAE)**

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Keywords : 16S; Callosobruchus; Pairwise percentage divergence,
phylogenetic tree

A phylogenetic analysis of two species of Callosobruchus i.e. Callosobruchus analis and *Callosobruchus maculatus*, belonging to the order Coleoptera based on partial sequence of 16S mitochondrial gene is presented. The mitochondrial gene sequences of 560 bp encoding 16S were determined for the two *Callosobruchus* species collected from its host i.e. infested seeds of *Vigna radiata* (mung) after rearing them up to five to six generations in glass jars in BOD incubator at temperature ranging from 26-28^o.c at 70% relative humidity. Partial 16S rRNA gene fragments of both the species were amplified by using specific primers. Pairwise percentage divergence amongst various species of Bruchidae (obtained from GenBank) was calculated. Two species of *Callosobruchus* under study showed (0.147% divergence within the genus but two individuals of same species ranged between 0.564-0.569, with minimum sequence divergence 0.003%. Two species of out-group taxa *Acanthoscelides obvelatus* and *A. argilaceus* were found to be closely related to each other, to each other, and showed sequence divergence value of 0.001% and 0.067 divergence with *A. obtectus*.

A-P-30

GENOMIC DIVERSITY OF ENDANGERED SIRI BREED OF CATTLE OF EASTERN HIMALAYAS

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Keywords : Mitochondria, COI, d-loop, Siri, evolution, inheritance, recombination, migration, genetic variation, Molecular clock.

The Siri (*Bos indicus*) breed is an endangered cattle species. Therefore, information about the genetic status of the Siri population is necessary to develop strategies for conservation and effective long-term treatment for management of this endemic breed. In the present approach, we developed mitochondrial COI gene and d-loop region. This is followed by pair wise calculation of distance and construction of phylogenetic tree using Kimura 2 parameter (K2P) model. The result revealed 99% similarities with both *B. taurus* and *B. indicus*, although the breed was considered to be under *B. indicus*. Phylogenetic analysis with COI barcode and d-loop revealed a distinct genetic difference between *B. taurus* (Korean, Japanese Black, Holstein, and Fleckvieh breeds) and *B. indicus* (Nellore and Zwergzebu breeds). The present study is the first attempt to develop barcode (Acc. No. : JN417003) of the last Himalayan breed of *B. indicus*. Both the K2P distance and phylogenetic analysis revealed a conflicting position of Siri, which need a more detailed analysis considering large scale data sets.

A-P-31

FEMALE REPRODUCTIVE SYSTEM OF MOTHOCYA RENARDI (BLEEKER, 1857) - A PROTANDRICALLY HERMAPHRODITIC CYMOTHOID PARASITIZIN THE SLENDER NEEDLEFISH

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Keywords : female reproductive system, *mothocya renardi*, *slender needlefish*

Mithocya renardi, (Bleeker, 1857), a protandrically hermaphroditic parasitic crustacean shows host specific parasitization on the slender needle fish *Sttongylura leiura distributed along the Coastal water of Malabar*. Both male and female parasites infest the branchial cavity of the host. The female breed continuously, judged by the presence of growing ovary throughout the year. The present paper reports the structure of female reproductive system of *M. renardi* at morphological level. Reproductive system of female *M. renardi* consists of a pair of ovaries and oviducts each lying on either side of the digestive tract. Attached with each ovary there are three testicular lobes visible only during the early phase of reproduction. During the stage of oocyte proliferation, the ovary appears as thin structure measuring 4-5 mm and 3 mm, length and width respectively and extends between third and fifth thoracic segments; the color being milky white. As the ovary matures it occupies whole of the thoracic cavity and bulged out as a kidney shaped structure; during this stage the ovary attains light fluorescent yellow color and the length and width being 12-13 mm and 10-11 mm respectively. Each oviduct measuring 3-4 mm arises from the postero-ventral side of the ovary and opens out close to the sixth thoracic appendage. As the ovarian wall is highly transparent, the arrangement of oocytes within the ovary is directly visible. The number of oocytes in each

ovary ranges between 300-400. The size of the mature oocytes being 1150-1200 μm . Each ovarian cycle extends approximately 8-9 months, after which the ovipositor ensures.

A-P-32

THE EFFECT OF PHENYTOIN ON DEVELOPMENT AND LIFE HISTORY TRAITS OF *DROSOPHILA MELANOGASTER*

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Keywords : *Drosophila melanogaster*, Phenytoin, toxicity, development

Phenytoin is an antiepileptic drug used to study the effect on development from embryogenesis until adult eclosion and life history traits in the fruit fly *Drosophila melanogaster*, were reared continuously on phenytoin containing food displayed a dose-dependent developmental delay, increased developmental mortality, reduced eclosion as adults, a reduction in fertility with the effect being more severe at higher concentrations. In this study, we investigated the effects of phenytoin exposure during development significantly showed the rate of egg-to-adult development than control. Our findings validate *Drosophila* as a useful animal model to study phenytoin toxicity.

A-P-33

**STUDIES REGIONAL DISTRIBUTION OF WATER,
PROTEIN
CONTENTS AND CALORIFIC VALUES IN VARIOUS BODY
TISSUES OF *FANABAS TESTUDINEUS* (BLOCH)**

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KEY WORDS : Water, Protein, Calorific value, fish, tissues.

Calorific Value, Moisture and Protein content in different tissues of the fish, *Anabas testudineus* have been studied. Amongst brain, heart, kidney, gill, muscle and liver the highest calorific value (3.933 K. Cal/g. dry weight) is found in liver and lowest (2.769 K. Cal/g dry weight) in brain. Moisture is maximum in brain (81.63% and minimum in liver (74.63%) protein is maximum in liver (18.98%) and minimum in brain (17.135). Moisture is inversely proportional to protein and calorific value.

A-P-33

**HISTOPATHOLOGY OF THE GILL, LIVER AND KIDNEY
TISSUES OF THE FRESHWATER FISH RASBORA
DANICONIUS EXPOSED TO SUGAR INSUTRY EFFLUENT**

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Keywords: Rasbora daniconins, Sugar industry effluent,
Histopathological changes, Tissues.

Effect of sugar industry effluent on histopathological changes in freshwater fish *Rasbora daniconius* has been studied exposing it for short term bioassay for 24,48,72 and 96th and LC₅₀ values were found 12.5,12,11.5 and 11% respectively. *Rasbora daniconius* were further reexposed to sub-lethal level (1/5 of LC₅₀ and 1/10 of LC₅₀ value of 96th) and to observed the effect on 30 days. The affected tissues such as gill showed destruction of epithelial cells and few lamellae were curled and live show's marked hepatic cell proliferation with nuclear hypertrophy and necrosis. Hypertrophy of renal tubule and necrosis' were noted in the kidney.

A-P-34

“STUDIES ON FREE FATTY ACID OF *ASCARIDIA GALLI* RECOVERED BY *GALLUS GALLUS DOMESTICUS* FROM NANDED REGION (M.S.) INDIA”

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Key words- *A.galli*, free fatty acid, *Gallus gallus domesticus*, Nanded region

The capacity for synthesizing long chain fatty acids is formed differently. The fatty acids may be related to the anaerobic environment of the gut, (Jacobson and Fairbairn, 1967). They exist in much smaller amounts than triglycerides, (Ginger and Fairbairn, 1966). Nevertheless they are metabolically very important constituents of lipid material. Free fatty acid being source of energy, they have an equal importance in the synthetic location also. The content and composition of the free fatty acids in helminthes parasites have received less investigation, i.e., Beames, (1965), Greichus and Greichus, (1967), Kawai, (1968), Ueda and Swada, (1968) and Rothstein, (1970).

The content of free fatty acid varies species to species and the content can also vary with the age of the nematode parasite, but in the same aspect we noted that the very less literature is available.

The literature which is taken above is from experimentally infected host. Hence, we worked on same aspect but host is naturally infected by the nematode parasite, i.e. *Ascaridia galli*.

A-P-35

**ISOLATION AND CHARACTERIZATION OF AVIAN
EMBRYONIC STEM CELLS WITH POTENTIAL
APPLICATIONS IN THE POULTRY INDUSTRY**

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Key words: AP; alkaline phosphatase, BDCs; blastodermal cells, EGCs; embryonic germ cells, ESCs; embryonic stem cells, HFRs; heart forming regions, HH; Hamburger-Hamilton, HN; Hensen's node, PGCs; primordial germ cells, SSCs; spermatogonial stem cells

Isolation and characterization of stem cells from chick embryo, and understanding regulation of their renewal and differentiation at cellular and molecular levels is likely to have several potential applications in the poultry industry. We have isolated and characterized stem cells from various regions of the early developing chick embryos such as the cardiac regions and Hensen's node(HN). HN is the Organizer of the early embryo, the cells of which contribute mainly to notochord and in a small proportion to somites while the heart-forming regions (HFRs), located on either side of the HN and primitive streak, develop into cardiac tissue. In early chick embryo, the precardiac cells reside within distinct groups of mesodermal cells known as presumptive heart forming regions (HFRs). When HFRs were excised from 18 hr incubated embryos and cultured *in vitro*, a tiny proportion of HFRs differentiated into beating cardiomyocytes. About one third of the HFR cells underwent spontaneous differentiation into adipocytes in culture. Simultaneously, some of the cells derived from HFR exhibited alkaline phosphatase (AP) activity indicating presence of stem cells

in the culture. HFR cells were positive for vimentin indicating their mesenchymal origin. FGF supplement increased the proportion of AP-positive cells in a dose-dependent manner. The results demonstrate that HFRs are a good source of mesenchymal stem cells. We transfected these HFR cells with GFP and injected them into the subgerminal cavity of the developing embryos. Over a period of time, they were found to migrate and populate specific embryonic tissues suggesting multipotent nature of these stem cells. In addition to HFR, we have also identified presence of stem cells in the cultures derived from HN of 18 hr incubated embryos. HFR and HN derived cells exhibited distinct morphological differences. HFR cultures contained spindle shaped fibroblast-like cells whereas the HN cultures were populated with cuboidal cells with elongated thin projections. Presence of AP activity in HN cells confirmed the presence of stem cells in the HN derived cultures. In contrast to HFR cells, HN cells were completely devoid of adipocytes. These observations indicate presence of discrete stem cell populations with different differentiation potentials in HFR and HN. While we do not foresee an immediate direct use of avian stem cells in therapy in poultry birds, these cells could be useful in poultry research and development in several different ways. Apart from using them for gaining insights into basic biology of poultry birds, they can be employed to study the efficacy of vitamins and other nutrients at the cellular levels as well as to study response of toxins, pollutants and drugs. Further, one can use them to study their susceptibility to infections by different bacteria and viruses.

A-P-36

**JODHPUR LANGURS, *SEMNOPITHECUS ENTELLUS*
BECAME MORE FAMILIAR TO HUMAN BEING DUE TO
FREQUENT ARTIFICIAL FEEDING**

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Key word: -Jodhpur, *Semnopithecus entellus*, artificial feeding,
human, familiar/agonistic

The Hanuman langur (*Semnopithecus entellus*) is the best studied and the most adaptable South Asian Colobine. They live in a wide range of habitats from the Himalayas and peninsular forests to semiarid woodlands, in villages and towns, and on cultivated land. The Hanuman langur troops living in garden are highly fed and they depend on 70-72% of total feeding on provisioning by local people and more familiar to human being.. Therefore the home range is decreased as they depend on natural food very less. And in open scrub area, where provisioning is low or nil, the home range is increased because the troops are mainly depend on natural feeding. The frequent provisioning affect the natural activities and normal behaviour of the species especially their ranging pattern and the quantum of home range size. Moreover, most of the Jodhpur langurs are provisioned by local people. Due to regular feeding by local people the langrs around Jodhpur became very familiar and not all shy as the interior or forest langurs, Besides this change in behaviour they also seem more hostile and behave indifferent for visitors.

A-P-37

**ESTIMATION OF DEHYDROGENASE ACTIVITY BY
INOCULATING EARTHWORMS IN COAL FLY ASH
AMENDED SOIL**

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Keywords: Fly ash, earthworm, *Drawida willsi*, Dehydrogenase enzyme, ameliorant, ANOVA.

The dehydrogenase activity in coal fly ash (FA) amended soil in presence and absence of earthworms (*Dawida willsi*) was investigated under laboratory condition for 90 days at different concentration of fly ash (5, 10 and 15%) at an interval of 15 days. In 5% FA amended soil with earthworms, a continuous increase in enzyme activity was observed reaching to 6.2 ± 0.2 from 1.8 ± 0.3 μg formazan/g soil/ h while in 10 and 15% amendment the enzyme activity increased from 1.50 ± 0.01 to 5.5 ± 0 and 0.85 ± 0.3 to 5.0 ± 0 μg

formazan/g soil/h up till 45th day of experiment and then decreased to 4.6 ± 0.1 and 1.0 ± 0.2 μg formazan/g soil/h respectively. In the absence of earthworms the enzyme activity was comparatively lesser than its presence. In 5% amendment without earthworm it varied from 0.96 ± 0.001 to 4.9 ± 0 μg formazan/g soil/hr and then declined to 1.2 ± 0.3 μg formazan/g soil/h. Similarly, in 10 and 15% amendment without earthworms the variation in the enzyme activity was 0.7 ± 0.2 to 1.9 ± 0.3 μg formazan/g soil/hr and 0.5 ± 0.2 to 1.5 ± 0.1 μg formazan/g soil/h in 60 and 45 days respectively and thereby showed a decline. In 5% amendment maximum activity was observed which showed gradual decline with further addition of fly ash. Simultaneously, the earthworm acted as an ameliorant enhancing the dehydrogenase activity. Therefore, the dehydrogenase activity was prominent in low dose of fly ash amended soil inoculated with earthworms. The concentration of fly ash in the amended soil and time interval had significant impact on the dehydrogenase enzyme activity in both with and without earthworm inoculation as revealed by two way ANOVA. ($F = 5.85$, $df = 6, 2$; $p < 0.001$, $F = 8.255$, $df = 6, 2$; $p < 0.001$ (without earthworm); $F = 7.09$, $df = 6, 2$; $p < 0.001$; $F = 5.71$, $df = 6, 2$; $p < 0.001$ (with earthworm)

A-P-38

**CERCARIAL DEVELOPMENT OF *FASCIOLA* WITHIN THE
INTRMEDIATE SNAIL HOST *LYMNAEA ACUMINATA*
FROM RIVER WATERS OF AURANGABAD (M.S.)**

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Key words: Paracitised snails, sporocyst, redia, cercaria, birthpore.

Collection of snail specimens of *Lymnaea acuminata* was done from river water around the city Aurangabad. Naturally infected snails were identified and dissected in order to study the cercarial development within the snail body. Infected gonads collected and got processed for general histological study in order to investigate cercarial development. Light microscopic observations of the

gonadal sections show various stages cercarial development within redia of liver fluke, *Fasciola*. Redia are formed after completion of the sporocyst development. Fully developed redia are polymorphic shaped sacks having mouth opening at the anterior end. Just behind the collar region at one site there is presence of birthpore which acts as an exit for developing cercaria.

From the germinal layer proliferation of germ ball takes place vegetatively. At the initial stages of germ ball development, it is simple ball of cells. On further development it becomes elongated with mesenchyme tissue. Advancement in further development, there starts the formation of digestive system with distinct intestinal lobes or caecae. During post developmental stages there is appearance of pharynx, suckers and tail region of cercaria. It seems that cercaria move towards anterior region with progress in their development. Fully developed cercaria having distinct tail gets birth through birthpore.

A-P-39

**DAMAGES TO STRUCTURAL WOOD BY THE TERMITE
ODONTOTERMES. WALLONENSIS WASMAN (ISOPTERA :
TERMITIDAE)**

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Subterranean termite belonging to genus *odontotermes* were reported damaging wood structure *O. wallonensis* destroying wood work in different types of houses. Besides destroying structural wood, termite also serious pest of other cellulose materials such as bounded books and paper in library and house. Johnson (1981,) Roonwal (1979) and Sand (1974) reported that termite as a pest of households material like, book and clothing, Termites thus have great economic impact on wood used in and around the building. However it is difficult to establish the exact cost of termite damage. The abiotic environmental factors influence the foraging activity of termite, atmospheric temperature and relative humidity and rainfall play a vital role in the survival of termite. However no information

is available on the influence abiotic factors on structural wood destroying activity termites. In India not even single research report has been published on economic loss cause by termites. Therefore the present investigation was undertaken to study the termite damages in different types of structural wood in different types of house their relationship with seasonal variation in abiotic factor such as rainfall, temperature, and relative humidity which influence the structural wood destroying activity of the termite and economic loss cause by them.

Extensive survey was conducted periodically during December 2008 to November. 2009 followed by regular monthly survey during December. 2009 to March 2010 on termite damage to different types of structural wood in RCC (rod cement concrete), TR (tile roof) houses and THs (thatched huts) in various places. A total 100 houses were inspected monthly in entire area selecting 10 houses of each type in each area in Bidar

The percentage of different type of houses damage by termite shows that, 14.16% of the total house selected at random for sampling have been damage by termite of which maximum were RCC house and minimum were 0.83% thatch huts (T.H.) *O. wallonensis* damage the structural wood the maximum extend 8.33% of RCC houses followed by Tiles roof House (T.R.) 5.0%.

A-P-40

**DO MALE RESIDENT HANUMAN LANGURS DEFEND
INFANT/ JUVENILE OF THEIR OWN TROOPS?**

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Key words: Hanuman langurs, infant, troop, defend, kin relation

A study on a resident male in a bisexual troop of Hanuman langur (*Semnopithecus entellus*) around Jodhpur, Western Rajasthan is conducted during 2010-11. The study troop Kailana- Canal (B-18)

had three males including resident male. There were 12 adult females, 13 infants and juveniles in this troop. Many of the time the alpha (resident) male observed more aggressive towards other adult males available in the troop but he never harm to male juvenile and infants. Although there were sub adult males also in troop but resident never attacked on them. On the other hand beta male was attacked by resident in several cases. Sometimes the resident showed his neutral behaviour towards infants. But other times it was observed when resident showed positive responses towards infants and juveniles. Other males also showed protective behaviour towards them. No incident of infanticide was observed and no resident male change took place during the study period. The study supported the prediction derived from the selection hypothesis i.e. new dominating male may allow the male juvenile and sub adult males to stay in same uni-male bisexual troop leading to multi-male situation. The resident male is quite likely to face much competition over resources particularly receptive females, but he may get additional advantage from those fellow and or rival males in cooperative defense against conspecifics and predator, thereby increasing reproductive success. The study further supports that the resident shows his positive response for infants and also for sub-adult males, while feeding, playing and resting.

A-P-41

**“IMPACT OF DIFFERENT SPACINGS AND FERTILIZERS
ON THE PRODUCTIVITY OF MULBERRY, (*MORUS ALBA*
L.) VARIETY -V1.”**

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Keywords: Mulberry Variety, Spacing, Fertilizers, Productivity.

A field experiment was conducted during 2008- 2009 and 2009-2010 on a newly established mulberry garden at Pakni Solapur (M.S). The experiment was conducted by using *Morus alba* L. of mulberry variety- V1. The garden plot was designed and split split

plots having four types of spacing namely 5' × 5' / tree type, 2' × 2', 3' × 1', 6' × 3' × 2' were maintained and different fertilizer doses were provided to assess the impact on the productivity. The present investigation shows that, there was positive impact of V3 (3' × 1') spacing type and T3 (NPK) fertilizer treatment on leaves weight as well as height of the mulberry plant when compared to control group.

A-P-42

SEASONAL VARIATION IN THE PROTEIN CONTENT OF FRESHWATER BIVALVE: *LAMELLIDENS CORRIANUS* DUE TO NEURO-ENDOCRINE MANIPULATION.

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Key words: freshwater bivalve molluscs, ganglia ablation, ganglionic extract injection, protein content,

Considering the metabolic shifts in freshwater bivalve shell fishes, due to neuro-endocrine stress we report here the seasonal variation in protein content from mantle, hepatopancreas, gonad, foot and gill of adult freshwater bivalve *Lamellidens corrianus* collected from Jayakwadi backwaters of Godavari river at Paithan during summer (April-ay), monsoons (July-August) and winter (December-January). Adult bivalves of approximately same size were distributed in four aquaria with aerator, first aquarium treated as control, from second aquarium animals cerebral ganglia of both sides were removed, third aquarium animals were injected dist. water and forth aquarium animals were injected cerebral ganglionic homogenate. The variation in the protein content of *L. corrianus* from different groups on second, seventh and twelfth day during three different seasons was estimated. During summer season the protein content in the foot was significantly decreased in cerebral ganglia ablated group and significantly increased in ganglionic

extract injected group on seventh day. The content was significantly increased in the gonad of both ablated and injected group on seventh day. On twelfth day the content significantly increased in foot and gonad of both groups, while the content significantly decreased in mantle from both group. During monsoon season the content significantly increased in hepatopancreas, gonad and foot of injected group as compare to ablated group. While on twelfth day the protein content was considerably decreased in all five tissues (mantle, hepatopancreas, gonad, foot and gill) of both group. During winter season on seventh day the protein content was significantly decreased in gonad, foot and gill of both group, while no significant changes were occurred on twelfth day in both groups. The results are discussed in the light of metabolic shifts in the bivalves due to neuro-endocrine manipulation.

A-P-43

**SEX DIFFERENTIAL PLAY BEHAVIOUR IN JUVENILE
HANUMAN LANGUR, *Semnopithecus entellus***

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Key words: *Semnopithecus entellus*, Sex Differential, Juvenile play

As in many of the species, play is an important feature of the behavior of immature primates. Every reader has a reasonable idea of what is meant by the term play and most, without prior experience, could recognize and distinguish it from nonplay. The present study deals with play behaviour among juvenile langur. Variables under objective were age changes, sex of the infant, age and sex of the interacting animals and the organizational pattern of elements within play behaviour category.

Male juvenile in all respects were more playful comparatively female juvenile. Sex differences were also obvious in terms of interactional patterns. Male juvenile exhibited overdue preference for same-sexed peers whereas among females this pattern was not

evident. Certainly, the majority of interactions were restricted to infants and juveniles. Male juveniles spend much of their non-feeding time engaged in social play. Juvenile langur engaged in 5 to 10 play bouts per hour, whereas adults rarely played. In present the study show becomes much more frequent during the juvenile period, and then declines steadily during adolescence.

A-P-44

**FLOCKING BEHAVIOR OF INDIAN MYNA
ACRIDOTHERES TRISTIS (LINNAEUS) IN AHMEDNAGAR,
MAHARASHTRA.**

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Key words: Indian Myna, Breeding Season, Roost Arrival, Flock Size, Flocking Behavior.

The Indian Myna *Acridotheres tristis* (Linnaeus) (Sturnidae: Passeriformes) is familiar urban bird. The birds roost communally throughout the year in large number either independently or forming mixed species roost. The flocking behavior of Indian Myna *Acridotheres tristis* (Linnaeus) was studied during post-breeding (August 2010- October 2010) and pre-breeding (November 2010 – March 2011) season at Ahmednagar. Monthly data of the flock size with respect to their arrival time was recorded at garden and parking of the New Arts, Commerce & Science College, Ahmednagar. The present paper deals with detailed observation on the flock size behavior of Indian Myna at Ahmednagar (Maharashtra).

A-P-45

**A BRIEF ACCOUNT OF INSECT DIVERSITY OF
ARUNACHAL PRADESH**

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Key words: Arunachal Pradesh, Diptera, Diversity, Fauna, Insect.

Arunachal Pradesh covers an area of 83743 sq. km. most of which are forest areas with out any human intervention. Preliminary study during last few years reveals occurrence of at least 10 species of the non-biting midges (Diptera: Chironomidae) belonging to different genera and at least 10 new species of *Chironomus* Meigen, *Microtendipes* Kieffer, *Parapsectra* Reiss and *Paratendipes* Kieffer have been identified. Studies of biting midges of the family Ceratopgonidae (Diptera) fauna accumulated during the survey are in progress. Previously, two sterpsipteran species of the genera, *Myrmecolax* Westwood and *Lychnocolax* Bohart were also reported from the area.

A-P-46

**TO STUDY THE ANTIDIABETIC EFFECTS OF *MORINGA
OLEIFERA* (LAM.) ON PLASMA GLUCOSE LEVEL IN
CAVIA PORCELLUS (LINN.).**

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Key words: Antidiabetic, *Cavia porcellus*, *Moringa oleifera*,
Plasma glucose level.

The present project has been undertaken to evaluate the antidiabetic effects of *Moringa oleifera* leaves on the plasma glucose level in a mammal *Cavia porcellus*. Moringa leaves were fed to the

experimental animals at the rate of 40 grams/kg body weight of the experimental animal/day for different time durations i.e. 7 days, 15 days, 30 days, 45 days and 60 days. A gradual depletion in the plasma glucose level from the control value (143mg/dl.) was recorded which was proportional to the duration of feeding schedule. The values of plasma glucose level recorded were 130mg/dl., 119mg/dl., 111mg/dl., 108mg/dl. and 105mg/dl. respectively and show a depletion ranging from 9.09% to 26.57%. The depletion in the plasma glucose level was probably due to the presence of some active ingredients such as β - sitosterol, moringine, rutin, benzyl isothiocynate etc. in the Moringa suggesting antidiabetic properties.

A-P-47

**DEVELOPMENT OF A SIMPLE AND NOVEL LOOP
MEDIATED ISOTHERMAL NUCLEIC ACID
AMPLIFICATION (LAMP) ASSAY FOR RAPID
DETECTION OF ROTAVIRUS INFECTION IN ANIMALS
AND HUMANS**

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Key words: Rotavirus, RT-LAMP, RT-PCR, NSP4 gene

Rotavirus (RV) is the leading cause of acute viral gastroenteritis throughout the world. We describe here the development and validation of a sensitive, specific, and rapid Reverse-Transcription Loop Mediated Isothermal Amplification (RT-LAMP) assay to detect rotavirus (RV) infection in animals and humans. After evaluating the sensitivity and specificity, the assay was deployed to detect RV in the field samples collected from animals (buffalo, cow and pigs) and human subjects. The results indicated the suitability and simplicity of the test and in comparison to diagnostic RT-PCR assay; RT-LAMP appeared to be rapid, specific, and cost-effective, with the potential for field use in developing countries for RVA molecular epidemiology.

A-P-49

EFFECT OF LEAF EXTRACTS OF ARGEMONE MEXICANA AND NERIUM OLEANDER ON THE DEVELOPMENT OF HELIOTHIS ARMIGERA (HUB.)

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Key words: *Helicoverpa armigera*, *Argemone mexicana*, *Nerium oleander*, chloroform and methanol

Larvae of *Helicoverpa armigera* (Hub.) were exposed to different concentrations of chloroform and methanol extracts of leaves of *Argemone mexicana* and *Nerium oleander* in artificial medium. The larval period was prolonged and the larval pupal intermediates and abnormal pupae were observed. At higher doses there was mortality in larval stage. The percentage of the adults emerged was reduced and many abnormal adults were emerged. The extracts can be sprayed on the growing vegetables for their protection against the *Helicoverpa armigera* infestation where chemical pesticides are harmful.

A-P-50

HAEMATOLOGICAL CHANGES IN THE BLOOD OF AIR BREATHING CAT FISH, CLARIAS BATRACHUS (LINN.) FED ON EARTHWORM (PERIONYX SANSIBARICUS).

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Key word- *Clarias batrachus*, Haematological changes, Goat liver, Earthworm (*P.sansibarichus*).

Investigation was carried out to assess the effect of feeding earthworm on Haematological parameter of the freshwater cat fish

Clarias batrachus Young, as bio-indicator of health status. A control group was set up with fish fed on goat liver and also test group was set up with fish fed on protein diet earthworm (*P.sansibarichus*). Earthworm fed group showed a gradual increase in haemetological parameters of total leucocytes (7.4 ± 4), Neutrophils(58.2 ± 1.25), lymphocytes (38.8 ± 0.5), monocytes (1.1 ± 0.5), eosinophils (1.4 ± 0.4), basophils(0.5 ± 0.4), total red blood cell (3.85 ± 0.1), haemoglobin (10.1 ± 2.45), hematocrit (8.5 ± 0.6706), mean corpuscular volumn (100.1 ± 7.245), mean corpuscular haemoglobin (34.1 ± 5), mean corpuscular haemoglobin concentration (34 ± 6), Red cell distribution width (16.9 ± 7.63) platelet distribution width (14.4 ± 1.4), platelet (251 ± 3.5), mean platelet volume (8.7 ± 2.5), erythrocytes sedimentation rate (10 ± 2), which are significantly greater ($p < 0.05$) than haematological value of fish fed the control diet goat liver with leucocytes (7.4 ± 1.54), neutrophils (54.47 ± 1.89), monocytes (0.6 ± 0.5), eosinophils (2.5 ± 0.5), lymphocytes (34.6 ± 1.7538), basophils (0.2 ± 0.1), total RBC (1 ± 0.25), haemoglobin (7.6 ± 2), hematocrit (6.88 ± 1), mean corpuscular volume (91.35 ± 11.4), mean corpuscular haemoglobin (30.57 ± 6.244), maen corpuscular haemoglobin concentration (32 ± 5), red cell distribution width (14.4 ± 7.55), platelet distribution width (13.2 ± 4), platelet (249.5 ± 10), mean platelet volume (6.2 ± 2.2), erythrocytes sedimentation rate (8 ± 3) which indicate sound physiological condition, sufficient blood production and suitability of food.

A-P-51

ROLE OF EARTHWORMS IN SOIL FERTILITY THROUGH THE PRODUCTION OF BIOGENIC STRUCTURE

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Key words- Earthworm, midden, soil organic matter, stabilization.

Eartworms are soil invertebrates that play a key role in recycling organic matter in soils. Earthworms influence the supply of nutrients through their tissues but largely through their burrowing activities,

they produce biogenic structure in the soil or in the soil surface. This study aimed at evaluating the effects of earthworms on soil organic matter (SOM) dynamics and aggregation, as influenced by production of biogenic structure. In the biogenic structure i.e. midden microbial activity was much more than the normal soil. Initial bacterial population in soil was $6.13 \pm 0.907 \times 10^9$ and $15.7 \pm 0.665 \times 10^9$ in midden that was 156.11 % more than the soil bacterial population. More significant effect is the concentration of large quantities of nutrients (N, P, K) that are easily assimilate by plant in fresh midden deposition. The increased transfer of organic C and N into soil aggregates indicates the potential for earthworms to facilitate soil organic matter stabilizer and accumulation in agricultural system.

VETERINARY SCIENCE (ORAL)

V-O-01

PURIFICATION AND IMMUNOBIOCHEMICAL CHARACTERIZATION OF SHEEP HYDATID CYST FLUID ANTIGEN.

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Keywords: Sheep Hydatid cyst fluid antigen, purification, Characterization, SDS PAGE, Gel filtration Chromatography, ELISA, Western Blot.

In the present study sheep crude hydatid cyst fluid antigen (SCHCFA) was prepared by ammonium sulphate precipitation, centrifugation and dialysis. SDS-PAGE of SCHCFA showed seven polypeptides. After gel filtration chromatography on Sephacryl S 200 two polypeptides of 66.5 kDa and 60.2 kDa were shown on 12.5% SDS – PAGE. Double immunodiffusion test, indirect ELISA and western blot analysis demonstrated that the 66.5 kDa and 60.2 kDa polypeptides were immunoreactive when treated against hyperimmune sera and known positive sera. It was concluded that these polypeptides (Purified sheep hydatid cyst fluid antigen) might prove to be a promising tool for the diagnosis of hydatid disease.

V-O-02

ROLE OF FUNCTIONAL DAIRY FOODS IN NUTRITIONAL AND HEALTH SECURITY

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National Dairy Research Institute, Karnal

Keywords: Functional Dairy foods, Nutraceuticals, Diet related diseases.

The world's demand for food is becoming greater than ever, according to the USA's census bureau's. World population clock, the current world population of 6.8 billion will exceed 9 billion by 2050 out of which around 17 to 20 % population will reside in India. Ensuring nutritional as well as health security to ever growing population is quite a challenging task, moreover increasing consumer concern over nutrition, obesity and related diseases. Characteristics of the developed world are becoming serious public health problems in countries with wide spread food insecurity. Children suffering from undernutrition today could WELL be afflicted with chronic diseases of development as adults in this regard the functional foods are an emerging field in food science due to other part of the world because of some common diet related disease conditions. Role of food as an agent for improving health has proposed this new class of food, called functional food with positive effects on host health or well being beyond their nutritional value. Increasing health and wellness concerns have moved functional foods and beverage from a niche segment to a mainstream product. United States, Europe and Japan represent the major worldwide, as stated by new market research report on functional foods and drinks. According to Leatherhead Food Research, the international market for functional food and drinks, defined as those making health claims, has increased by more than 31% between 2006 and 2009 to US \$ 25.1 billion and 2015 US \$ 27.1 billion with the US and European markets driving the growth. Milk and dairy products have been associated with health benefits for many years containing bioactive peptides, probiotic bacteria, antioxidants, vitamins, specific proteins, oligosaccharides, organic acids highly absorbable, calcium, conjugated linoleic acid and other biologically active component with an array of bioactivities, modulating microbial growth and immunoregulation. Though the demand for dairy products with enhanced health attributes is very high. The manufacture of these foods by Indian dairy industry is still at infancy. In the present paper the problems and challenges that encountered in the development of functional dairy foods will be discussed.

V-O-03

**HAEMATOLOGICAL ANALYSIS OF TWO CARNIVORES
OF NANDANKANAN ZOOLOGICAL PARK OF ORISSA**

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Vihar, Bhubaneswar- 751 004 (Orissa)

Key words: Tiger, hyena, haematology, carnivore, cytomorphometry.

The present study aims at haemocytological analysis of two species of captive carnivores namely tiger and hyena of Nandankanan Zoological Park, Bhubaneswar, Orissa, India. Blood samples of tiger and hyena were collected, processed and analyzed for various blood parameters like haemoglobin concentration (Hb), packed cell volume (MCV), mean corpuscular haemoglobin (MCH), mean corpuscular haemoglobin concentration (MCHC), total leucocyte count (TLC), were also analyzed for morphological and morphometrical studies (Cytomorphometry) of the various blood corpuscles. The detailed values of stated parameters are recorded and discussed.

V-O-04

**SUSTAINABLE SHEEP REARING BY GRAZING WITH
SUPPLEMENTATION**

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Keywords: Sheep, supplementation, concentrate, UMMB.

An experiment was conducted to study the economic benefits of concentrate and Urea molasses mineral block (UMMB) supplementation to grazing sheep. In two growth trials main season and off season born lambs, eight per group were grazed without supplementation, (T₁), with concentrate (T₂) and UMMB (T₃)

supplementation. In both trials T₂ group had higher net income (Rs. 7147.18 and 4629.50) followed by T₃ group (Rs. 6392.88 and 3577.55). Lowest net income was observed for T₁ group (Rs. 5370 and 2880). Main season lambs fetched more net returns than off season lambs. Supplementation helped to attain better market weights in shorter periods. The need for supplementation was more pronounced in off season lambs than in main season lambs. Rearing sheep by grazing with supplementation is more sustainable since it generates more net income for the use same resources.

V-O-05

PARTIAL PURIFICATION AND CHARACTERIZATION OF SHEEP MUCOSAL LAYER PROTEINS

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Keywords: Sheep, Mucosal protein, LPLC, RP-HPLC, SDS-PAGE

Partially purification and characterization of mucosal of epithelial proteins of sheep intestine, trachea and uterus was performed using LPLC, RP-HPLC and 12.5 % SDS – PAGE sheep intestine showed lowest concentration of cataionic proteins and sheep uterus being the highest. Protein extract of sheep intestine, trachea and uterus were separated into 3, 3 and 4 peaks respectively and when subjected to LPLC. Analytical RP-HPLC separated intestinal proteins and tracheal proteins into 6 and 7 peaks respectively. 12.5% SDS-PAGE detected 11 protein bands (166.3 kDa to 7.9 kDa) in sheep intestine, 16 bands (166.3 kDa to 9.3kDa) in uterus and 14 bands (166.3 kDa to 9.3 kDa) in trachea, 166.3 kDa, 117.2 kDa and 100.0 kDa proteins are found common in all the tissues.

V-O-06

PORROCAECUM BAYLISI, SP. N. FROM THE INTESTINE OF SHEEP (ABNORMAL HOST) FROM MEERUT REGION.

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Keywords: *Porrocaecum*, Nematoda, Parasites of Sheep & Fowl.

During the study of parasites of sheep Meerut region, male and females of a new species of nematode genus *Porrocaecum* (Railleit and Henery, 1912) recovered from the small intestine of sheep is described. Unlike other known species showed new taxonomic character and other morphometric variations. *Porrocaecum* was larger nematode obtained from unnatural host sheep otherwise *Porrocaecum* has been reported from birds. The above nematode was cylindrical and whitish. In the present study the morphometry of male worm has been described. The above new nematode belongs to the superfamily – Ascaridoidea, family – Ascarididae and subfamily- Anisakinae.

V-O-07

FACTORS AFFECTING SUSTAINABLE DEVELOPMENT OF LIVESTOCK FOR FOOD SECURITY IN INDIA.

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Keywords: Livestock, Sustainable Development, Indigenous Breeds, Organic Farming.

Livestock are a major entity making strong contributions to food security in India. In view of higher rate of progress in livestock production in the recent decades, there is an increased dependence of food security on the livestock especially in the developing countries. However, the sustainability of the existing livestock production systems has been affected by the increased use of exotic

breeds, industrial farming and the consumption of inorganic pesticides. Support to the extensive system of production with indigenous livestock breeds would enhance sustainability of agriculture and livestock system to further support food security in the country.

V-O-08

**EFFECT OF STORAGE TEMPERATURE CONDITIONS ON
SENSORY AND TEXTURAL ATTRIBUTES OF
FUNCTIONAL *DODA BURFI* (INDIAN MILK CAKE)**

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Doda burfi (Indian milk cake) is a hitherto indigenous sweetmeat of Northern India and is considered a delicacy to be served on special occasions. The product bears distinguish features such as granular texture, caramelized flavor, dark brown colour with sweet and pleasant aroma of incorporated nuts and germinated wheat. Effect of different temperature conditions on sensory and textural attributes of functional *doda burfi* (Indian milk cake), prepared from a combination of oat fiber and diesol™ (hydrolyzed gum acacia) (soluble fiber), and organic salt of calcium was studied. The product was kept at 25 and 40°C and the sensory variables like colour, body and texture, flavour, sweetness and overall acceptability values when analyzed subjectively were found significant ($p < 0.05$) whereas the same were found non-significant using CIE-LAB. At both temperatures, sensory scores for *doda burfi* decreased but the downfall was more prominent at 40°C compared to 25°C. Similarly textural attributes like hardness, adhesiveness, cohesiveness, gumminess and chewiness showed a significant decreasing trend ($p < 0.05$) when kept at 40° C whereas the same was found non-significant at 25° C. Though the sensory scores were not very much high after a shelf life of 27 days at 25° C and 15 days at 40° C but can be considered considering the health benefits of the product in mind. Product after storage period analyzed was found to provide

50% per cent of the daily requirement of the fiber and is shelf stable at ambient room temperature conditions.

V-O-09

**PROBLEMS OF UNFERTILIZED EGGS IN THE HYBRID
AND RECIPROCAL OF MULBERRY SILKWORM
BOMBYX MORI L.**

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Key words : Sericulture, Silkworm, *Bombyx mori*, Hybrid,
Reciprocal, Eggs, Infertility

The silkworm rearing basically depends on the quality breed, seed & feed, where the breed refer to high hetrotic vigour, seed to eggs and feed to the leaf, but the quality is considered a common factor. The quality seed is the backbone of sericulture industry which need proper infrastructure, appropriate technologies and deep sense of involvement of manpower for operations and production of good quality seed. Recently it has been noticed that drawback in silkworm rearing followed by poor productivity is recorded due to low rate of hatching and infertility in eggs. The similar question regarding the problems of above average unfertilized eggs in reciprocal of Dun 6 x Dun 22 hybrid also raised. The literature revealed that the hatchability is very strongly correlated with fertility of egg while the rate of fertility might be affected due to various factors, i.e. unfavorable climatic conditions, mating time & period, egg washing & treatment, cold storage of egg and moth, quality of feed, diseases & microbial infection, rearing approach and self involvement. No doubt the problems of infertility in eggs related to various factors are well settled and appropriate technologies are developed, but the affect of climatic conditions, feed & mating behavior can not be neglected because the temperature ⁰C & relative humidity % have variable affect even in macro changes, feed on quality and mating on rate of fertility. So a programme to carryout a study on the

problem of unfertilized eggs in Dun 6 x Dun 22 breeds of mulberry silkworm & its reciprocal was designed.

The study was undertaken during two seasons, i.e. autumn & spring season of the year 2009 & 2010. The study material, i.e. silkworm eggs of Dun 6 x Dun 22 breeds were taken from stock lots. Under methodology during rearing of silkworm two factors namely feed (Good & coarse mulberry leaf) and climatic conditions (Temperature °C & Relative Humidity%) while during grainage two other factors i.e. mating frequency of male and mating period were taken for study. Accordingly the larvae were fed with good & coarse mulberry leaf and reared under normal & prescribed conditions. As the rearing over and cocoons harvested, after selection same were processed for grainage. As per combinations the eggs (df/s) were prepared were observed for hatching in next season. The silkworm rearing and grainage were conducted following the standardized methods. The data so collected were analyzed for inference and conclusion were made for further improvements.

The results revealed that there was a variation in egg infertility & hatchability but not remarkable. While the moth fed in larval stage with good quality of mulberry leaf produced lesser number of unfertilized eggs in compared to coarse leaf. The moth reared in larval stage under both normal & prescribed temperature °C & relative humidity % did not show any significant difference in unfertilized eggs as the rearing conditions were congenial, however the infertility was more in normal conditions (NTP). Under mating behavior female moth mated for 02 hours showed more number of unfertilized eggs laid followed by the moth mated for 03 hours in autumn season. The eggs laid by female moth which were mated with male for IIIrd times showed more number of unfertilized eggs followed by the female moth mated for IIInd time. The female moth mated with fresh male i.e. Ist time also shown unfertilized eggs in autumn rearing season but percentage was less comparatively so seasonal affect can not be ruled out. While comparing the results of Dun 6 & Dun 22, the infertility was more in case of Dun 22 (self crosses) in autumn, and in reciprocal Dun 22 X Dun 6. The year wise assessment did not show any reasonable affect on infertility.

On conclusion it can be say that it may multifactor problems of unfertilized eggs.

V-O-10

**MOLECULAR CHARACTERIZATION OF AVIAN
INFLUENZA VIRUS ISOLATES FROM INDIAN POULTRY**

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Key words: avian influenza virus; Indian origin; isolate; molecular techniques; RT-PCR.

The present study was carried out to characterize the avian influenza virus of Indian origin by detailed molecular techniques. For this purpose, 1,423 number of tissue samples were processed for virus isolation in avian influenza virus antibody negative chicken embryos of 9-11 day old. RT-PCR was conducted from the RNA extracted from the allantoic fluid of avian influenza virus inoculated chicken embryos. A total of 515 samples were tested by RT-PCR and positive bands of specific amplification of 488 bp of HA gene were obtained by one step RT-PCR with HSAIVH9F and HSAIVH9R subtype specific primers from the three samples. A 555 bp product which included HA gene cleavage site was obtained using the primers HSAIV47F and HSAIV47R from the cDNA synthesized from the allantoic fluids of all the three isolates. The H9 subtype was also confirmed by amplifying another region of HA gene using primers H9HA 692-714 and H9HA 1011-988 which gave rise to 319 bp amplicon. The 488 bp, 555 bp and 319 bp fragments of three isolates were cloned into pGEM-T easy vector and sequenced. The results indicated species variation among sequences of H9N2 isolates.

V-O-11

**STUDIES ON OF LACTOBACILLUS CULTURES TO
ENHANCE THE BIOFUNCTIONAL ATTRIBUTES OF
FERMENTED MILK**

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(India)

Key Words:- Lactobacillus, Angiotensin-converting enzyme (ACE), antioxidant and caseinophosphopeptides (CPPs)

The health benefits of dairy products are the result of biologically active components that are present in the native milk and also, due to their suitably modulated activities produced through the action of bacteria, in the fermented or sour milk products. In this study, the total of 24 lactic acid bacteria (LAB) strains were obtained from National Collection of Dairy Culture (NCDC), NDRI, Karnal, Haryana (India). The fermented milk prepared using these strains were evaluated for the bio-functional attributes such as antioxidant activity, angiotensin-converting enzyme (ACE) inhibitory activity and level of caseinophosphopeptides (CPPs). The biological activity was measured in the supernatant of the fermented milk after centrifugation. The maximum caseinophosphopeptides (CPPs) was found in a supernatants of the milk fermented with *Lactobacillus fermentum* (3.9 mg/ml) followed by *Lactobacillus casei spp. casei* (3.6 mg/ml), whereas the minimum value was observed in supernatants of *Lactobacillus acidophilus* (0.27 mg/ml). The highest values for antioxidant activity was found 1.35 μ M TEAC / mg of protein in the supernatant of milk fermented with *Lactobacillus acidophilus* and ranges from 0.007 - 1.35 μ M TEAC / mg of protein. The lowest IC₅₀ values for angiotensin-converting enzyme (ACE) inhibitory peptides was found 31.71 μ g of protein/ml in the supernatant of milk fermented by *Lactobacillus paracasei spp. paracasei* whereas the highest 372.62 μ g of protein/ml in case of *Lactobacillus delbrueckii ssp. lactis*. These functional properties of fermented milk depend on the type of *Lactobacillus* culture along

with incubation period, pre treatment of milk and amount of culture used. These findings can be further exploited for the production of health promoting fermented products.

V-O-12

**MAN-MONKEY CONFLICT FOR NATURAL RESOURCES
DUE TO HUMAN POPULATION EXPLOSION AND
EXPANSION IN URBANIZATION**

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Key word: - Man-Monkey conflict, langur, natural resources, urbanization

One of the most significant developments in human relationships in the last twelve thousand years, after the advent of agriculture and especially after the growth of industrialization has been the aggregation of vast numbers of humans in cities. And this process called urbanization has brought in its own problems. Human population growth and activities like deforestation, agriculture and urbanization lead to an ever-increasing encroachment on wildlife habitats. Reduction of wild animals' natural habitats forces species unable to adapt to altered habitats into small marginal patches. Simultaneously with the development of human urban settlements, a few non human primate species have also become urbanized, with the difference that while man created his own city environment by building homes and other requisite, the non-human primate species which took to urbanization simply usurped the existing either ruined or living human dwelling facilities and adopted themselves to live in such new environment. Study was to assess the influence of resource abundance and distribution on group size and composition in the common langur (*Semnopithecus entellus*). Group size and composition of the common langur was found to increase with an increasing degree of clumping of resources. Increase in resource

abundance coincided with decreased group size, probably an artifact of the effect of distribution of resources, which in itself was negatively correlated with resource abundance. The effect of resources on adult males was stronger than on adult females.

VETERINARY SCIENCE (POSTER)

V-P-01

AFLATOXIN LEVELS IN FEEDS AND FEED INGREDIENTS OF LIVESTOCK AND POULTRY IN KERALA

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Key words: - aflatoxin, livestock feed, feed ingredients

Levels of total aflatoxin and aflatoxin b1 in feeds ingredients, collected from various farms of Keralla, were analyzed using elisa based fluoroscopy. the **levels** of aflatoxin varied widely (1-400ppb) in poultry, duck and quail feeds compared to the acceptable dietary limits. aflatoxin b1 formed 66-82% of total aflatoxin. the **levels of** aflatoxin varied widely in feed ingredients (1-680ppb) and the level was very high in maize and ground nut cake .since jowar and broken rice are low in toxin levels, they can be used to replace maize. Prolonged storage of feeds and feed ingredients in warm humid conditions should be avoided to minimize the risk of aflatoxin contamination

V-P-02

CLONING, CHARACTERIZATION AND EXPRESSION OF MYOSTATIN GENE IN CHICKEN

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Key words:- Characterization . chicken, expression, myostatin

A study was conducted to characterized Myostatin gene and to explore m RNA expression profile in broiler and layer chicken. the myostatin cdnas of broiler and layer varies of chicken were cloned and sequenced .the total length of the cDNA was 1128 bp. the difference of nucleotides and amino acids between broiler and layer

varies were c (alanine) > t (valine), c > t and c (praline) > t (leucine). The gene expression of profile was different between broiler and layer strains. The pattern of Myostatin expression was significantly associated with body weights in Chicken

V-P-03

COMPARATIVE ANALYSIS OF PEDUNCLE AND LOOP OF MODAL AND NALIA TASAR COCOONS OF ORISSA

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Key words: - Modal, Nalia, Univoltine, Bivoltive, Peduncle, loop, *Antheraea Mylitta*

Antheraea mylitta (Drury) is a tropical tasar-silk producing insect belongs to the superfamily Bombycidae and family Saturniidae. Its population occupying different ecology and geographical regions shows a certain degree of phenotypic variability, for which they are known as “eco-races”. The present paper throws some light on the comparative analysis of peduncle and loop of Modal and Nalia tasar cocoons of Orissa. Modal is shorea based ecorace of tropical tasar silk worm *Antheraea mylitta* (Drury) exclusively wild in nature produces the heaviest cocoon with highest silk content among all the sericigenous lepidopterans of the world. Its cocoon is characterized by a strong and stout peduncle with clear round ring. It behaves Univoltine in higher altitude above 600 m ASL. At medium altitude (301 to 600 m ASL), it behaves bivoltine. This bivoltine ecorace is called Nalia which multiplies in rainy and autumn season. Qualitatively Nalia ecorace cocoons are inferior to that of true Modal Univoltine cocoons and characterized by slender and long peduncle with more than one ring. The comparative analysis of peduncle and loop of Modal and Nalia tasar cocoons is discussed and further studies on their population and ecological genetics are suggested.

V-P-04

DUCK MMORTALITY IN INDIGENUS AND EXOTIC BREEDS IN AN ORGANIZED FARM

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Key words: Duck, mortality, breeds disease, season

Duck mortality in ages , months, seasons and causes confirmed in two financial years 2009-2010. average mortality was 13.57% mortality in desi, khaki campebell, white pekin and moti were (20.1), (65.9),(6.78) and (7.2%) respectively . highest death in may, (33.77) then april (28.5,) june (7.79), february (7.95), november (7.04), october (5.49) january (4.25), december (3.65), august (1.56) july (1.09), march (1.31) and september (0.93). summer took most mortality (84.54) followed by winter (10.49) and rainy season (4.96). duck deaths were predation (21.62), enteritis (19.70) debility (19.26) corneal opacity (10.81), inanition (7), septicemia (5.16), pneumonia (3.08), hepatitis (3), nephritis (2.60), wound complication (1.68), ophalitis.

V-P-05

EFFECT OF ENTEROTOXIMIA VACCINATION ON SEMEN CHARACTERISTICS OF MALE MALABARI BUCKS

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Key words: enterotoximia vaccination, buck, semen characteristics

Semen sample were collected from adult healthy Malabari bucks before and after enterotoximia vaccination up to one month at weekly intervals and there after at 60th day of vaccination. On evolution semen sample it was found that there was no significant

effort of vaccination on gross motility, volume and percentage of live spermatozoa. Significant difference ($p < 0.05$) was observed before and after vaccination between percentage of sperm responded to hypo-osmotic swelling test and after two months indicating that the change in semen characteristics due to enterotoxemia vaccination is responsible.

V-P-06

**COMPARATIVE SEQUENCE ANALYSIS OF POX VIRUS
A32L GENE ENCODED ATPASE PROTEIN AND
CARBOXYL TERMINAL HETEROGENEITY OF INDIAN ORF
VIRUSES**

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Key words:-A32L gene, ATPase, Orf virus, Poxvirus

Thirteen orf virus (ORFV) isolated from natural outbreak in sheep and goats belonging to different geographical region of India were analyzed of ATPase proteins revealed highly conserved N-terminal region with five different motifs among all Poxvirus and divergent carboxyl terminus among all Indian (ORFV) isolates. A homology model and secondary structure prediction of N-terminal region of (ORFV) A32L revealed that most of the Poxviruses including (ORFV) ATPase proteins belong to a distinct clade of the HerA/FstK super family. The study indicates the circulation of heterogeneous strains of ORFV in India and possible of differentiation of ORFV strains.

V-P-07

**CLONING, CHARACTERIZATION AND EXPRESSION OF
MYOSTATIN GENE IN CHICKEN**

Bhattacharya T.K.

Project Directorate On Poultry, Hyderabad-500030

Key words:- Avian influenza virus; Indian origin; isolate; molecular techniques; RT-PCR

The present study was carried out to characterize the Avian influenza virus of Indian origin by detailed molecular techniques. for this purpose , 1,432 number of tissues samples were processed for virus isolation in Avian influenza virus antibody negative chicken embryos of 9-11 days old RT-PCR was conducted from the RNA extracted from the allantoic fluid of avian influenza virus innoculaed chicken embryos. A total of 515 samples were tested by RT-PCR and positive bands of specific amplification of 488 bp of HA gene were obtained by one step RT-PCR with HSAIVH9F and HSAIVH9R subtype specific primers from the three samples. A 555 bp product which included HA gene cleavage site was obtained by using primers HSAIVH47F and HSAIVH47R from the cDNA synthesized from allantoic fluid of all the three isolates. The H9 subtype was also confirmed by amplifying another region of HA gene using primers H9HA 692-714 and H9HA1011-988 which gave rise to 319 bp amplificon. The 488 bp 555 bp and 319 bp fragments of three isolates. were cloned into pGEM-T easy vector and sequenced The result indicated species variation among sequences of H9N2 isolates

V-P-08

**SUSTAINABLE LIVELIHOOD THROUGH BACKYARD
POULTRY REARING BY FEW WOMEN FARMERS OF
ORISSA”**

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Key words: Backyard poultry, CARI- Devendra, Mortality, Vaccination.

The study was conducted with 150 women of Keonjhar, Sambalpur and Mayurbhanj district of Odisha who reared CARI-Devendra (a dual purposed poultry birds with colored plumage) under extensive system of management. Twenty five numbers of day old chicks. 10kg of chicks feed (C.P.23%,ME: 2900 Kcal), one feeder, and one drinker were supplied to each farmers as input who constructed low cost indigenous poultry houses (50 sq.ft. floor space) with locally available materials like bamboo and mud chicks were brooded for initial 15 days after which they were allowed to go to collect feed from surrounds. Kitchen wastes, leftover food of the family and other waste feed materials were offered to the birds regularly besides clean water. Vaccination against Rnikhet disease (lasota on 7th day and R2B injection at 3rd month) was undertaken. Monthly body weight age at first egg (days), egg number and weight(g) up to 50 weeks of age, mortality pattern along with analysis of feed available to the birds (crop contain) were recorded . Economics were calculated on cost benefit ratio it was observed that substantial amount (more than 15,000/- Rupees)

V-P-09

**EVALUATION OF QUALITY OF BRANDED LASSI SOLD
IN MARKET**

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Keywords : chemical, LAB, Lassi, Market, Quality, Sensory

Lassi refers to serve beverage prepared from dahi, which offers benefits associated with fermented milks. With advancement of technology and modernization of dairy industry, various dairy products are available in market under different brand names; lassi is one of them. Quality of lassi differed due manufacturing technique, ingredients used, consumers liking etc. Therefore no two brands, even two lots within the brand produce identical quality products. However higher degree in sensory acceptability and sufficient population of live LAB are pre-requisite to any fermented milks in general and lassi in particular. With this view, evaluation of branded lassi sold in Ahmednagar market was done in the laboratory, Department of Animal Science and Dairy Science, Post Graduate Institute, MPKV, Rahuri. Conclusions are presented based on results obtained.

The branded lassi sold in market had poor in sensory quality as compared to laboratory made lassi. Of course branded lassi were also sensorily acceptable but reduced degree. Freshness of laboratory made lassi might have contributed towards higher sensory scores.

Considerable variation in chemical composition was noticed in the samples of moderate, acceptable and within the range of 0.74 to 0.77 = 0.019% (La).

Further, it was noted that the branded lassi had contained sufficient population of live LAB (4.333×10^7 cfu/ml) to exert beneficial effect on consumers as fermented products.

V-P-10

**HIGH PERFORMANCE LIQUID CHROMATOGRAPHY
FOR THE SCREENING OF DRUG (DICLOFENAC)
RESIDUES IN SOME TISSUES OF MICE**

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Key words : Diclofenac sodium, mice tissue, HPLC.

Diclofenac Sodium is chemically, sodium salt of 2 – [2,6-dichlorophenyl] amino] benzene acetic acid having anti-inflammatory and analgesic properties. The present study was designed with the objectives to standardize the procedure for extraction, detection and quantification of residues of diclofenac sodium in the major tissues viz. liver, kidney, intestine and the testis of the mice (*Mus musculus*) employing high performance liquid chromatography (HPLC), after oral administration of diclofenac @ 3 mg/kg body weight for consecutive 10 days. The drug was chromatographed on a C-18 column using a mixture of acetonitrile : water in the ratio (85:15) as mobile phase at a flow rate of 1.0 ml/min. Diclofenac was eluted as sharp symmetrical peak ranging between 2.12 – 2.25 min of retention time. The recovery percentage of the drug analyzed in the liver, kidney, intestine and in the testis was 85.70%, 67.17%, 58.76%, and 67.12% respectively. The results have been discussed.

V-P-12

**RARE OCCURRENCE OF KERATINIZED STRAP
(ANITSCHKOW) CELLS (KSC-A) IN BUCCAL MUCOSA OF
HUMAN ORAL SQUAMOUS CELL CARCINOMA**

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Key words: Oral squamous cell carcinoma (OSCC), cytopathology, exfoliated cytosmears, cytological pleomorphism, keratinized strap (Anitschkow) cells (KSC –A), Nuclear Cytoplasmic (N/C) ratio.

Cytopathology of human oral squamous cell carcinoma (OSCC) exhibits cytological pleomorphism. During the present case-control study, a rare type of ribbon like keratinized flat cells were observed in different sites of buccal mucosa of human being suffered from OSCC. Based on the structural peculiarities, these cells were renamed as keratinized (Anitschkow) strap cells (KSC-A). Cytoplasm was observed to be keratinized and nucleus was deeply stained and found to be either narrow spindle, rod or bar-shaped. Cytometrically, the nuclear- cytoplasmic (N/C) ratios of the KSC-A was calculated to be 1:11.2 in males and 1:11.3 in females which are more than those of normal counterparts. Rare occurrence, cellular keratinization, hyperchromasia and increased N/C ratio in both sexes indicate the state of malignancy and thus, the present finding has a practical value in early detection and diagnosis of the OSCC [atients. conditions. The increase in cholesterol and alkaline phosphatase, decrease in urea, acid.

V-P-13

**EVALUATION OF QUALITY OF BRANDED LASSI SOLD
IN MARKET**

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Key words : chemical, LAB, Lassi, Market, Quality, Sensory

Lassi refers to serve beverage prepared from dahi, which offers benefits associated with fermented milks. With advancement of technology and modernization of dairy industry, various dairy products are available in market under different brand names; lassi is one of them. Quality of lassi differed due manufacturing technique, ingredients used, consumers liking etc. Therefore no two brands, even two lots within the brand produce identical quality products. However higher degree in sensory acceptability and sufficient population of live LAB are pre-requisite to any fermented milks in general and lassi in particular. With this view, evaluation of branded lassi sold in Ahmednagar market was done in the laboratory, Department of Animal Science and Dairy Science, Post Graduate Institute, MPKV, Rahuri. Conclusions are presented based on results obtained. The branded lassi sold in market had poor in sensory quality as compared to laboratory made lassi. Of course branded lassi were also sensorily acceptable but reduced degree. Freshness of laboratory made lassi might have contributed towards higher sensory scores.

Considerable variation in chemical composition was noticed in the samples of moderate, acceptable and within the range of 0.74 to 0.77 = 0.019% (La).

Further, it was noted that the branded lassi had contained sufficient population of live LAB (4.333×10^7 cfu/ml) to exert beneficial effect on consumers as fermented products.

V-P-14

**HIGH PERFORMANCE LIQUID CHROMATOGRAPHY
FOR THE SCREENING OF DRUG (DICLOFENAC)
RESIDUES IN SOME TISSUES OF MICE**

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Key words : Diclofenac sodium, mice tissue, HPLC.

Diclofenac Sodium is chemically, sodium salt of 2 – [2,6-dichlorophenyl] amino] benzene acetic acid having anti-inflammatory and analgesic properties. The present study was designed with the objectives to standardize the procedure for extraction, detection and quantification of residues of diclofenac sodium in the major tissues viz. liver, kidney, intestine and the testis of the mice (*Mus musculus*) employing high performance liquid chromatography (HPLC), after oral administration of diclofenac @ 3 mg/kg body weight for consecutive 10 days. The drug was chromatographed on a C-18 column using a mixture of acetonitrile : water in the ratio (85:15) as mobile phase at a flow rate of 1.0 ml/min. Diclofenac was eluted as sharp symmetrical peak ranging between 2.12 – 2.25 min of retention time. The recovery percentage of the drug analyzed in the liver, kidney, intestine and in the testis was 85.70%, 67.17%, 58.76%, and 67.12% respectively. The results have been discussed.

V-P-15

**RARE OCCURRENCE OF KERATINIZED STRAP
(ANITSCHKOW) CELLS (KSC-A) IN BUCCAL MUCOSA OF
HUMAN ORAL SQUAMOUS CELL CARCINOMA**

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[patients. conditions. The increase in cholesterol and alkaline phosphatase, decrease in urea, acid

V-P-16

MOLECULAR CHARACTERIZATION OF AVIAN INFLUENZA VIRUS ISOLATES FROM INDIAN POULTRY

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Key words: avian influenza virus; Indian origin; isolate; molecular techniques; RT-PCR.

The present study was carried out to characterize the avian influenza virus of Indian origin by detailed molecular techniques. For this purpose, 1,423 number of tissue samples were processed for virus isolation in avian influenza virus antibody negative chicken embryos of 9-11 day old. RT-PCR was conducted from the RNA extracted from the allantoic fluid of avian influenza virus inoculated chicken embryos. A total of 515 samples were tested by RT-PCR and positive bands of specific amplification of 488 bp of HA gene were obtained by one step RT-PCR with HSAIVH9F and HSAIVH9R subtype specific primers from the three samples. A 555 bp product which included HA gene cleavage site was obtained using the primers HSAIV47F and HSAIV47R from the cDNA synthesized from the allantoic fluids of all the three isolates. The H9 subtype was also confirmed by amplifying another region of HA gene using primers H9HA 692-714 and H9HA 1011-988 which gave rise to 319 bp amplicon. The 488 bp, 555 bp and 319 bp fragments of three isolates were cloned into pGEM-T easy vector and sequenced. The results indicated species variation among sequences of H9N2 isolates.

V-P-17

**CYTOTOXICITY STUDY ON *FICUS RELIGIOSA* AND
ZIZIPHUS MAURITIANA LEAF EXTRACTS AGAINST
JURKAT CELL LINE**

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Key words: *Ficus religiosa*, *Ziziphus mauritiana*, anticancer

Different parts of *Ficus religiosa* and *Ziziphus mauritiana* tree has traditional usage against many ailments and diseases. In the present study, *in vitro* anticancer potential of leaf extracts of *F. religiosa* and *Z. mauritiana* against Jurkat cell line was investigated by means of flow cytometry using Annexin V/7AAD apoptosis kit. The aqueous extract of *F. religiosa* was found to markedly inhibit the proliferation of Jurkat cells in a dose-dependent manner, whereas the aqueous extract of *Z. mauritiana* did not show any cytotoxic activity against Jurkat cell line in a dose-dependent manner.

V-P-18

**EFFECT OF PHYTOHORMONE GIBBERLIC ACID (GA₃)
ON GROWTH OF THE SILK GLANDS AND ECONOMIC
PARAMETERS OF ERI SILKWORM *SAMIA CYNTHIA*
RICINI BOISD.**

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L4770

Key words: *Samia cynthia ricini* Boisd., economic parameters, phytohormone, Gibberlic acid.

The effect of phytohormone Gibberlic acid (GA₃), on the growth and economic parameters of silkworm, *Samia cynthia ricini* Boisd. was studied. Three concentrations viz. 100 ng/ml, 200 ng/ml and 300 ng/ml of the hormone were administered orally through leaf to three different instars of silkworm larvae. The result of exogenous administration of GA₃ showed significant increase in larval weight, cocoon weight, cocoon shell weight, silk gland weight and amount of protein content in silk gland in comparison to the controls. The maximum elevation in all the parameters was observed with 300 ng/ml concentration of GA₃ treatment. The 300ng/ml treatment of 4th instar larvae showed the highest cocoon shell weight (0.853 g) against untreated control (0.545 g), which is the main economic parameter of sericulture.

V-P-19

IN-VITRO TEST TO ASSESS THE POTENCY OF THE ANIMAL VACCINES – A SPECTRAL ANALYSIS

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Key Words: Haemorrhagic Septicaemia Vaccine (HSV), Black Quarter Vaccine (BQV),

Livestock are to be regularly vaccinated to protect them from many infectious and contagious diseases. This study provides scope for spectroscopic method that can be used as in-vitro test to assess the potent of the vaccine instead of conventional in-vivo test. Haemorrhagic septicaemia (HS) is a major disease of cattle and buffaloes occurring in many Asian and African countries, resulting in high mortality and morbidity. In many Asian countries disease outbreaks mostly occur during the climatic conditions typical of monsoon (high humidity and high temperature). Among the various bacterial diseases affect the animal, Blackleg is one of the fatal disease of young cattle and sheep and occasionally in other animal

species. Two groups of seven animals were vaccinated with Haemorrhagic Septicaemia Vaccine (HSV) and Black Quarter Vaccine (BQV). Pre and post vaccinated sera samples of cattle were tested using Fourier Transform Infra Red (FTIR) spectrometer. The application of spectroscopy for the study of biomedical compounds has increased tremendously in recent years. Spectroscopic method of blood analysis is an alternate technique to the clinical method since they require fewer samples and provide more information. The variation in peaks was due to the change in protein and lipids levels in the animals. The present work can be extended and compared with the other antibody tests in future.

V-P-20

NUTRIENT REMOVAL FROM JALAP BAORI (STEP WELL) WATER WITH *TYPHA ANGUSTATA* PLANTED IN A FLOATING WETLAND SYSTEM

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Key words: Long term net reduction, eutrophication, plant uptake, nutrient removal

An aquatic macrophyte-based wastewater treatment study was carried out to investigate the nutrient removal efficiency of *Typha angustata*, a common cattail. Outdoor laboratory experiments were conducted for a period of 41 days. Water from a reservoir called Jalap Baori in Jodhpur city (Rajasthan) was used as the water sample in this study. A wetland test cell or cylindrical tank made of fibreglass reinforced plastic of dimensions 2 ft diameter and 3 ft height, capacity being 260 litres, was used. Control without plants was also operated. Long term net reduction was found to be 39.2% for TP (total Phosphorus), 60% for OP (Orthophosphate), 69.7% for TN (total Nitrogen), 0.9% for AN (Ammonical Nitrogen). The results of the study revealed that the floating wetland systems planted with *Typha angustata* could decrease the nitrate and

phosphate content of the Baori water, specially total Nitrogen. The quality of treated water from the tanks with plants was found to be better than those without plants.

V-P-21

**MAN-MONKEY CONFLICT FOR NATURAL RESOURCES
DUE TO HUMAN POPULATION EXPLOSION AND
EXPANSION IN URBANIZATION**

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Swami, Chena Ram, and Sangram**

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Key word: - Man-Monkey conflict, langur, natural resources,
urbanization

One of the most significant developments in human relationships in the last twelve thousand years, after the advent of agriculture and especially after the growth of industrialization has been the aggregation of vast numbers of humans in cities. And this process called urbanization has brought in its own problems. Human population growth and activities like deforestation, agriculture and urbanization lead to an ever-increasing encroachment on wildlife habitats. Reduction of wild animals' natural habitats forces species unable to adapt to altered habitats into small marginal patches. Simultaneously with the development of human urban settlements, a few non human primate species have also become urbanized, with the difference that while man created his own city environment by building homes and other requisite, the non-human primate species which took to urbanization simply usurped the existing either ruined or living human dwelling facilities and adopted themselves to live in such new environment. Study was to assess the influence of resource abundance and distribution on group size and composition in the common langur (*Semnopithecus entellus*). Group size and composition of the common langur was found to increase with an increasing degree of clumping of resources. Increase in resource abundance coincided with decreased group size, probably an artifact

of the effect of distribution of resources, which in itself was negatively correlated with resource abundance. The effect of resources on adult males was stronger than on adult females.

V-P-22

**IDENTIFICATION OF SNP'S IN EXONIC AND INTRONIC
REGION OF CAST GENE IN INDIAN GOAT**

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Key words: CAST, Goat, Meat tenderness, SNPs

The calpains and calpastatin (CAST) make up a major cytosolic proteolytic system, the calpain-calpastatin system, found in mammalian tissues. The relative levels of the components of the calpain-calpastatin system determine the extent of meat tenderization during postmortem storage. CAST gene helps to inhibit the function of Calpain gene, which is responsible for muscle tenderness. Several alternatively spliced transcript variants of this gene have been described, but the full-length nature of only some have been determined. Aim of this study was to first time characterize polymorphism status of CAST gene in a panel of seven Indian goat breeds differing in phenotype (weight and size) and geographical distribution. We have selected the regions of gene, which have been reported to have association with meat tenderness in goat and/or sheep (intron5, exon 6, intron 12 and 3'UTR) and two non associated exons (exon 9 and exon 10). Genomic DNA was extracted from whole blood using Phenol-Chloroform protocol. PCR was performed with 50-100 ng genomic DNA in a 25 µl reaction volume. 200µM of each dNTP, 50pMol of each primer and 0.5 units of Taq DNA polymerase was used for reaction. The PCR products were genotyped on ABI-3100 DNA sequencer. Resulting sequences of all studied regions except intron 12 were compared with cattle. As a result, fifty five (55) nucleotide changes have been observed in total experimented regions of CAST gene, in which, eight variations were identified in intron 12 compared with ovine sequence (EF669476). Other variations were observed in cattle sequences,

which include fourteen variations in exon 5 and 6 region (compared to accession no. AY008267), six variations in exon 9 and seven variations in exon 10 (compared to accession no. NW_001495281.2). We found three SNPs in sequenced CAST regions with one SNP at g245C>T in intron 12 and two SNPs (g90409A>G and g90412G>A) in exon 10. In addition, twenty variations were observed in partial 3'UTR compared to cattle (AF159246). Its important to mention that 3'UTR-g2959A>G has been reported to be associated with meat tenderness in cattle with 'A' allele associated with more tender meat, reveals here 'G' allele at g2959 in caprines. Considering the economic importance of the meat quality trait, CAST gene provides useful marker information for further more association studies and validation of markers.

FISHERY SCIENCE (ORAL)

F-O-01

EFFECT OF EXPERIMENTALLY PROVOKED HYPOXIA ON THE LDH ENZYME ACTIVITY IN AN AIR – BREATHING FISH- *HETEROPNUSTES FOSSILIS*

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Keywords: Catfish, Hypoxia, Aquatic organism, Teleost, LDH activity, *Heteropneustes fossilis*.

Hypoxia is one of the major stresses which are frequently experienced by the aquatic organism in a tropical area like India. Aquatic organisms which frequently exposed to hypoxia show adaptation at behavioral morphological and/or physiological level. Air-breathing catfishes are a group of teleosts which have a special capacity of withstanding the long periods of hypoxia and even the drought. The effect of hypoxia is manifested at all the three levels, namely behavioral, morphological and physiological. To assess the effect of hypoxia at physiological level, change in LDH activity in selected tissue of an air breathing Indian catfish, *Heteropneustes fossilis* has been undertaken. Fish were exposed to experimentally provoked hypoxia and were sacrificed at different stages of hypoxia to study the effect on the LDH enzyme activity in muscle and liver of the fish. The LDH activity has been measured using the technique of UV-VIS Spectrophotometry. The results obtained in experimental fishes have been compared with those observed in controlled ones. The observations indicate that different tissues respond differently to the stress of hypoxia and the enzyme activities respond in a tissue specific manner. It is not uniformly distributed across the metabolic pathway. The results are discussed in the light of tissue specificity.

F-O-02

**ECOLOGICAL STATUS AND FISH PRODUCTION
POTENTIAL OF CHANDO, AN OXBOW LAKE OF RIVER
MANORMA BASTI (UP)**

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Keywords: Chando Lake, Physico-chemical condition, fish productive potential.

Present paper deals with the ecological status and fish production potential with reference to its physico –chemical properties during three seasons from June 2009 to May 2010. Chando Lake is a vast untouched lake from study view point. Chando, the oxbow lake of river Manorma, is spread over in an area of about 650 hectares. It is an unpolluted interiorly located lake to the south east of Basti. Varieties of fishes of different orders viz., Clupeiformes, Cyprniformes, beloniformes, Ophiocephaliformes, Perciformes, Mugilliformes, Mestacembaliformes etc. have been found in our preliminary studies. It reflects that fish productive potential of this lake is optimum. Proper management in light of integrated fish farming and their spots have been investigated which may enhance fish productive potential of this lake.

F-O-03

**INFLUENCE OF HYDROSMOTIC STRESS ON SERUM
THYROID HORMONE LEVELS IN TELEOST *CHANNA
PUNCTATUS* ON EXPOSURE TO CONFIDOR INSECTICIDE**

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Keywords: *Channa punctatus*, Thyoride hormone, Cortisol, metabolism and Confidor.

Thyroid hormones and cortisol are vital for the refualtion of metabolic and hydromineral homeostasis in fish. In this study, Triiodothyronine (T₃), Thyroxine (T₄), Thyroid stimulating hormone (TSH) and Cortisol in the serum were studied and Na⁺, K⁺, Cl⁻ and Ca⁺ also analyzed in the teleost *channa punctatus* after exposing to Confidor, after 96 hrs, T₃ and TSH were significantly decreased and T₄ and cortisol levels were increased. The serum ions Na⁺, K⁺ and Ca⁺ levels increased significantly and Cl⁻ level decreased considerably. Thus the data supports the hypothesis of lead role of cortisol in stress response in *Channa punctatus*.

F-O-04

**SEASONAL OVARIAN CYCLE AND CORRELATIVE
VARIATIONS IN LIVER OF STINGING CATFISH
HETEROPNEUSTES FOSSILIS (BLOCH)**

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Keywords: Catfish, GSI, HIS, Ovary, Liver, Seasonal cycle.

Reproductive activity in most of the teleost undergo cyclic changes. Pattern of these changes are characteristic for each species. In order to understand the reproductive biology, knowledge about the duration of breeding, development and gonad maturation are of great significance. In the present study, the seasonal ovarian cycle and correlative variations in live were observed in catfish, *Heteropneustes fossilis*. Developmental activities in ovary and liver of catfish exhibited seasonal variations that can be divided into five distinguishable phases on the basis of gonadosomatic index (GSI), hepatosomatic index (HSI), morphological aspects and histological changes during different periods of the annual reproductive cycle. These phases are, resting phase (Dec- Jan), preparatory phase (Feb-Apr), pre-spawning phase (May-June), spawning phase (July-Sep) and post –spawning phase (Oct-Nov). The GSI showed regular fluctuations during different months and was found ranging form

0.676 to 7.616 whereas, HIS was found ranging between 0.67 to 2.44. The GSI value was found lowest during resting phase and highest during spawning phase contrary to this, HSI value was found lowest during spawning phase and highest during preparatory phase. Overall a negative correlation was established between GSI and HSI values during reproductive cycle. Various developmental stages of oocyte were observed during histological observations. Oogenesis consists growth of oocyte during reproductive process including oogonia, vitellogenesis and ripening to post-ovulatory follicles. The hepatocytes also exhibited changes coinciding with the seasonal gonadal cycle of catfish. On the basis of the study, it can be concluded that the GSI increases from preparatory to spawning phase due to maximum utilization of lipid contents of liver for gonadal maturation, development and other reproductive activities.

F-O-05

KARYOMORPHOMETRICAL ANALYSIS OF TWO SPECIES OF FAMILY CHANNIDAE OF ORISSA, INDIA

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Keywords: Karyotype, chromosomes, Channidae, FN

Karyomorphological studies were carried out in two species of family Channidae viz. *Channa marulius* and *C. striatus* commonly known as murrels or snakeheads. The specimens were collected from the ponds of Khurda and Puri Districts of Orissa, India. The diploid chromosome numbers in these two species were 44 and 40 respectively. The karyotypes were observed to be $2n=44$, 10 metacentric (m) + 30 telocentric (T) (FN=46) in *C. marulius*. No sex chromosomes could be found in the form of heteromorphic pair.

F-O-06

REGULATION OF SPWANING IN INDIAN MAJOR CARPS.

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Keywords: Adenohypophysical, Dopamine antagonists, Gonodotropin, Indian major carps, immunohistochemical, Neurohormones, ovaprim, Pimozide, Domperidone, Spawning.

Quality fish seed production and supply to the farmers in proper composition, size number and in time plays a significant role in aquaculture practices. Gonodotropin releasing hormone (Gn-Rh) in combination with dopamine antagonists (eg. Pimozide/domperidone) has simplified the process of seed production in our rural livelihood. Effect of these neurohormone and their super active analogues in combination with dopamine antagonists on the adenohypophysical cells of the Indian major carps during the spawning has been elaboratively discussed. The immunohistochemical analysis of the cytological changes brought about in the adenohypophysical cells of Indian major carps after application of ovaprime, (Salmon Gn-Rh in combination with domperidone a dopamine antagonists) has been highlighted. This is important in the context of rapid weather changes and fluctuating monsoon.

F-O-07

**GENOTOXIC EVALUATION OF FENVALERATE IN
FRESH WATER FISH THROUGH MICRONUCLEUS TEST**

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Keywords: Micronucleus, fenvalerate, genotoxicity, *Channa punctatus*.

Genotoxic potential of pyrethroid pesticide fenvalerate was studied in the blood (RBCs) of fresh water fish *Channa punctatus* by using Micro-nucleus test (MNT). The fishes were acclimatized in the laboratory and divided into control and experimental groups. The three sublethal concentrations (0.0157, 0.0314 and 0.0625 ppm) of fenvalerate were identified and fishes were exposed to these concentrations for a maximum period of 30 days. It was found that fenvalerate induced micronuclei formation was highest on fifth day at 0.0625 ppm followed by a gradual decrease upto 30 days.

F-O-08

HIGH ENVIRONMENTAL AMMONIA INFLUENCES THE EXPRESSION OF NITRIC OXIDE SYNTHASE ISOFORMS AND ENHANCES THE EXPRESSION OF NITRIC OXIDE IN AIR BREATHING CATFISH, *HETERONEUSTUS FOSSILUS*

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Keywords: Nitric oxide synthase, nitric oxide, *Heteropneustes fossilis*, hyper-ammonia stress.

Nitric oxide (NO), an important biological messenger is produced by sequential oxidation of L-arginine to L-citrulline and catalyzed by one of the nitric oxide synthase (NOS) isoforms. Exposure to high external ammonia (25 to 50 mM NH₄Cl) led to higher induction of activities of different isoforms of NOS, expression of different NOS enzyme proteins in air-breathing catfish, *Heteropneustes fossilis*. Relatively low levels of NO were found to be present in different tissues and also in plasma of control fish, which further enhanced significantly in fishes treated with high concentrations of environmental ammonia (25 to 50 mM NH₄Cl). In control fish, presence of cNOS (Ca⁺²-dependent) isoforms (eNOS and nNOS) in different tissues was confirmed by enzymatic and Western blot analyses. Exposure to high external ammonia led to

expression inducible NOS (iNOS) enzyme in different tissues accompanied with the expression of iNOS proteins and iNOS mRNA. High external ammonia also led to induction of activities of cNOS isoforms. Immunocytochemical analysis indicated a zonal-specific expression of both cNOS and iNOS isoforms in different tissues. Accumulation of ammonia that resulted during hyper-ammonia stress could be the cause of induction of NOS and more production of NO in this fish. Hyper-ammonia stress also caused more expression and nuclear translocation of NFkB (as a measure of activation) in hepatocytes thereby suggesting that the induction of iNOS in this fish in higher environmental ammonia is mediated through the involvement of NFkB, and important transcription factor. More expression of cNOS isoforms and induction iNOS in *H. fossilis* implies that the fish is capable of generating more NO as a sort of physiological adaptation to survive under hyper-ammonia stress, which they face regularly in their natural habitats.

F-O-09

CHARACTERIZATION OF OUTER MEMBRANE PROTEIN OF AEROMONAS HYDROPHILA CAHH14 AND ITS IMMUNE POTENTIAL IN ROHU, *LABEO ROHITA*

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Keywords: *Aeromonas hydrophilia*, outer membrane proteins, SDS-PAGE, RPS, Dot-blot.

The present study was undertaken to characterize the outer membrane protein (OMP) of CAHH14 strain of *A. hydrophilia* through SDS-PAGE analysis and to study its immune potential in rohu, *Labeo rohita*. The immune potential was studied by intraperitoneal injection of OMP antigen with and without Freund's complete adjuvant. After post immunization for two months the fish were challenged with present strain and the relative percentage survival (RPS) was found 77-88%, which reflects the protective

immounogenicity nature of OMP antigen in rohu. Dot blot was performed for the detection of antigen in the tissue and serum collected from immunized fish.

F-O-10

**MOLECULAR ANALYSIS OF GENETIC DIVERSITY AND
IN-SITU APPROACHES FOR CONSERVATION OF A
FRESHWATER CATFISH *SPERATA SEENGHALA*
(SKYES, 1839)**

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Keywords: IUCN status of *Sperata seenghala*, PCA, NMDS, genetic polymorphis, conservative management.

Genetic diversity among five geographically isolated populations of a freshwater cat fish *Sperata seenghala*, (Skyles, 1839) was studied using RAPD-PCR primers as genetic markers. 60 accessions were collected from five lentic waterbodies of Madhya Pradesh namely Bhadbhada reservoir (n=08), Mohinisagar reservoir (n=11), Bansagar reservoir (n=15), Bargi reservoir (n=11) and Gandhisagar reservoir (n=15) constructed on Kolans, Sindh, Sone, Narmada and Chambal Rivers respectively covering whole Madhya Pradesh. Ten random primers were primarily scored in all 60 individuals of which five primers gave scorable results were selected and used for final analysis. By comparing the RAPD banding patterns, variations were found between and within the population. Bhadbada reservoir, Mohinisagar reservoir, Bansagar reservoir, Bargi reservoir and Gandhisagar reservoir showed genetic polymorphism as 61.09, 87.59, 93.96, 88.46 and 71.20% respectively, which is clearly indicating that, Bansagar reservoir may be a good habitat as much as to conservation concern. The un-weighted pair group method with averages (UPGMA) dendrogram generating using Jaccard's coefficient showing all five populations distributed in the five clusters indicating each cluster for each population who represented separate gene pool. Principal component analysis (PCA) variance

showed comparative statistics as component 1 and component 2 where Bahsagar population is totally isolated with rest of four populations. However, Non-Metric Multidimensional Scaling (NMDS) showed overlapping these populations with each others. Discrete genetic structuring in the populations studied and provides useful information for future conservation measures. Hence, present investigation may serve as a reference point of view for future examinations of genetic variations within fish populations. Which are commercially important but also play a significant role in food chain in lentic as well as lotic habitats.

F-O-11

**DEVELOPMENT OF IMMUNOLOGICAL TEST FOR
DETECTION AND QUANTIFICATION OF VITELLOGENIN
IN ASIAN CATFISH, *CLARIUS BATRACUS***

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Keywords: *Clarias batrachus*, Vitellogenin,
immunohistochemistry, western blot, ELISA.

Vitellogenin is the egg yolk precursor protein in all oviparous animals including fish. Polyclonal antiserum against Vitellogenin (Vtg) from Asian catfish, *Clarias batrachus* was raised in a rabbit following standard immunization protocol. It was found to be specific for *C. batrachus* Vtg in western blot, after adsorption with *C. batrachus* liver homogenate and then used to standardize immunological tests for different applications. Using this antiserum Vtg was immunohistochemically localized in liver and ovary of vitellogenic female *C. batrachus*. It was used in western blot to detect yolk proteins in developing eggs and larva of *C. batrachus* collected at different time periods after fertilization. It showed a high molecular sized eggs yolk protein upto 6 days post fertilization. A competitive ELISA was also standardized and used to measure the plasma Vtg concentration in annual reproduction cycle of female

C. batrachus. It showed that the level peaked in May (~ 2.2 mg/ml), approximately 1 month before spawning and stayed significantly higher throughout breeding season (June and July) and declined gradually thereafter.

F-O-12

**BLOOD CHEMISTRY OF THE INDIA FRESHWATER FISH,
NOTOPTERUS NOTOPTERUS (PALLAS)**

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Keywords: Pituitary hormones, *Notopterus notopterus*, protein, Glucose, urea, haemoglobin.

The blood chemistry was studied in both the sexes of the fresh water fish, *Notopterus notopterus*, during spawning period. The blood levels of some hormones, haemoglobin, total serum proteins, urea and glucose were determined. The serum content of the hormones were determined by applying radio immunoassay technique and standard cyanmethemoglobin and Biuret methods were used to determine haemoglobin concentration (Hb) and serum total protein (TP) respectively; for total glucose and urea, GOD-POD and modified Berthelot methods were used respectively. The results indicate that the gonadotropins (FSH & LH) and prolactin levels found to be increased in females compared to male fish, whereas thyroid hormones (T3 & T4) were less in females. The gonadal hormones such as estradiol 17 β level found to be same in both male and female fish, progesterone level was more in female. The testosterone though found in both sexes, the level of the hormone was more in male fish.

The results indicate that the fish *N. notopterus* is highly tolerant to copper sulfate (96hr LC50 values were found to be 30 ppm). The biochemical profile such as the serum protein, glucose, urea and urea nitrogen is decreased, under exposure to toxic level of copper

sulfate, whereas haemoglobin content increased. Thus the result suggests that the reduction may be because of stress due to copper contamination. Since copper is one of mineral element needed for the absorption of iron which may leads to increase in red blood cell count. The addition of red blood cell count may cause enhancement in haemoglobin content after exposure to copper sulfate.

F-O-13

**EVALUATION OF LETHAL TOXICITY OF TWO
CARBAMATE PESTICIDES IN RELATION TO THE AGE
OF A FRESHWATER AIR BREATHING FISH CHANNA
PUNCTATUS (BLOCH)**

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Keywords: Lethal concentration, Carbamate Pesticide, *Channa punctatus*.

The present study is aimed to assess the lethal toxicity of two carbamate pesticides namely Aldicarb and Mancozeb in relation to age of fish *Channa punctatus*. The LC50 dose of the two pesticides for 24hr and 48hrs. The quantities of the Aldicarb required to constitute LC50 dose for 24hr and 48hrs duration of exposure for small (15cm), middle (22cm) and large size (29cm) fishes was found to be 935 mg/l, 1.110 g/l and 1.305 g/l and 645 mg/l, 875 mg/l and 1.275 g/l respectively. For Mancozeb the quantity was 1.200 g/l, 2.200 g/l and 3.150 g/l for 24 hrs exposure and 1.025 g/l, 1.950 g/l and 2.875 g/l respectively for 48 hrs. The amount of Aldicarb required to constitute safe concentration was 0.407 g/l, 0.423 g/l and 0.401g/l, respectively for the three size group of fishes. While, the requisite quantity of Mancozeb for safe concentration was 0.421 g/l, 0.744 g/l and 1.035 g/l respectively.

F-O-14

**PHENOTYPIC , RAPD AND PROTEIN FINGERPRINTING
PATTERN OF *VIBRIO PARAHAEMOLYTICUS* ISOLATED
FROM *PENAEUS MONODON***

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Keywords: *Vibrio parahaemolyticus*, RAPD, WCP, Protein profiling, SDS-PAGE.

Phenotyping and genotyping characterization of *Vibrio parahaemolyticus* strains isolated from shrimp were studied by using conventional biochemical study, Random Amplified polymorphic DNA (RAPD) and whole cell protein (WCP) profile. Biochemical study classified *V. parahaemolyticus* into 3 strains. The primer OPB1 amplified 5-9 bands with molecular weight of 0.410 – 3.58 kb where as primer OPB17 amplified 7-8 bands of molecular weight varied from 0.430-3.46 kb. The protein profile produced 5-14 bands of molecular weights varied from 17.84 – 107 kDa at various NaCl concentrations. The unique bands from RAPD and WCP may be useful marker for further strain differentiation in epidemiological study.

F-O-15

**SEASONAL VARIATION IN RELATIVE DENSITY OF
HELMINTH PARASITES IN A STRIPED MURREL,
CHANNA STRIATUS (BLOCH)**

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Keywords: relative density, helminth parasites, *Channa punctatus*.

The paper reports seasonal variation in relative density of helminth parasites in a striped murrel, *Channa punctatus* (Bloch). The work was carried out at $20\pm 1^{\circ}\text{C}$ and $30\pm 1^{\circ}\text{C}$. A total of 520 helminth parasites was collected at $20\pm 1^{\circ}\text{C}$ with relative density of 58.27%, 33.65%, and 8.08% infecting respectively intestine, stomach and gills. Similarly, $30\pm 1^{\circ}\text{C}$ out of 413 helminth parasite, 52.06%, 36.32% and 11.62% parasites were collected from intestine, stomach and gills respectively. No definite trend was observed between body weight of *Channa striatus* and number of Helminth parasites. Although, the parasites were maximum in body *Channa striatus* of 50-60g at both the temperatures.

F-O-16

INNOVATION ON THE HATCHING TECHNIQUE IN FLOW THROUGH SYSTEM OF ASIAN CATFISH *CLARIAS BATRACHUS* (LINNAEUS) IN THE VIDARBHA REGION

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Keywords: *Clarias*, hatching techniques, water temperature, temperature monitoring system

Asian catfish, *Clarias batrachus* is popularly known as magur. It is one of the promising varieties of catfish found all over the country. In spite of its high market price, demand of this species is considerable due to its protein rich flavor, presence of single central bone and medicinal value. Magur is usually bred during June to August in Vidarbha region by applying hypophysation techniques. The recorded fecundity of fish *Clarias batrachus* is 50000 to 60000 eggs per kg body weight of fish, which is too low as compared to Indian major carps. The magur does not tolerate the rapid decrease in water temperature (as much as $2^{\circ}\text{C}/\text{Hr.}$). It dies when subjected to constant temperature below 18°C for period, longer than 1 month. The present work deals with the effect of light in the flow through system to increase the water temperature in hatchery phase of *Clarias batrachus* as compared to existing hatchery technology. In

vidarbha region during the monsoon the average minimum temperature is found to be 16⁰C which may decline up to 6⁰C in extreme condition. But the ideal water temperature required for the rearing of magur larvae is 22⁰C to 30⁰C in the existing flow through system the temperature monitoring system has not been used which seems to be necessary to increase the rate of survival of magur larvae. The magur and air breathing fish could be culture in shallow water bodies, the Vidarbha region, being drought prone can be well suited for its farming. As the seed production technology for this species has not been standardized for the Vidarbha region, hence the present work is carried out to see the efficacy of innovative technique for survival of hatched larvae.

F-O-17

SEASONAL AND SEX RELATED VARIATION OF CERTAIN BIOCHEMICAL PROPERTIES AND FATTY ACID PROFILES OF MUSCLES AND LIVER OF ADULT CATLA CATLA (HAMILTON)

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Keywords: Season, sex, biochemical properties, fatty acid profile, SFA, MUFA, PUFA

Basic biochemical composition and fatty acid profile of Catla catla were analyzed in (2008-2010). Protein and ash were high in male but lipid was in female. Increased values in summer and lower in the rain in both the sexes ($p < 0.05$). Higher lipid content was observed in liver. There were quantitative differences between the proportion of individual fatty acid ($p < 0.05$). the most abundant SFA fatty acid was palmitic (C16:0), MUFA mainly represented by Oleic acid (C18:1 ω 9) and reasonable amount of essential PUFA, also present (eicosapentaenoic acid and docosahexanoic acid) spawning season in female indicated slightly higher content of C18:1, C16:1, C22:6 ω 3 in female.

F-O-18

COMPARATIVE MORPHOLOGY OF CORPUSCLES OF STANNIUS IN SOME FRESHWATER AND SEA WATER FISHES

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Keywords: Corpuscles of Stannus, Freshwater fish, Sea Water fish.

In this study morphology, numbers and location of corpuscles of Stannius in six freshwater fishes and six sea water fishes have been investigated. The comparison of corpuscles of Stannius is made as these fishes have different aquatic habitat. The six fishes from freshwater are *Notopterus notopterus*, *Tialpia mossambica*, *Channa punctatus*, and *Clarias garipinus*. All these fishes are locally available from the aquatic bodies of Gulbarga. The other six sea water fish are *Rostrelliger kanagurta*, *Hemiramphus far*, *Parastromateus niger*, *Sillago sihama*, *Pampus argentes* and *Scoliodon laticudus* and these fishes are collected from Kanwar coast. The corpuscles of Stannius in these fishes exhibit different locations either in the anterior, middle or posterior region of the posterior kidney on the dorsal side. The colour of the gland varies from white to yellow or cream. The size of the gland compared between freshwater fish and sea water fish indicates that the fish from sea water have larger gland. In view of localization of the CS in the kidney of the fishes studied in the present investigation that other than *N. notopterus*, all other freshwater fish have the CS situated at the middle portion of the posterior kidney this is also true with the location of CS in sea water fishes. The fish *N. notopterus* stands primitive as far as location of CS is considered in the systematic position.

F-O-19

**SUSTAINABILITY OF MARINE FISHERIES IN ODISHA
THROUGH A COMMUNITY BASED STRATEGY.**

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Keywords: Sustainability, Resource, depletion, extinction, community, management.

Exploitation of marine fishery resources has crossed the maximum sustainable yield (MSY) levels leading to possibilities of extinction of some species in response to commercial harvesting. The declining marine fish catch in Odisha threatens the livelihood security of the fisherman community. Odisha has a coastline of 480 kms. About 4.5 lakhs of fisherman depends on marine fishing for their livelihood in 641 villages in six coastal districts of the Bays fo Bengal. This paper has made an attempt to examine the sustainability of marine fisheries and suggest a community based fisheries management strategy for sustainable development of marine fisheries in Odisha.

F-O-20

**HISTOPATHOLOGICAL IMPACT OF SUB ACUTE
COPPER EXPOSURE ON GILL AND LIVER OF
FRESHWATER STINGING CATFISH, *HETROPNEUSTES
FOSSILIS* (BLOCH)**

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Keywords: Copper sulphate, *Heteropneustes fossilis*, histopathology, gill, liver.

Gill and Liver is important vital organ of fish. Gills are the primary site of contact of any waterborne pollutant while liver is associated

with detoxification and metabolism of xenobiotics. Fish are the aquatic animal and serves as good bio-indicator of heavy metal pollution in aquatic bodies. Heavy metals are potent pollutants that cause toxic effects on biota. Copper is one of grey listed heavy metals, widely used in aquaculture metal and paint industry. In spite of being essential micronutrient copper alters normal architecture of gill and hepatocytes during sub acute exposure. Present study revealed that copper as copper (II) sulphate adversely affects the histopathology of these target organs of fish during acute exposure. Hemorrhage, clubbing of gill tips, fusion of secondary lamellae and other architectural changes in gills were observed along with excessive mucous secretion. Hepatocytes show cytoplasmic vacuolization, loss of normal architecture, infiltration of blood in portal vein, necrosis and other degenerative changes.

F-O-21

ZINC SULPHATE INDUCED MICRONUCLEUS TEST AND MITOTIC INDEX ON *CHANNA PUNCTATUS* IN VITRO

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Keywords: ZnSO₄, genotoxic, micronucleus test, mitotic index, Cytotoxic ets.

Zinc plays an essential role in wide range of cellular process, including defense against free radicals and maintaining genomic stability of aquatic fauna. In the present study, we analysed the induced mitotic index of dividing cells of kidney and micronuclei in peripheral erythrocytes of *Channa punctatus* following in vivo exposure of three different concentrations ZnSO₄.7H₂O. Our result revealed that Zinc induced significantly high incidences of micronuclei in peripheral erythrocytes, and inhibited mitotic index and caused considerable delay in the generation time of kidney cells in treated organisms. Time and concentration related response of the chemical as observed in this study clearly indicated the genotoxic nature of Zinc Sulphate significantly i.e. ($p \leq 0.05$ to $p \leq 0.01$).

F-O-22

**IMMUNOMODULATION INDUCED BY VITAMIN C ON
HEALTHY AND IMMUNOCOMPROMISED INDIAN
SNAKE HEAD *CHANNA PUNCTATUS***

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Keywords: Vitamin C, *Aeromonas hydrophila*, *Channa punctatus*, non-specific immunity.

In this study the immunomodulatory effect of vitamin C was investigated. Vitamin C was obtained in the form of fresh lime juice extract. In the first stage normal health fishes were taken for the study and in the second stage immunocompromised fishes were taken. Three different doses of Vitamin C were prepared (viz. 0.5, 1.0, 1.5 mg/100gm body weight) and inject intraperitoneally to the fishes and different non-specific immune parameters were evaluated on 3rd, 5th, 7th and 10th day after the doses were given. In the second stage of experiment fishes were challenged with *Aeromonas hydrophila* and immunological parameters were assayed after 72 hours of challenge. In both the cases it was found that all the immunological parameters were enhanced significantly as compared to the control. In the normal healthy fishes the highest immunomodulatory fishes highest effect was seen on 7th day with a dose of 1.5 mg/100 body weight.

F-O-23

**EVALUATION OF VERTICAL DISTRIBUTION OF
PLANKTON OF MOTIPUR OX-BOW LAKE OF
MUZAFFARPUR DISTRICT (NORTH BIHAR)**

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Keywords: Motipur Ox-bow lake, Vertical distribution, Plankton, migration, photosynthetic activity, Environmental parameters, Different zones of water.

The paper deals the evaluation of vertical distribution of plankton of Motipur Ox-bow lake of Muzaffarpur District (North Bihar) at different depths of water (surface, middle and bottom zones) during the period of 2009-2010, planktonic organism, both phyto and zooplankton, showed vertical distribution in the Motipur Ox-bow lake. It was found that phytoplankton migrated towards the surface in a winter months and at later months of monsoon season and concentrated to mid and bottom water in a summer, while zooplankton migrated to mid bottom water during monsoon and winter season and to surface water during summer months. It may be concluded that the seasonal vertical migration of plankton influenced by various environmental factors such as light, temperature, dissolved gases and gravitational forces etc.

F-O-24

**EFFECT OF EXPERIMENTALLY PROVOKED HYPOXIA
ON THE PSEUDOBRANCHIAL NEUROSECRETORY
CELLS IN THE TWO AIR-BREATHING CATFISH *CLARIAS*
BATRACUS AND *HETEROPNEUSTES FOSSILIS* :A
BIOCHEMICAL INVESTIGATION**

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Keywords: Hypoxia, Catfishes, Neurosecretory, pseudobranchial.

The pseudobranchial neurosecretory system found uniformly in catfishes and some of the other economically important groups of teleosts from Indian waters are one of the known diffuse endocrine systems which have all the attributes of other such systems present in vertebrate in different parts of the body. These systems are observed to regulate important physiological process through paracrine/autocrien mode of action with bioactive substances secreted by the neurosecretory cells. The group in which this system has been identified is mostly air-breathing fishes that are known to tolerate low oxygen concentration in water. In an attempt to understand the functional significance of these cells belonging to this new system of neurosecretion in two species of air-breathing catfish *Clarias batrachus* and *Heteropneustes fossilis* were exposed to experimentally provoked hypoxia and the effects were observed at biochemical level by Gel Electrophoresis. The results obtained were compared with the observation made on controlled fish specimens. Marked difference was observed in the protein profile of the pseudobranchial neurosecretory cells.

F-O-25

**ULTRA STRUCTURE AND DISTRIBUTION OF TASTE
BUDS IN *HETEROPNEUSTES FOSSILIS* (BLOCH)**

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Keywords: *Heteropneustes fossilis*, Taste buds, Scanning electron microscopy.

The distribution and morphological features of taste buds in *heteropneustes fossilis* (Bloch) were investigated with scanning electron microscopy. The taste buds were distributed on external lips, skin surface barbel, within the oral cavity, including anterior part of oesophagus. Taste buds located on the external skin and barbel and within the oral cavity differ in appearance. Taste buds were of protrudes type and few were of within the oral cavity differ in appearance. Taste buds were of protrudes type and few were of

sunken type, Microvilli projected through the central pore of each taste buds. The number of taste buds varied in different body parts of the fish.

F-O-26

**FISH DIVERSITY, FISH HABITATS, FISH DISEASE AND
AQUACULTURE IN
NORTH-EAST INDIA HOTSPOT**

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Key words: Fish diversity, rivers, wetlands, aquaculture, North-East India Hot spot

Ichthyological survey conducted in 54 rivers in North-East India Hotspot of Biodiversity since 1975 to 2011, revealed the occurrence of more than 250 species of freshwater fishes belonging to 67 genera, 24 families and 10 orders. Topographic maps (1970-71) and satellite imageries were georeferenced and mosaiced. Comparison of Topo maps with LISS IV satellite imageries (2007) have been compared. It revealed slight change detection in River Barak course during 40 years. Study of endangered Mahseer fishes using GIS tools revealed five species (four of genus *Tor* and one of genus *Neolissochilus*) from the Barak drainage. The habitat condition of the mahseer fishes was found degraded. The 'Beels' in Assam (1,00,000 ha) form c 49.5 % of the total wetland area in India. Out of c 70,000 ha of Beel area, c 19,000 ha is still good ; c 15,000 ha semi-derelict and, c 35,000 ha is derelict. Assam Beels Fish yield c 173 kg/ha/year. Sone Beel showed 103 kg/ha/year. Change detection of Sone Beel boundary with GIS tools showed shrinkage of 3,539.6 ha during 1880 to 1980. Integrated Fish Farming (IFF) study revealed good earning. EUS has been causing large-scale mortality among the freshwater fishes since 1988. There are fluctuation in the intensity of the disease in relation to species affected. Low total alkalinity (TA) could be pre-disposing 'Stress

factor'. Sick fishes show low haemoglobin and polymorphs, but high ESR and lymphocytes. Communicative nature of EUS revealed variation in time gap between fish and infection in different species. Inoculation of microbes in the test animals did not reveal of any sign of ulcerations for two years. Haemolytic *E. coli*, *Aeromonas hydrophila*, *Staphylococcus epidermitis*, *Pseudomonas aeruginosa*, etc., in the surface lesions as well as in the gut, liver, gills, heart, kidney and gonads were recorded from sick fishes. All these were sensitive to antibiotics. Fungal isolation revealed *Aphanomyces* sp. Histopathological (HP) studies showed focal areas of increased fibrosis and chronic inflammatory cell infiltration in muscles. Virus has been isolated using BF2 cell line. Electron Microscopic studies with the ultra-thin sections of still-occurring EUS-affected fish tissues revealed the presence of virus-like particles (inclusion bodies). Preliminarily, a Picobirna virus (size 30-40 nm) has been electron microscopically identified. Confirmation was done through immunofluorescence assay and reverse transcription. Experimental study of initiation of EUS was done in fishes and fish lesions were formed in the experimental set-up possibly due to the interaction of fishes with bacteria, the environment and possibly the viruses.

F-O-27

**STEROIDS STUDY IN FRESHWATER FISH
OPHIOCAEPHALUS STRITUS DURING PRE-MATURE,
MATURED AND SPAWNING BY ENZYME ASSAY BASED
CHEMILUMINESCENCE TECHNOLOGY**

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Key words:- Steroids, *Ophiocaephalus stritus*, Chemiluminescence technology

Like higher vertebrates, quantity of sex steroids in freshwater fish has been studied by using enzyme assay based Chemiluminescence technology. In premature fish having length (12cm) and weight (30

gm), quantities of testosterone 0.11 ng/ml in male and -0.55 ng/ml in female, estradiol -0.65 pg/ml in male 0.24 pg/ml in female, progesterone -3.01 ng/ml in male and 3.01 ng/ml in female DHEAS in male 0.001 µg/ml, 0.006 µg/ml in female. Leutrifer hormone (LH) -076 mIU/ml in male and 0.15 mIU/ml in female follicle stimulating hormone (FSH) -0.43 in male and 0.41 in female and cortisol in male -3.2 nmol/lit. and -0.44 nmol/lit. in female. In mature fish having length (15cm) and weight (35gm),, level of testosterone 0.24 ng/ml in male and 0.04 ng/ml in female, estradiol 0.004 pg/ml in male and in female 2.4 pg/ml, progesterone 3.001 ng/ml in male and -3.001 ng/ml in female. DHEAS 0.2 µg/ml in male and in female 0.2 µg/ml. Leutrifer hormone, (LH) 0.2 mIU/ml in male and 0.6 mIU/ml in female. Follicle stimulating hormone (FSH) -2.87 in male and 32.7 in female and where as cortisol -5.9 nmol/lit. in male and in female -0.2 nmol/lit. Thus, in spawning having length (15cm) and weight (35gm), quantity of testosterone 0.04 ng/ml in male and -0.89 ng/ml in female, estradiol in male -0.4 pg/ml and in female 0.4 pg/ml, progesterone in male 2.01 ng/ml and -2.01 ng/ml in female DHEAS 0.002 µg/ml in male and in female 0.009 µg/ml) Leutrifer hormone (LH) 0.2 mIU/ml in male and in female 0.02 mIU/ml. Follicle stimulating hormone (FSH) -3.87 in male and in female 0.01 and cortisol in male -1.2 nmol/lit. and in female -1.45 nmol/lit., has been recorded significantly. Negative values indicate that there is no reactivity of tracers in serum so no hormone present.

F-O-28

**STUDIES ON BIOLOGICAL CHARACTERISTICS OF
BOMBYX MORI L. (LEPIDOPTERA: BOMBYCIDAE) FED
WITH FORTIFIED MULBERRY LEAVES WITH
HOMEOPATHIC DRUGS HYDRASTIS**

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Keywords: Mulberry leaves, *Bombyx mori*, Fortification, Homoeopathic drug, Hydrastis, Rearing performance, Larval and post-Cocoon characters.

In the present investigation the Fifth instar Silkworm larvae, *Bombyx mori* L. were fed on mulberry leaves fortified with Homoeopathic drug *Hydrastis* mother tincture, Hydrastis30 X and Hydrastis 200X potencies with various concentrations i.e. 1:4 and 1:8 ratios @ 2 ml per feed. The impact of treatments on larval, cocoon, shell and pupal weight, silk ratio, average filament length and weight, denier and number of breakages during reeling were examined. The study showed that, the growth of silkworm larvae fed on mulberry leaves with Hydrastis mother tincture, Hydrastis 30XX and Hydrastis200 X is beneficial and shows the enhancement in the cocoon and post cocoon characteristics of *Bombyx mori* L.

F-O-29

**ANTIBIOTICS IN SHRIMP AQUACULTURE CAUSING
NUISANCE IN INDIA**

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Key words: antibiotics; shrimp; aquaculture; costal; prophylactic;
diseases; environment; resistance

The indiscriminant use of antibiotics in aquaculture to avoid disease threats may cause development of antibiotic resistance among pathogens infecting cultured animals and humans. However, this is a recent issue and has not yet been thoroughly investigated. Furthermore, there is limited knowledge about the environmental effects of antibiotic use in aquaculture. It is well known that antibiotics are commonly used in shrimp farming to treat or prevent disease outbreaks, but there is little published documentation on details of usage patterns. This study, conducted in 2005-06, shows that a most of the shrimp farmers along the west coast of India used antibiotics in their farms. Total 60 shrimp farmers interviewed, all of them used antibiotics in shrimp pond management. Most farmers used them prophylactically, some on a daily basis, and at least ten different antibiotics were used. Many farmers were not well informed about efficient and safe application practices. A more restrictive use of antibiotics could have positive effects for the individual farmer and simultaneously, decrease impacts on regional human medicine and adjacent coastal ecosystems. It is likely that dissemination of information could contribute to a decreased use of antibiotics, without affecting the level of shrimp production.

F-O-30

**LEAD INDUCED HISTOPATHOLOGICAL ALTERATIONS
IN GREEN GLAND OR KIDNEY OF FRESHWATER
PRAWN, *MACROBRACHIUM DAYANUM* (CRUSTACEA -
DECAPODA).**

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Key words: *Macrobrachium dayanum*, Lead toxicity, Histopathology, Green gland or Kidney.

Lead is a nonessential “**grey listed**” heavy metal cause serious problem in both aquatic plant and animals. Lead is used in fuels, ceramics, paints and glass wares in industries and vehicles. Haematological, nephrological, histopathological and neurological effects of lead are well known in vertebrates. Fresh water prawn, *Macrobrachium dayanum*, a potential animal for freshwater aquaculture, were subjected to sub-acute concentration of Lead nitrate (29.12 mg/l; 25% of 96h LC₅₀) showed severe histoarchitectural alterations in green gland or kidney after 10, 20 & 30 day exposure. Chief alterations during sub-acute exposure were hypertrophy and necrosis in endsac, inflammation and breaking in bladder wall, peculiar vacuolization in proximal and distal tubule which results in breaking of tubules, granulomatous deposition, migration of haemocytes and fibroblast like cells and nuclear pycnosis & karyolysis. The severity of pathomorphological alterations was found duration dependant. Bio-indicator role of *M. dayanum* in relation to metal toxicity has been discussed.

F-O-31

**SIGNAL TRANSDUCTION MECHANISM IN
GONADOTROPIN-, IGF-I-, AND INSULIN-INDUCED
STEROIDOGENESIS IN CARP OVARY: NEW INSIGHTS
FROM RECENT STUDIES**

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Signal transduction pathways mediating gonadotropin-, IGF-I- and insulin-induced testosterone and 17β -estradiol production in carp ovarian theca and granulosa cells in short-term co-incubation was investigated. Inhibitors of voltage sensitive calcium channels (VSCCs) and calmodulin attenuated HCG-induced steroid production whereas modulators of adenylate cyclase and protein kinase A increased their production indicating that in gonadotropin-induced carp ovarian steroidogenesis both calcium- and PKA-dependent pathways are involved. Interactions between these two pathways are evident from the positive effects of elevated intracellular calcium on HCG-induced steroid production and the attenuation of forskolin- and dibutyryl cAMP-induced steroidogenesis by inhibitors of VSCCs and calmodulin. Involvement of a third signaling pathway, mitogen-activated protein kinase (MAP kinase) in the regulation of gonadotropin-induced steroidogenesis in carp ovary has also been identified. An antagonist of MEK $\frac{1}{2}$ markedly attenuated HCG-induced steroid production. HCG stimulated MEK $\frac{1}{2}$ dependent phosphorylation of extracellular signal regulated protein kinase $\frac{1}{2}$ (ERKs $\frac{1}{2}$) in cultured follicular cells in a time- and dose-dependant manner. Results demonstrated that ERK $\frac{1}{2}$ transduce signal downstream of PKA in HCG-induced steroidogenesis. Evidence for the presence of cross-talk between calcium-dependent pathways and the MAP kinase cascade has been shown by demonstrating the inhibitory effects of verapamil and calmodulin on ERK $\frac{1}{2}$ activation after HCG stimulation. Using Wortmannin and LY294002, two mechanistically different specific inhibitors of phosphatidylinositol 3-kinase (PI3 kinase), the possible

role of PI3 kinase in this process has been identified. IGF-I and insulin were shown to activate PI3 kinase after 90 min of their treatment. Involvement of MAP kinase in this process has also been demonstrated by showing the attenuation of steroidogenesis in presence of an antagonist of MEK $\frac{1}{2}$. MAP kinase was rapidly phosphorylated and activated (30–150 min) in response to exposure of follicular cells with IGF-I and b-insulin which was significantly attenuated in presence MEK1/2 inhibitor. Taken together, these results suggest that PI3 kinase is an initial component of the signal transduction pathway which precedes MAP kinase during IGF-I- and b-insulin-induced steroidogenesis in *C. carpio*.

F-O-32

REPLACEMENT OF FISHMEAL WITH CHICKEN MEAT WASTE AND SOYA BEAN MEAL ON GROWTH, BODY BIOCHEMICAL COMPOSITION AND ENERGY UTILIZATION OF THE FRESHWATER PRAWN *MACROBRACHIUM ROSENBERGII* POST LARVAE

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Key words: Macrobrachium, Fishmeal, Chicken meat waste, Soya bean meal, Growth

The present investigation was made to analyze the influence of replacement of fishmeal with chicken meat waste and soya bean meal on the growth of *Macrobrachium rosenbergii* post larvae (PL). Actually, three types of formulated feeds were prepared using fish meal, chicken meat waste, and soya bean meal as protein source (40%) separately with other basal ingredients, such as green gram (24%), ground nut oilcake (24%) and Cod liver oil, (2%). Egg albumin (3%) and tapioca flour (6%) were used as binding agents. Vitamin B-complex (1%) and a pinch of salt were also mixed. *M. rosenbergii* PL (1.14 cm and 0.16g) were subjected to feeding trail

with these formulated feeds for a period of 60 days. Parameters of food indices, such as survival rate, weight gain, food conversion ratio and protein efficiency ratio were found in the order of fish meal > chicken meat waste > soya bean meal included feed fed PL. The proximate composition of biochemical constituents, such as total protein, amino acid, carbohydrate and lipid in these feeds fed PL were also found in the same order. Similarly, parameters of energy utilization, such as rates of feeding, absorption, conversion, ammonia excretion and metabolism were also found in the same order. Therefore, the dried chicken meat waste can be incorporated as protein source in low cost feed formulation for freshwater prawns.

F-O-33

CERTAIN PROBLEMS AND PROSPECTS OF SUSTAINABLE FISHERIES

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Keywords: Sustainable development, Industrial revolution, PROFISH, World Bank, Ethics.

The term “sustainable development” was first used by Brundtland Commission that defined the term as “...meets the needs of present without compromising the ability of future generations to meet their own need” and currently involves - Environment, Local People and Future- commonly abbreviated as **ELF**, and in this connection the carrying capacity is most important. The earlier available carrying capacity has drastically been curtailed due to the consequences of First and then in continuation the Second Industrial Revolution that increased the world population by 6 times and average per capita income by an average around ten times, but a heavy price has been paid in terms of depletion of natural resources and environmental degradation causing shrinkage of fish habitat by way of expanding water pollution from various sources contributed by large scale industrialization and urbanisation. The Real Problem

is the sharply rising population of man, a devastating parasite on nature. As a solution the PROFISH programme of The World Bank on aquaculture is briefly discussed. The human attitude regarding the resource utilization is suggested to limit itself less than the nature's capacity to replenish the resources and the Ethics from ancient Indian literature viz. *Yajurved* and *Srimadbhagwatgita* are discussed briefly as a guide for conservation and sustainable fishery and livestock resources.

F-O-34

INFLUENCE OF HERBALS *ALOEVERA*, *CINNOMUM VERUM* AND *CENTELLA ASIATICA* ON THE GROWTH PERFORMANCE AND PROXIMATE COMPOSITION OF *MACROBRACHIUM MALCOLMSONII* POST LARVAE

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Key words: *Macrobrachium malcolmsonii*, *Aloevera*, *Cinnomum verum*, *Centella asiatica*, Growth, Biochemical profile

The freshwater prawn, *Macrobrachium malcolmsonii* post larvae were fed with the different concentration (1%, 3%, and 5%) of selected medicinal herbs, such as *Aloevera*, *Cinnomum verum* and *Centella asiatica* incorporated diet. The basal ingredients used to prepare the experimental diet were fishmeal (25g), groundnut oilcake (20g), soybean meal (20g), rice bran (10g), and corn flour (10g). Egg albumen (7g) and Tapioca flour (5g) were used as binding agents. Vitamin B-complex (1g) and a pinch of salt were also mixed. The diet without herbal incorporation was served as control. These diets were fed to *M. malcolmsonii* PL for the period of 90 days. The food indices parameters, such as survival rate, weight gain, specific growth rate and protein efficiency ratio were higher in *Aloevera* 5%, *C. verum* 5% and *C. asiatica* 5% incorporated diet fed PL when compared with control. Similarly, the proximate composition such as total protein, amino acid,

carbohydrate and lipid contents were higher in these groups when compared with control. The similar trend was observed in energy utilization parameters, such as feeding rate, absorption rate, conversion rate, metabolic rate and NH₃ excretion rate were higher in herbals incorporated diet fed PL groups when compared with control. Activities of digestive enzymes, such as protease, amylase and lipase were also found to be higher in these diets fed PL when compared with control. Similarly, the concentrations of vitamin C and E were recorded in appreciable quantity in these groups. The levels of essential amino acids and fatty acids were higher in these groups. Since these herbals incorporated diets produced better survival, growth and production of *M. malcolmsonii* PL, they can be utilized for preparation of herbal diets for aquaculture of *Macrobrachium*.

F-O-35

**GROWTH PERFORMANCE OF THE MONSOON RIVER
PRAWN *MACROBRACHIUM MALCOLMSONII* ON
FORMULATED FEEDS WITH COMBINATIONS OF
PULSES AND CEREALS ALONG WITH COCONUT
OILCAKE AND SOYA MEAL**

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Key words: *Macrobrachium malcolmsonii*, cereals, pulses, growth, protein, amino acids, carbohydrate, lipid.

In order to promote the inland aquaculture of economically important monsoon river prawn, *Macrobrachium malcolmsonii* this study was conducted for assessing and categorizing the growth performance of the post larvae (PL) of this prawn species on feeds formulated with locally and cheaply available commodities. Actually, combinations of pulses and cereals (black gram and maize; red gram and rice; Bengal gram and barley) along with coconut oilcake and soya meal were used as basal ingredients. Two types of feeds with different proportion of pulse and cereal (type-A: 25%

pulse + 25% cereal; type-B: 40% pulse + 10% cereal) were prepared in each combination along with equal proportion of coconut oil cake and soya meal (20% each). Tapioca flour (5%) and egg albumin (4%) were used as binding agent. Vitamin B-complex (1%) was also mixed. These feeds were fed to *M. malcolmsonii* PL for a period of 45 days. The efficacy of these feeds on growth performance and biochemical constituents were assessed. Commercially available standard Scampi feed was served as control. The overall influence of these feeds on growth and concentrations of biochemical constituents (total protein, amino acid, carbohydrate and lipid) of PL were found to be the best in scampi feed followed by the feed rich in pulse (type-B) and the feed with equal proportion of pulses and cereals (type-A). Among three combinations of pulses and cereals were tested, the feed formulated with black gram and maize showed the best overall performance, followed by red gram and rice, and Bengal gram and barley. All the results were confirmed through paired sample t-test, DMRT, and two-way ANOVA. The survival rate was found to be better in formulated feeds fed PL when compared with control. It is assumed that the additive/ preservative added in the commercially available scampi feed may be contributed for the lower survival rate recorded. Moreover, the commercially available scampi feed is not always affordable to small farmers. Therefore, the farm made feeds with locally available commodities of pulses, cereals and by-products can be prepared and used in a sustainable manner for healthy promotion of *Macrobrachium* culture.

F-O-36

GROWTH OF MIXED-SEX AND MONOSEX NILE TILAPIA IN DIFFERENT CULTURE SYSTEMS

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Key words: Nile tilapia, Monosex culture, Growth in different culture systems.

Growth of 17 α -methyltestosterone treated monosex Nile tilapia was compared with hormone untreated mixed-sex fish in cistern, flow-through, pen and pond culture systems. Fish were cultured under similar feeding regime and stocking density for six months and different growth parameters were analyzed. Monosex tilapia showed significantly higher growth than mixed-sex fish. Fish in Pond culture showed significantly higher growth than fish in other culture systems. Monosex tilapia in pond culture system showed the highest growth while mixed-sex tilapia in cistern culture system showed the lowest growth. Monosex tilapia culture in earthen ponds might be considered the ideal method for tilapia culture in India.

FISHERY SCIENCE (POSTER)

F-P-01

IMPAIRMENT OF STEROIDOGENESIS IN FEMALE CYPRINUS CARPIO BY CADMIUM CHLORIDE : A STUDY OF OVARIAN P₄₅₀AROM GENE EXPRESSION AND AROMATASE ACTIVITY.

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Keywords : cadmium chloride :17 β -estradiol, ovary, P₄₅₀arom,
Cyprinus carpio

Effect of cadmium chloride (CdCl₂) on ovarian 17 β -estradiol production was studied in sexually mature female C. carpio. CdCl₂ at Sub-lethal concentration attenuated LH-induced 17 β -estradiol production both *in vivo* and *in vitro* almost in a dose - and time-dependent manner. The mechanism of toxicity of CdCl₂ on 17 β -estradiol production was investigated in Vitro. CdCl₂ at sub-lethal concentration strongly attenuated LH stimulated P₄₅₀ aromatase activity and P₄₅₀ aromatase activity and P₄₅₀aromgene expression. These suggest that the deleterious effect of CdCl₂ on 17 β -estradiol production is mediated through inhibition of ovarian P₄₅₀ aromatase activity and P₄₅₀arom gene expression.

F-P-02

**REPRODUCTION RELATED OBSERVATIONS ON
THYROID AND CAUDAL NEURO SECRETORY SYSTEM
IN PREPAWNING PHASE OF CLARIAS. BATRACHUS**

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Keywords: *Clarias Batrachus* Thyroid gland, Caudal Neuro Secretory System, Histology.

The thyroid gland may be defined as the tissue which is capable of accumulating iodine in great excess and combining it with an organic compound Thyroxin, the involvement of thyroxin in the metabolism associated with growth and the caudal neuro secretory system is a neuro endocrine apparatus characteristic of the posterior spinal cord of teleost fishes. The caudal neuro secretory apparatus is known to influence ionohydrosmotic regulation, so the mature acclimatized specimens in the pre-spawning phase of *Clarias batrachus* were studied under the controlled experimental condition in the lab for knowing the histology of the thyroid gland and the caudal neuro secretory system. Histologically, the thyroid gland is in the form of dissimilar patches in the region of the ventral aorta and afferent bronchial arteries and these scattered follicles are seen all over the pharyngeal region, and in the caudal neuro secretory system, the perikarya of the cells are of large size with polymorphic nuclei, sometimes elaborately multilobate.

F-P-03

**ZINC SULPHATE INDUCED MICRONUCLEUS TEST AND
MITOTIC INDEX ON CHANNA PUNCTATUS IN VIVO**

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Key Words : ZnSO₄, Genotoxic, Micronucleus Test, Mitotic index, Fish, Cytotoxic etc.

Zinc plays an essential role in wide range of cellular process, including defense against free radicals and mandating genomic stability of aquatic fauna. In the present study, we analyzed the induced mitotic index of dividing cells of kidney and micronuclei in peripheral erythrocytes of *Channa Punctatus* following in vivo exposure of three different concentrations ZnSO₄.7H₂O. Our result revealed that Zinc induced significantly high incidences of micronuclei in peripheral erythrocytes, and inhibited mitotic index and caused considerable delay in the generation time of kidney cells in treated organisms. Time and concentration related response of the chemical as observed in this study clearly indicated the genotoxic nature of Zinc Sulphate significantly i.e. ($p \leq 0.05$ to $p \leq 0.01$).

F-P-04

**STUDY ON SOME FACTOR AFFECTING AERIAL AND
AQUATIC RESPIRATION IN AN AIR BREATHING FISH,
CHANNA GACHUA (HAM)**

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Key words: Oxygen consumption, *Channa gachua*.

In the present investigation an attempt has been made to study the effect of some factors such as body weight, sex, ambient water temperature, pesticide and hormones on oxygen consumption in an air breathing murrel fish, *Channa gachua* (Ham). The oxygen consumption in *C. gachua* of different body weight in aquatic, aerial and total oxygen uptake was found inversely proportional to body weight. The results indicate that the male fishes consume more oxygen but females take less oxygen due to their activities and life style. IN this species the oxygen uptake from water, air as well as total varied considerably with the seasonal variation of ambient water temperature. The oxygen consumption was lowest during the month of December and gradually increased with the rise in temperature reaching at its maximum in June. Thus the nature of

oxygen consumption is directly proportional to the ambient water temperature. A significant positive relationship exists between water temperature and oxygen consumption. The correlation co-efficient (r) for aquatic, aerial and total oxygen consumption was noted as 1.0, 1.0 and 1.04 at lower temperature range (21.6⁰-28.2⁰C) and 0.943, 0.9907 and 0.9901 at higher temperature range from (28.2⁰-31.4⁰) respectively. The effect of three different pesticides namely Metacid-50 (Organophosphate), Dithane M-45 (Carbamate) and Kelthane (Organochlorine) were studied on changes in dual mode of oxygen consumption. Exposure of fish to above noted pesticides brought significant decrease in aquatic as well as total oxygen uptake percent while in increased in oxygen consumption through aerial route as compared to control one due to the action of pesticides on respiratory muscles causing paralysis, respiratory failure and death. The treatment of hormones i.e. Hydrocortisone (1mg/100g) and Thyroxine (0.5mg/100g) in *C. gachua* brought significant increase in aquatic, aerial and total oxygen uptake where as Adrenaline (0.00006 mg/100s) caused slight decrease in aquatic but abrupt and significant fall in aerial and total oxygen consumption. The treatment of Progesterone (1mg/100g) caused significant increase increase in aquatic and decrease in aerial and total oxygen uptake whereas Testosterone (2 mg/100g) significantly increased in aquatic and total oxygen uptake but slight decrease in aerial oxygen uptake was noticed. Thiouracil (2mg/100g) increased the aquatic oxygen consumption and decreased the aerial and total oxygen consumption respectively. The details have been discussed in this paper.

F-P-5

CHANGES IN TOTAL CARBOHYDRATE AND GLYCOGEN METABOLISM IN FRESH WATER MAJOR CARPS *CATLA CALTA* AND *LABEO ROHITA* DUE TO INFESTATION BY *EUCLINOSTOMUM LATEROSTOMUM*, A TREMATODE PARASITE.

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Keywords: *Calta cala*, *Labeo rohita*, *Euclinostomum laterstomum*, Carbohydrate metabolism, Glycogen metabolism

Though parasitological is relatively young in biology, parasitism is deep rooted. The relation between the parasite and host is interesting and important. In a host-parasite relationship, it is the host that accommodates the parasite and contributes for its development. As the development of the parasite progresses, the host is weakened and deteriorated. Such deleterious effects of parasites on host are biologically and commercially important to us. That the parasites are biologically harmful is already documented (Holmes & Bethel, 1972; Minchella & Scott, 1991). Basing on the available work and related scientific literature, the post-helminth parasitic effects in commercially important cultured fish, *Catla catla* and *Labeo rohita* are examined. These two fishes are popular edible fishes due to their delicious taste. In these two fishes the metabolic changes in carbohydrates and glycogen has been studied in normal and post infected fishes.

F-P-6

**HISTOPATHOLOGY INDUCED BY ORGANOCHLORINE
INSECTICIDE ENDOSULFAN ON FRESH WATER
TELESOT ANABAS TESTUDINEUS.**

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Key words: Endosulfan, Sublethal concentration, Histopathology, Anabas testudineus.

An acute static renewal test was conducted to determine the 24, 48, 72 and 96h median lethal concentration of endosulfan (35 EC). One tenth of the 96h LC_{50} was taken as sublethal concentration and fishes were exposed to this concentration for 30 days. Histological examination of brain of *A. testudineus* exposed to sublethal concentration of 1.691 ppb for 30 days showed severe depletion of the layer stratum griseum periventriculare and catecholamine neurones in the optic tectum. In posterior tuberal nucleus endosulfan produced an "interrupted string of pearls." The trunk kidney of exposed fish had enlarged sinusoids, decreased amount of haematopoietic tissue, occluded glomerular capillaries, necrosis of haematopoietic tissue, glomerular cells and tubular cells. Histology of spleen of exposed fish showed necrosis in red pulp, hyperplasia and exudate in white pulp and increased number of melanomacrophage centres (MMC). Based on the results of this study, it is concluded that endosulfan is highly toxic to edible fresh water fish *Anabas testudineus* and it can cause important changes in the histological characteristics of the fish.

F-P-7

**PREVALENCE AND DENSITY OF CESTODE PARASITES
COLLECTED FROM A FRESH WATER FISH,
MASTACEMBALUS ARMATUS IN KRISHNA RIVER AT
SANGLI DISTRICT (M. S.), INDIA.**

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Key words: Prevalence, Mastacembalus armatus, Cestode,
cicumoncobothrium, senga

The present communication deals with the prevalence and density of cestode parasites of fresh water fish Mastacembalus armatus. The cestode parasites were collected from June 2007 to May, 2008. During this period total 120 fishes were dissected and screened for the presence of cestode parasites. Out of 120 fishes 38 were found infected with cestode parasites. Total 54 parasites were collected and preserved in 10% formalin for taxonomic study. Identified cestode parasites belong to genera circumoncobothrium and senga. The prevalence is 31.66% and Density of infection is 0.45%.

F-P-8

**ABSOLUTE AND RELATIVE FECUNDITY IN CHANNA
GACHUA DUE TO INDUCTON OF OVAPRIM**

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Key Words: Ovaprim, Fecundity, Channa gachua

To evaluate effectiveness on induced spawning of *Channa gachua* fecundity using single intramuscular injection of Ovaprim. Regression analysis (ANNOVA) was also used to assess the body weight dependence on absolute and relative fecundity. Absolute fecundity was positively correlated with wet body weight ($r = 0.667^{***}$) ($p < 0.001$), while relative fecundity remains fairly constant ($r = 0.275n.s$) ($p > 0.05$) with increasing body weight. Body weight and absolute or relative fecundity can also be described by linear equation ;

$Y = a + bX$, which can be used to estimate the absolute fecundity with a fair amount of accuracy.

F-P-9

BIOCHEMICAL CHANGES DUE TO OVAPRIM AS INDUCTION TO ARTIFICIAL SPAWNING IN CHANNA GACHUA

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Key words : Biochemical changes, Ovaprim, artificial spawning, *channa gachua*

The fresh water fish. *Channa gachua* injected with Ovaprim (Salmon gonadotropin releasing hormone analogue, dopamine antagonist and taken from male and females before injection and some biochemical were carried out and used as control values. Administration of hormones accelerated the maturation and percent of ovulation. Plasma levels of Estradiol in female, increased sharply at 6 hrs after the first injection of the ovaprim. Plasma Testosterone (T) in males increased parallel to the plasma Estradiol in females. Also the results showed significant increase in protein and lipid values after Ovaprim injection.

F-P-10

**BIOCHEMICAL AND HAEMATOLOGICAL
ALTERATIONS IN FRESHWATER FISH
THYNNICHTHYES SANDKHOL (SYDES) EXPOSED TO
METASYSTOX.**

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Key Words: Biochemical, hematological, Metasystox, Thynnichthyes sandkhol.

The acute toxicity of organophosphate pesticide Metasystox on hematological and biochemical parameters of an economically important freshwater fish, Thynnichthyes sandkhol was studied under static conditions. Fishes were exposed to predetermined LC₅₀ concentration 4.28ppm for 24 hr exposure and the alterations in biochemical and hematological parameters were studied. During above treatment, level of constituents found to be decreased in the parameters like RBC by -72.43% haemoglobin -18.35% and plasma protein -16.46% whereas, WBC and plasma glucose level found increased 57.94% and 26.35%. respectively. Observed biochemical and haematological parameters are the stress indicators and may be used as non specific biomarkers in the field of environmental toxicology.

F-P-11

**PREVALENCE OF ZOONOTIC HELMINTH PARASITES
OF THE MASTACEMBALIDAE IN FRESHWATER FISHES
FROM VIDHARHA REGION OF MAHARASHTRA STATE,
INDIA.**

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Keywords : Helminth parasite, Mastacembelidae, Prevalence,
Vidharbha Region.

The aim of the study was to determine the occurrence of helminth parasites of freshwater fishes from Vidharbhan region of Maharashtra State. The analysis of Mastacembalidae fishes of 487 collected during seasons in Oct. 2008- Sept. 2010 revealed 8 Species composing the helminthes community. The material was then examined under a stereoscopic microscope. Among Fishes examined 374(94.5%) were found infected. The component species were Azygia (56.7%). Isoparorchis Sp. (71.2%) Senga Sp. (29.7%), Phyllodistomum sp. Circumonocobothrium, have zoonotic imprtance for fishes leading to diseases. Therefore, monotoring of parqasitic fauna in aquatic is necessary to reconginze the fish's potential to spred zoonoses in various regions of Vidharbha.

F-P-13

"DIVERSITY OF PLATYHELMINTHES IN FRESHWATER FISHES FROM MAHARASHTRA STATE"

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Key Words: Diversity, Platyhelminthes, Freshwater fishes, Maharashtra.

The present study deals with diversity of platyhelminthes were studied for taxonomic characteristics in relation with geographic distribution and host species in freshwater fishes from Maharashtra State. During the present Study (Oct.2008- Sept. 2010) total 11 platyhelminthes (Cestodes and trematodes) were recorded. All these species differs from each other in general topography of taxonomy. The parasites belonging to the class Cestoda are highly diversified with 07 different species recorded followed by 4 species from the class Trematoda.

The result shows that among seven species the prevalence of senga sp. *Circumcobotrium* sp. *Lytocestus* sp. and *Clinostomus* sp. was high whereas it was low in case *Ganesia* sp, and *Azygia* sp. the present studies are helpful for the status of diversity of helminth parasites from Maharashtra state.

F-P-14

**HAEMATOLOGICAL ALTERATIONS INDUCED BY
ENDSOLFAN PESTICIDE IN A FRESHWATER FISH
CHANNA PUNCTATUS.**

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Keywords : Haematological Alteration, Endosulfan, Channa punctatus

In the present study the fish channa punctatus were exposed to 0.0045 ppm concentration of endosulfan pesticide for 96 hours. The haematological parameters such as Red Blood Corpuscles (RBC), White Blood Corpuscles (WBC), Blood Glucose and hemoglobin (Hb) were studied. The parameters such as RBC and Hb were decrease where as WBC and blood glucose were increased.

F-P-15

**NEW SPECIES OF THE GENUS LYTOCESTUS
(CARYOPHYLLIDEA LYTOCESTIDAE) FROM CATFISH
IN AURANGABAD DIST. (M.S.) INDIA.**

Sushil Jawale and Sunita Borde

Key words: Caryophyllaeid, Clarias batrachus, Aurangabad.

New caryophyllidean species of the genus Lytocestus from catfish Clarias batrachus (L.) from Aurangabad District are described. The differential characters of Lytocestus jadhavii Sp.Nov. is an elongated body, tapering posteriorly, differentiated head, butterfly shaped ovary, coiled uterus.

F-P-16

**SEASONAL VARIATION IN PHYSIO-CHEMICAL
FACTORS OF A FRESH WATER FISH POND AND THEIR
ROLE IN FISH CULTURE**

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Keyword : Pond, Physiochemical factors, water quality.

The present paper records the information on variation of water quality of Bisar Tank in Gaya town during different season of study period, 2009-2010. In present investigation, different physiochemical factors of water such as water level, Temperature, Turbidity, pH, CO₂, Do and Total hardness has been analyzed during April 2009 to March 2010 at 3 main seasons (Summer, Rainy and winter). This water has been used for culturing of fish without any scientific maintenance. Due to increased pollution from domestic and other human activities, fish production of pond is affected. This study may be useful for further analysis and improvement of water status of this pond.

F-P-17

**PHYSIOLOGICAL FUNTION OF GILLS OF FRESHWATER
FISH PUNTIUS TICTO (HAMILTON-1) IS
IONOREGULATORY RATHER THANGAS EXCHANGES**

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Key words: Puntius ticto, Sodium, Potassium Lithium ion, Protein Oxygen consumption.

The physiological function of gills of typical freshwater fish, Puntius ticto was studied after exposing the fishes to salinity. The ionic concentration viz. Na⁺, K⁺, Cl⁻, Li⁺, Oxygen consumption and protein were determined in gills after exposure to different concentration of

salinity. The oxygen consumption in *P. ticto* showed a steep decrease in different concentration of salinity. However significant increase. Whereas as Li^+ did not show any significant change. The Na^+ showed a uptake in gills and the phenomenon in gills appears to be due to $\text{Na}^+/\text{K}^+/\text{Cl}^-$ co transport mechanism in gills. Thus, the present study strongly support the direct evidence for the ionic regulatory hypothesis of gills rather than gas exchange has was believed.

F-P-18

**STUDY ON THE TREMATODES & NEMATODES
PARASITES OF FRESH WATER FISHES**

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In the present study investigation were carried out on the trematodes and nematodes parasites of fresh water fishes of two different ponds, which are stocked for fish culture. Due to heavy stocking and problem for aquaculturist. Thus for proper culture one should known about which are found in the present investigations are *Gyrodactylus* and *Dactylogiyrus* which makes the fish lethargic and weak. The digenean damage to skin of fishes after descaling it. The nematodes which are found in the present study are *Camillanus* and *Capillaria*. They can infect all organs of the host, causing loss of function of the damaged area. Signs of nematodiasis anemia, emaciation and reduced vitality. The treatment for the above infections are also been discussed.

F-P-19

EFFICACY OF WATER HYACINTH *EICHHORNIA CRASSIPES* AS A SOURCE OF PROTEIN COMPONENT IN *CLARIAS BATRACUS* (LINN.) FEED.

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Key words : *Clarias batracus*, *Growth*, *Formulated diets*, *Eichhornia crassipes*.

Five varieties of diets with protein levels 15%, 22.75%, 30.50%, 38.75%, and 46% were formulated using Water hyacinth (W11) *Eichhornia crassipes* as a diet component mixture of groundnut oil cake+ fishmeal mixture (1:9) were formulated to evaluate its acceptability and suitability on the growth of *Clarias batracus* (Linn.) under laboratory condition. Wild *Clarias Batrachus* (Linn.) Of 0+ age group with a Weight range of 9.50-15.00g were used after acclimatization. During four weeks experiment. The growth, feed intake and metabolic rate were recorded on weekly basis.

Results indicated that the species fed with the diet formulated exclusively with WH with protein level 15% experienced net weight loss of -41.692g while on reduction of its proportion of 20% with 36.75% protein level in the diet. The net growth was recorded to one maximum of +41.692 and was found to be superior to other diets at the water temperature ranging from 26.2 °C to 30°C. The FCR, SGR and the metabolic rate in terms of distance covered are discussed in detail.

F-P-20

**EFFECT OF CADMIUM ON PROTEIN CONTENT IN
MUSCLE, LIVER, GILL AND KINDNEY OF FRESHWATER
FISH CHANNA PUNTATUS (BLOCH.)**

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Cadmium, Charnna of aquatic environment with heavy metal such as cadmium has become a matter of great concern because of its toxicity, persistence and bioaccumulation. Cadmium has no known biological function and fish are generally very sensitive to cadmium poisoning. The contamination of water bodies with heavy metals as a consequence of industrial, agricultural and anthropological activities, is a potential threat for aquatic organisms and also to public health. Cadmium is biologically non essential heavy metal that comes from natural an anthropogenic sources. It is a teratogen, carcinogen and a possible mutagen. Cadmium has been reported to be a widespread environmental pollutant that causes severe impact in organisms. The present investigation was planned to determine the protein content in muscle, liver, gill and kidney of *Channa punctatus* exposed to sublethal concentrations of cadmium chloride for 4, 7, 15 and 30 days. The levels of protein content in the muscle, liver, gill and kidney were investigated in both control and exposed group fish and compared. The results clearly showed that the sublethal concentration of cadmium chloride significantly decreased the protein levels in the exposed fish *C. punctatus* after 4, 7, 15 and 30 days of exposure in comparison to control.

F-P-21

HISTOCHEMICAL ALTERATIONS IN THE OVARY OF FRESHWATER FISH, RASBORA DANICONIUS EXPOSED TO PAPER MILL EFFLUENT

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Key words : Paper mill effluent, ovary histochemistry, Rasbora daniconius

This investigation deals with the effect of paper mill effluent on the histochemical components of the ovary of freshwater fish, Rasbora daniconius. Histochemical studies on protein, lipid and glycogen contents of ovary of Rasbora daniconius showed a progressive decrease in staining intensity to Mercury bromophenol blue (Hg-BPB), Sudan black B and Best's carmine at 30 days exposure when treated at sublethal concentration [1.9% (1/5) and 0.95% (1/10) LC₅₀ of 96 hrs] of paper mill effluent..

F-P-22

ICHTHYODIVERSITY OF THE RANGAVALI DAM, NANDURBAR MAHARASTHRA STATE.

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Keywords : Freshwater, Ichthyodiversity, species, genera, families, bony and cartilaginous fishes.

The Indian Ichthyodiversity is divided into two classes, viz., Chondrichthyes and Osteichthyes. Freshwater fishery sites are varied like 45,000 km of rivers, 1,26,334 Km. of canals, ponds and

tanks 2.36 million hectares of reservoirs. There are about 450 families of freshwater fishes globally. Ichthyodiversity is also essential for stabilization of ecosystem, protection of overall environmental quality, for understanding intrinsic worth of all species on the earth. In India, there are 2,500 species of freshwater fishes that have been recognized out of which 930 are categorized as freshwater species. Fishes were collected from Rangavali dam at Navapur, District – Nandurbar (Maharashtra State) India. Samples were collected from different stations between June 2007 and May 2009 on a monthly basis, using 1-2 mm pore size fish net, and with horizontal and vertical hauls. The samples. Fishes were evaluated qualitatively, and the species were identified from collected samples. Fishes were collected from the catch of local fisherman. Initially fishes were identified by local name and common name as named by local fishermen. The scientific identified by local name and common name as named by local fisherman. The scientific identification and classification were made. In the present study, 28 fish species were found. Among 28 fish species 25 genera and 12 families were grouped under seven orders.

F-P-232

**RICE-FISH INTEGRATION IN RAIN-FED ECOSYSTEM
THROUGH RAIN WATER HARVESTING IN ON-FARM
RESERVOIR**

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Keywords : Economic analysis; Integrated aquafarming; On-farm reservoir; Optimal size; Rain-water balance model

Lined and unlined on-farm reservoirs (OFR) were constructed with different side slopes (1.5:1 and 1:1) and depths (2, 2.5, 3, 3.5 m) so as to provide the supplemental irrigation to crop as well as fish culture in the OFR. Daily simulation of the water balance models (cropped field; OFR) followed by economic analysis was carried out. Due to the competition between crop and fish for the available

scarce rainwater in the OFR, the model results were versatile and the farmers may select the OFR sizes according to paying capacity. The net profit varied according to different sizes of the OFR. The depth and side slope for both OFR (lined and unlined) were 2.5 m and 1:1. Benefit cost ratio (BCR) was obtained 1.62 for the lined OFR, while 1.51 for the unlined OFR.

F-P-24

**FOOD AND FEEDING HABIT OF SCYLLA SERRATA AND
SCYLLA TRANQUEBARICA FROM CHILIKA LAGOON,
EAST COAST OF INDIA.**

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Key words : Food and Feeding habits, two crabs, Chilika Lagoon,

The food and feeding habit of two mud crabs have been studied during July 2007- May 2008 from Chilika Lagoon. The highest length was observed being 16.7 cm and 22.5 cm in *Scylla serrata* and *Scylla tranquebarica* respectively. Similarly the highest weight of *Scylla serrata* and *Scylla tranquebarica* was found to be 605 gm and 1100 gm respectively. The food of crab includes Crustaceans, Fishes, Molluscas, Detritus, and plants etc. The highest percentage of food of crab includes Crustaceans, (22%-55%) followed by Fishes (18-35%), Molluscas (8-35%) and Detritus (0.5-8.3%) in both the crabs. The food and feeding habits of crab as dependent on the availability of the food in that area. There is no difference in feeding habits depending on the size of the crabs. The food and feeding habits of two crabs were analyzed from eight stations from Chilika Lagoon where the crabs are available through out the year.

F-P-25

**INTERLAMINAR PHENOTYPIC VARIATIONS IN THE
BASAL DENDRITIC SPINES OF MULTIPOLAR NEURONS
IN THE VISUAL WULST OF BREEDING FEMALE BAYA
WEAVER, *PLOCEUS PHILIPPINUS***

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Keywords : Multipolar neurons, visual wulst, spines, basal dendrite.

Visual wulst, the rostro-dorsal surface of avian telencephalon extending from midline to the lateral region of brain, is a laminated “Bulge” consisting of four histologically distinct rostro caudally arranged laminae with a sequence- Hyperpallium apicale (HA), interstitial nucleus of the hyperpallium apicale (IHA), hyperpallium intercalatum (HI) and hyperpallium densocellulare (HD). Multipolar neurons, distinguished on the basis of their almost rounded or irregularly shaped medium to large sized soma giving off 4-8 thick dendritic branches towards all the possible directions from the soma, are the most abundant neurons (42%) spanning all the four laminae of wulst with maximum presence in HA (54%) trailed by HD (23%), IHA (15%) and HI (8%), as per observed in this crum.

In the present study, to elucidate the interlaminar differences in the dendritic spine morphology, distribution and density on the basal dendrites of multipolar neurons of the visual wulst of breeding female Baya (*Ploceus Philipinus*), neurohistological Nissl staining and Golgi-Colonnier methods have been employed. Significant variations (at 5% probability, $n_1 = 3$ and $n_2 = 4$) in spine density in the basal dendrites of multipolar neurons among the four laminae of wulst, i.e., HA, IHA, HI and HD, has been observed. In addition, various other spine dimensions (Spine head size and spine neck length) are also studied and compared.

F-P-26

STUDIES ON DNA DAMAGE AND REPAIR KINETICS IN CULTURED BLOOD CELLS OF ROHU (LABEO ROHITA) EXPOSED TO AN ORGANOPHOSPHATE PESTICIDE, PHORATE.

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Key words : Cell culture, Labeo rohita, phorate, comet assay, DNA damage, DNA repair

Short-term blood cell culture was carried out to study the DNA damage and recovery in rohu (*Labeo rohita*) exposed to an organophosphate pesticide, phorate. The 24 h cultured cells were exposed to 4, 20, 100 and 500 µg/ml concentrations of phorate for 3 h. After exposure one set of cultured plates from each treatment group along with the controls were subjected to alkaline comet assay. From each treatment group along with the controls were subjected to alkaline comet assay in order to detect the genotoxic effects of the pesticide. Two similar sets were transferred to pesticide free media and sampled at 1.5 and 3 h of transfer. The results showed that both the pesticides were able to induce genotoxic effects after 3 h of pesticide exposure. However after 1.5 h in the number of DNA breaks. A complete recovery in 4 and 20 µg/ml dose levels of phorate treated cells were noticed at 3 h of incubation in the pesticide free media. The present study thus advocates the utility of *in vitro* system in the study of genotoxic potentialities of compounds on the blood cells of rohu owing to its capability to detect DNA damage as well as repair.

F-P-27

**EFFECT OF PROBIOTIC ON GROWTH AND SURVIVAL
OF PENAEID SHRIMP: A CASE STUDY OF BALASORE
COAST, ODISHA.**

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Keywords : Effect of Probiotic, Growth, Survival, Penaeus monodon, Balasore, Odisha.

The probiotics of commercial brand was applied to shrimp culture pond of 0.8 hectare in area with the density of 22/m² and a gut probiotics mixed with feed and applied to culture pond of penaeus monodon which was compared with control pond. The average body weight, total production, and survival rate of shrimp applied with probiotics were higher than that of control ponds. The shrimp culture ponds without probiotics were seriously affected by bacterial infection, gill chock and tail rot diseases. However, these problems are not encountered in probiotics treated ponds. The average body weight of the shrimp during harvest from control pond was 27 gm and total production was 2460 kg and feed consumption ratio weight was 29.8 gram against the total production of 2962 kg and feed consumption ration was 1:1.1. of survival 75%. From the present study, it can be concluded that probiotics play a vital role in growth and survival of shrimp by maintaining good water quality throughout the culture period.

F-P-28

**THE STATUS AND POTENTIAL OF FISHERIES IN
NALBARI DISTRICT OF ASSAM**

Rezina Ahmed

Key words: Status, Potential, Fisheries, Management

Nalbari district-area 1999 Sq. Km. (Longitude 91°.0 E- 91°.45 E and Latitude 26°.0 N-26°.45 N) having population of more than 10, 12,608. The district is interspersed with abandoned beds of rivers which are subjected to annual inundations. There are altogether 38 number of large beels, 88 hectre areas of swamp and low-lying areas covering on land area of 200.20 hectres. Along with the riverrine areas these beels and low-lying areas have high fishery potentiality. There about 19452 number of ponds under various development blocks, where the pisciculture is practiced. There are 42 varieties of fish species with high commercial value. These information are the immense importance in fisheries management, investment and community development of the area.

F-P-29

**LIMNOLOGICAL EVALUATION OF THE FISHERIES
POTENTIALS AND PRODUCTIVITY OF THE WETLANDS
OF UPPER STRETCHES OF RIVER BRAHMAPUTRA.**

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Key words : Fisheries potential, wetlands, Brahmaputra River

The flood plain wetlands cover a surface area of *ca.* 1.0 lakh hector i.e. 72.45% of the total lentic area of the state and the 50% of these are present in the upper stretches of Brahmaputra valley. Two wetlands were selected for the study, one connected seasonally to Brahmaputra River and the other is closed type. Physico-chemical

parameters were evaluated monthly from the samples collected from three stations of each wetland from 2007 onwards. Annual fish yield were recorded Morphometric and physico-chemical parameters of the wetlands were used to estimate the potential fish yield according to morpho-edaphic index (MEI).. The mean depth and alkalinity values were used to estimate the MEI.. For high potential fish yield and sustainable exploration of the fisheries, effective management of the wetlands should be adopted. The connecting channel of the open type wetland should be maintained properly so that the auto stocking from the river is possible. In the closed type wetland, management practices for fish culture and conservation of indigenous fish species should be implemented. .The present paper deals with the assessment of fisheries potential and the co-efficient of co-relation with other abiotic variables which were done using SPSS software package.

F-P-30

**“GUT CONTENT ANALYSIS OF COMMON INDIAN TOAD
DUTTAPHRYNUS MELANOSTICTUS (SCHNEIDER, 1799)
FROST ET AL., 2006 (ANURA: BUFONIDAE) FROM
AURANGABAD (MAHARASHTRA)”**

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Key words: Analysis, toad, Aurangabad, diversity, fauna.

Gut content analysis of 90 *Duttaphrynus melanostictus* showed that these toads feed on a wide range of invertebrates. Among them the insects form the major part. The feeding of toad was confined to ground and litter dwelling forms but was apparently unselective. The food items ingested were within the size of 5-15 mm. The prey smaller than the size of 5.0 mm showed less diversity suggesting that these forms are less easily distinguished by the toads. There are differences between the diets of toads collected from two different localities i.e. University campus (Site-A) and the Industrial area around Aurangabad city (Site-B). The differences in their food may

be related to the differences in the different faunas of two localities. The intake of vegetable material by these hosts due to an accidental ingestion but the intake of inorganic material forms an accidental result of feeding on organic detritus material.

F-P-31

**USE OF COMMUNITY PONDS FOR AQUACULTURE IN
AURANGABAD DISTRICT, MAHARASHTRA, INDIA :
COMPARATIVE APPROACH**

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Keywords. Aquaculture, village tank, percolation tank, minor irrigation tank, fingerlings, productivity.

In India almost all villages are having either one type of water body like village tank, percolation tank or minor irrigation tank. Among these water bodies percolation tanks and minor irrigation tanks are partially utilized for aquaculture production systems, where very low fish production levels are observed. Village tanks are completely unutilized for this purpose. In assuming the immense resource potential of these water bodies for aquaculture, present study was undertaken by selecting three inland water bodies *viz.* village tank, percolation tank and minor irrigation tank in Aurangabad district of Maharashtra. Few necessary arrangements were made for making these water bodies suitable for aquaculture. Fish seed in the form of fingerlings @ 7000/ha were stocked in each water body. Fertilizers and feed was given as per requirements. Water quality and fish growth were regularly monitored. Fish harvest was started from 7th month of culture period and ended in 10th month. Village pond is having very high productivity, hence fish production was also high i.e. 1900 kg/ha where as it was 1223 Kg/ha in percolation tank and 652 Kg/ha in minor irrigation tank. Cost of production and cost benefit ratio was determined. On the

basis of the experiences in culture practices and observations few conclusions were made for utilizing these water bodies for aquaculture purpose.

F-P-32

**STUDY OF BIODIVERSITY OF FISHES OF SONE RIVER
AT BANSAGAR DAM**

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Sone river is one of the biggest river of Madhya Pradesh. It originates from Amarkantak and after crossing eastern part of Madhya Pradesh and U.P. it enters Bihar and mingles With Ganga river near Patna.A Dam has been constructed at Deolondh known as Bansagar Dam.which is one of the Biggest Dams of Madhya Pradesh .A Study has been Made on Biodiversity of fishes at Bansagar Dam.Aquaculture is presently one of the fastest growing food production system in the world with an annual growth rate of 9%. Global aquaculture production has increased three folds and by weight from10.4 to 30 million tons (between 1990 to 2004) From nutritional point of view,these aqua products are considered as a healthy food material due to presence of superior quality of highly digestable protein, polyunsaturated fatty acids,besides vitamins valuble minerals such as phosphorous,calcium,iron and sodium contents, which are difficult to obtain in adequate quantity in other food products.

Potentially,the inland fish resources of India are among the richest in the world. It is estimated that more then 850 fresh water fishes are available in fresh water ecosystem.The Himalayan rivers Ganga and Brammaputra together with their tributaries and distributaries harbour 265 and 126 fish species respectively, whereas peninsular rivers support 76 fish species.Therefore it was decided to study the biodiversity of fish fauna of bansagar dam at Deolodh(It is one of the biggest dams in m.p.) This dam is constructed on sone river. Sone originates from Amarkantak and mingles with Ganga at Patna .There are about fourteen tributaries of sone river (The important

ones are the Tpan, Johilla, Mahanadi and Gopad) The sone river receives industrial waste from jute industry and Amlai paper mill. A separate study of the impact of pollution by the effluents of above mentioned industries is being carried out. The sone river travels about 145 kms. to reach Deolond. Bansagar dam is located at 127 kms. from Shahdol and about 55 kms. from Rewa and 80 kms. from Satna. In the year 2000-2001 in Bansagar dam the fish yield was 7985.5 kg. and the maximum of 219966.0 kg. had been recorded in 2002-2003. Whereas fish yield 168276.5 kg. in 2003-2004. 150794 kg. in 2004-2005 and 66986.5 kg. were noted in 2005-2006. Available information indicates that ichthyo-diversity is not only diminishing but fish yield is also declining. The factors responsible for loss of ichthyo-diversity and fish yield in natural aquatic ecosystems are habitat destruction due to change in quality and quantity of water, alteration in feeding and breeding grounds accompanied by irrational fishing practices and over exploitation of fishes. Today the commercially important fish of the dam are catla, *Labeo rohita*, *Cirrhinus mrigala*, *Cyprinus carpio* etc. these are common at study site. The ichthyofauna consists of carps and cat fishes. Numerically the carps dominate over other groups throughout the observation. Conservation of ichthyo-diversity is now a widely accepted concept for enhancing fish production and attaining the objective of food, nutrition and economic security.

F-P-33

**INDUCED EFFECT OF MALATHION AND
CYPERMETHRIN INSECTICIDES ON BIOCHEMICAL
CONSTITUENTS OF FRESH WATER FISH,
LEPIDOCEPHALICHTHYS GUNTEA (HAM-BUCH)**

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Key words: Ichthyofauna, Biochemical constituents,
Lepidocephalichthys guntea, Cypermethrin, Malathion.

Pesticides have shown to exert a wide range of metabolic, biochemical and behavioral changes in animals. In the present study, the freshwater fish, *Lepidocephalichthys guntea* was exposed to Cypermethrin (synthetic pyrethroids) and Malathion (organophosphorus compound), insecticides, both are widely used in agricultural field. The Lc 50 value of Malathion and Cypermethrin were found to be 11 and 5.2 ppm respectively. The sub-lethal concentrations like 1/4th and 3/4th of Lc 50 values of both insecticides were taken for evaluation of biochemical changes in fish for 96 hours of exposure. Biochemical parameters such as total Glycogen, protein and lipid were analyzed from whole body tissues of *Lepidocephalichthys guntea*. Results showed significant fluctuation in protein, decrease in glycogen and lipid over the control. Hence pesticides in a natural environment would affect the health of ecologically important ichthyofauna in natural water bodies indicating the need to protect environment and minimize pesticide in agricultural fields.

F-P-34

SMOKED FISHES AS NUTRITIONAL, QUALITY AND ITS IMPACT TOWARDS BIOTECHNOLOGY

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Key words: - Fisheries, Indigenous Technical Knowledge (ITK), traditional smoked fishes, Post harvest technology (PHT), Fish products, socio- economic status.

The Madhya Pradesh has been among the pioneering states in the country. It was found that in order to increase fish productivity of forms with the increasing awareness about participation in different enterprises and their contribution to economy, intense efforts are being made at upgrading the skills of women and providing them with greater opportunities in fisheries sector in Madhya Pradesh, India. Women from rural area may an important role in establishing and form in food habits of the families, proper nutrition is for good

health of any one. Chhindwara is one of Madhya Pradesh's districts, and is part of the state's Jabalpur division. The fisherwomen of this area are mostly involved in fish farming and are eaters of smoked local fishes. Fisherwomen have involved various technologies in fisheries over a period of time by trial and error, continuous observations and evaluation to use the traditional practices in this field. The specific objectives of this study were to the availability, consumption and landing pattern of fishes, to find the reasons for adopting traditional practices by fish trade, fish outlets, under domestic fish market. An exploratory research design was used in the investigation and the data were collected by personal interviewed method with the help of structured interview schedule. The findings of the present study indicated that majority of the fisherwomen were high adopters of recommended traditional smoked technology. Efforts are needed to organize co-operative marketing and processing of smoked fish. Awareness programme to improve the quality of smoke fish is the need of the hour which will ensure quality improvement and thereby good health of the consumers as well as contribute better returns to the producers and dealers. Efforts on the part of extension agency are required by way of organization guideline, training and demonstration for motivating and considering fisherwomen in adoption of recent traditional technology to maximize the production and increase the profit. The direct sale to consumers, sale through middleman and sale to whole sellers were the three major modes impact of marketing adopted by smoked fisherwomen. Efforts are needed to organize co-operative marketing and processing of smoked fish. Costliness of packaging material, non-establishment of processing and storage facilities (unit/plant) nearly, high transportation charges, non-availability of skilled labour, suitable market price, delayed payment by purchaser (whole sellers, contractors) and with non-availability of electric current regularly for freezing of fish were the important difficulties encountered by fisherwomen in marketing of smoked fish. In order to minimize marketing cost due to costly preservative, packaging material it is essential to find out cheaper and locally available packing, storage material as a substitute. Secondly, establishment of storage and processing units is the immediate need. This can be done on co-operative or public sector basis. It will not only

overcome the risk in spoilage of fishes for want of storage facility but also guarantee for increased profits by processing the smoked fish.

Therefore, the activities proposed under National Fisheries Development Board (NFDB) for development of domestic marketing are expected to significantly contribute in reducing post harvest losses, enhance revenue and also improve the hygienic and sanitary conditions in fish markets. However the fisherwomen are not aware of the improved post harvest technique towards biotechnology of smoked fish. If they are made aware of improved Post harvest technology (PHT) methods and techniques, lot more gains can be derived which will help to sustain their livelihood.

F-P-35

IMPACT OF CHROMIUM ON LIVER OF *CHANNA PUNCTATUS*

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Keywords: Chromium, liver, biochemical changes, histopathological changes, *Channa punctatus*

Natural waters are often contaminated by untreated wastes of industrial, technological and agricultural origin containing various metallic compounds. Heavy metals due to their bio accumulative and non-biodegradable properties constitute a core group of aquatic pollutants. Chromium is an element of subgroup VI. It can exist in oxidation states ranging from -2 to +6, but is most frequently found in the environment in the trivalent (+3) and hexavalent (+6) oxidation states. Hexavalent chromium is more toxic than the +3 form because its oxidizing potential is high and it easily penetrates biological membranes.

Aquatic medium is a very efficient solvent for many chemical compounds and all aquatic organisms including fish are extremely vulnerable to toxic effects resulting from the absorption of oral

ingestion of these contaminants from the ambient medium. Toxic effects are mostly preceded by biochemical, physiological and histomorphological changes in the organisms. If these changes qualitatively and quantitatively can provide clear and early indications of toxicity and information pertaining to the detected abnormalities in the tissues combined with physiological and biochemical data may provide a more accurate and complete explanation of the activity of the toxicant or pollutant. As well as the liver plays a central role in transforming and clearing chemicals and is one of the most susceptible organ to these toxicants. In this context, the present study has been planned to investigate the histopathological and biochemical effects of hexavalent chromium on liver tissue of fresh water fish *Channa punctatus*.

In the present study impact of chromium in two sublethal concentrations (2.5 mg/L and 5 mg/L) which are 1/20th and 1/10th of LC₅₀ of hexavalent chromium, was observed on the histopathological and biochemical profile of fresh water fish *Channa punctatus*. For it, the source of hexavalent chromium is Potassium di-chromate (K₂Cr₂O₇, Ranbaxy Laboratories Limited, Punjab, India). Fish were exposed to these two concentrations and a control group was maintained throughout the experiment. After 60 days exposure liver tissue was dissected out and histological and biochemical changes such as protein, total lipid, cholesterol, triglycerides, glycogen, glucose, alkaline phosphatase, acid phosphatase, Glutamic oxaloacetic acid (GOT), Glutamic pyruvic transaminase (GPT) and lactate dehydrogenase (LDH) were observed in it. Appreciable decline in protein, total lipid, triglycerides, glycogen, glucose, alkaline and acid phosphatase, LDH were observed, however, the cholesterol, GOT and GPT content increased significantly.

This study reflects the extent of the toxic effect of hexavalent chromium and the metal induced cumulative deleterious effects at various histopathological and biochemical levels in *Channa punctatus*.

F-P-36

MOLECULAR CHARACTERIZATION OF TOLL-LIKE RECEPTOR 2 (TLR2), AND ITS DOWN-STREAM SIGNALING FOLLOWING LIGANDS EXPOSURE AND BACTERIAL INFECTION IN THE INDIAN MAJOR CARP, ROHU (*LABEO ROHITA*)

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Key words : Indian major carp; *Labeo rohita* ; TLR2 ; IL-8; *Streptococcus uberis*

Toll-like receptors (TLRs) are one of the key components of innate immunity. Among various TLR types, TLR2 is involved in recognizing specific microbial structures such as peptidoglycan (PGN), lipoteichoic acid (LTA) zymosan etc., and after binding them it triggers myeloid differentiation primary response gene 88 (MyD88)-dependent signaling pathway to induce various cytokines. In this report, full-length TLR2 gene was cloned and characterized in rohu (*Labeo rohita*), which is highly commercially important fish species in the farming-industry of Indian subcontinent. Phylogenetically, rohu TLR2 (rTLR2) was closely related to common carp and exhibited significant similarity (93.1%) and identity (88.1%) in their amino acids. During embryogenesis, rTLR2 expression was detected as early as ~ 7 h post fertilization indicating its importance in embryonic innate immune defense system in fish. Basal expression analysis of rTLR2 showed its constitutive expression in all the tissues examined, highest was in the spleen, and the lowest was in the eye. Activation of TLR2 and the induction of IL-8 in various tissues was observed following zymosan, PGN and LTA exposure and *Streptococcus uberis* and *Edwardsiella tarda* infections. Blocking NF- κ B resulted in down-regulation of PGN mediated IL-8 expression indicating the involvement of NF- κ B in IL-8 induction. Together, these findings highlighted the important

role of TLR2 in immune surveillance of various organs, and in augmenting innate immunity in fish in response to pathogenic invasion.

F-P-37

EFFECT OF CADMIUM ON PROTEIN CONTENT IN MUSCLE, LIVER, GILL AND KIDNEY OF FRESHWATER FISH *CHANNA PUNCTATUS*(BLOCH.)

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Key words: Cadmium, *Channa punctatus*, protein content, heavy metal, fish.

The contamination of aquatic environment with heavy metal such as cadmium has become a matter of great concern because of its toxicity, persistence and bioaccumulation. Cadmium has no known biological function and fish are generally very sensitive to cadmium poisoning. The contamination of water bodies with heavy metals as a consequence of industrial, agricultural and anthropological activities, is a potential threat for aquatic organisms and also to public health. Cadmium is biologically non essential heavy metal that comes from natural and anthropogenic sources. It is a teratogen, carcinogen and a possible mutagen. Cadmium has been reported to be a widespread environmental pollutant that causes severe impact in organisms. The present investigation was planned to determine the protein content in muscle, liver, gill and kidney of *Channa punctatus* exposed to sublethal concentrations of cadmium chloride for 4, 7, 15 and 30 days. The levels of protein content in the muscle, liver, gill and kidney were investigated in both control and exposed group fish and compared. The results clearly showed that the sublethal concentrations of cadmium chloride significantly decreased the protein levels in the exposed fish *C. punctatus* after 4, 7, 15 and 30 days of exposure in comparison to control.

F-P-38

EFFECT OF COPPER ON BEHAVIOUR OF FRESHWATER PRAWN, *MACROBRACHIUM LAMARREI* (CRUSTACEA - DECAPODA)

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Keywords:- Freshwater prawn, *Macrobrachium lamarrei*, Copper toxicity, Behaviour

Heavy metal pollution is a prime concern nowadays. Copper despite being an essential micronutrient becomes highly toxic, when present in higher concentration, affecting both flora & fauna. Behaviour being most sensitive, affected first by metals thereby deteriorating quality and quantity of aquaculture production. Fresh water prawns, *Macrobrachium lamarrei* were subjected to acute concentration, 0.304 mg/L (96h LC₅₀) of copper sulphate to evaluate the behavioural alterations. Animals showed initial hyperactively followed by letharginess after 48h; chelepede scrapping, erratic movements, loss of balance, increased aggressiveness; profused mucous secretion on gill, carapace and abdomen.

Blackening in gill, carapace and abdominal region was noticed in 25% prawns after 96 h exposure. Intensity of behavioral alterations was found duration dependent, underlying mechanism of copper toxicity, bio-indicator role of *Macrobrachium lamarrei*, as well as bio-marker potential of various behavioural patterns have also been discussed.

F-P-39

**FISH DISEASES AND METHODS OF THEIR DIAGNOSIS
AND CONTROL: A CONCEPT IN INTEGRATED
FARMING APPROACH FOR SUSTAINABLE
DEVELOPMENT**

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Key words : Fish diseases, Integrated farming, diagnosis, control methods

Fish is a common food for many people in India and fish farming is an age old activity and in practice from ancient times. Wild freshwater fish are caught in many ways. At present, because of indiscriminate and over exploitation, environmental damage caused by overuse of agricultural chemicals and serious pollution caused by humans, the precious food source is becoming impoverished. Integrated Fish Farming (IFF) is a sustainable-agriculture technology practiced widely in Asia and other regions of the world. This is very popular, advanced and widely practised in China. Hence most culture methods have either been derived from Chinese methods or modified suitably as per the regional requirements. This integrated technology can offer farmers economic improvements while lessening the adverse environmental impacts of fertilizer based-farming. IFF systems typically involve a combination of fish polyculture, integration of agricultural production (livestock and/or crops) with aquaculture, and on-farm waste and wastewater recycling. Evolved on the principles of productive recycling of farm wastes, fish- livestock farming systems are recognized as highly assured technologies for fish cultivation. In this integration, fish species selection is one of the important point, where plankton feeder should be 60% and omnivorous should be 40%. A combination of six species viz, Catla (20%), Silver carp (20%),

Rohu (20%), Mrigal (15%), Grass carp (10%) and Common carp (15%) should be stocked at density of 8000 to 8500 fingerlings/ha for the targeted production level of more than 3500 kg/ha. Integrated cattle and fish farming is an ideal method for assured fish production in small ponds (<0.1 ha). In this technology, the fish crop is raised using the cattle on the pond embankment or any other suitable site of the farm. Integrated pig- fish farming is a highly profitable fish culture system, where pigs are reared adjacent to the fish ponds, preferably on the pond embankment from where pig urine, excreta and spilled pig feeds are introduced into the pond water. Integration of duck farming gives add on benefits as they feed on insects and parasites harmful to the fishes, duck droppings provide essential nutrients and importantly, they increase the dissolved oxygen (DO) level in the pond with their frequent movement thus reduce stress to the animals. Again integration of vegetable farming with above system would be highly beneficial for meeting the daily demands of fishers. Not only this would make the fishers engaged during their off-time, but the fruits and vegetables can be the source for their domestic demands. The concept of different integrated farming practices and their socioeconomic potential have been elaborated in the present paper.

F-P-40

MOLECULAR TYPING OF AEROMONAS ISOLTES FROM POLLUTED WATER : METHODS AND APPLICATION

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Key Words : Aeromonas, Fish, Water, Molecular typing, RAPD, PCR

There has been a steady deterioration in the quality of water of River Ganga over several decades, as these receive millions of litres

of sewage, industrial and agricultural wastes. There are serious water quality problems in the cities, towns and villages using these waters. Water borne diseases are rampant, fisheries are on decline, and even cattle are not spared from the onslaught of pollution. The pathogen under investigation is bacteria belonging to the genus *Aeromonas*, family *Aeromonadaceae*, which are widespread in the environment, especially fresh water and have been implicated as pathogens in human and animal diseases. They have been implicated in a wide spectrum of diseases of human infections and animals, including fish, frogs, reptiles, birds and cattle (Janda and Abbott, 1998; Pidiyar et al., 2002). Among *Aeromonas* species, *A. hydrophila*, *A. caviae*, *A. veronii*, *A. eucrenophila*, *A. popoffii* and *A. culicola* are predominating species isolated from human cases where as *A. hydrophila*, *A. sobria*, *A. veronii* b.v. *sobria* have been found fish samples (Janda and Abbott, 1998; Szczuka and Kaznowski, 2004). Since *A. hydrophila* was first recognized as an important pathogen for aquatic animals and significant opportunistic pathogen for humans having public health significance, many efforts were dedicated to find methods for accurate identification and classification of species belonging to this genus (Cascon et al., 1996). *Aeromonas* spp. are known to be phenotypically, serologically and genetically quite diverse and the conventional methods of identifying these microorganisms like microbiological culture, biochemical tests, protein analysis, serotyping etc. give contradictory results. Alternative specific genomic fingerprints have been proposed as diagnostic tools by means of amplification of interspersed repetitive DNA sequences present in bacterial genomes, referred to as rep-PCR (Rademaker and Bruijin, 1997) or by amplification of random sequences by arbitrary primers, RAPD (Williams et al., 1990). Isolation and identification of *Aeromonas* species from Ganga river system at Allahabad and their characterization using PCR and RAPD-PCR have been elaborated in the present paper.

GENERAL (ORAL)

G-O-01

BIO-EFFICIENCY OF NATURAL PLANT PRODUCTS AGAINST INSECT-PEST AND FOR SECURITY OF FOOD IN INDIA.

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Keywords: Natural plant product, Aphid mortality, *Lipaphis erysimi*, neem seed kernel.

Use of natural plant product in the management of mustard aphid, *Lipaphis erysimi* (Hemiptera : Aphididae) under laboratory condition was carried out. The results revealed that the nymphs and adults mortality of *Lipaphis erysimi* varied significantly with three different plant products concentrations. The mortality was high with seed kernel extracts of neem, *Azadirachta indica* A. Juss, (Miliaceae) and is ranging from 83.85 to 90.00 percent at different concentration followed by leaves extracts of hridpatti, *Digitalis purpurea* Linn. (Poaecae) ranging from 67.86 to 90.00 percent. The extracts showed moderate nymphs and adults mortality ranging from in bark extracts of arjun, *Terminalia arjuna* Roxb. Wt. & Am. (Chenopodiaceae) (54.09 to 77.70), damajari, *Tylophora indica* (Burm f.) Merr. (Menispermaceae) (43.07 to 75.00) and adarakh, *Zingiber officinale* Rosc. (43.07 to 72.78) percent at different concentrations. The effect of latjeara, *Achyranthes aspera* Linn. (Amaranthaceae) was least effective ranging only 00.00 to 18.66 percent caused the lowest mortality to the nymphs and adults of *Lipaphis erysimi*. Pooled data showed that all the plant materials treatment were showed significant superior over untreated control in reducing the nymphs and adults of mustard aphid. The treatment with pure seed juice of *A. indica* gave the highest mortality 83.85 to 90.00 percent to the nymphs and adults of mustard aphid, *Lipaphis erysimi* followed by *D. purpurea* under all the experimental conditions. These botanicals may be plays significant role in food security under fields and storage conditions.

G-O- 02

**EFFECT OF NATURAL ZEOLITE CHABAZITE ON FISH
MUSCLE PROTEIN**

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Keywords: Zeolite, fish, protein and muscle.

Zeolites are naturally occurring alumina-silicates of alkali and alkaline earth metals, having water molecule within their structural frame work. They have been used in an array of applications in various animals to improve body, weight, feed efficiency, reduce incidence and severity of diarrhoea, improve eggs shell thickness, increase fat, protein and calcium content of cow milk, etc. In the present investigation, role of natural zeolite chabazite on fish muscle protein contents studied. The experimental fish *heteropneustes fossilis*, and important food fish collected locally and acclimatized prior to experimentation. Chabazite sample was first washed and then crushed to powder form before use. The exposure period was 180 days. After an interval of 30 days, fish muscle was removed and processed for protein isolation. Protein samples were analysed by SDS-PAGE. The protein bands thus obtained were compared with control, the band of interest which showed increase in protein contents, was close to 43 kd. The results indicates that chabazite play an important role to increase protein contents in fish muscle protein.

G-O-03

**INTEGRATION OF MICRONUCLEUS AND COMET
ASSAYS IN RATS TO REDUCE ANIMAL USAGE IN
GENETIC TOXICOLOGY STUDIES**

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Keywords: Integration, genetic toxicology, animal reduction.

This is a preliminary study outlining the utility of the combined Micronucleus and Comet assays (MN/Comet) for genotoxicity testing of chemicals with potential animal savings. Two positive genotoxins (Ethyl methane Sulphonate and Carbendazim) were used in this study. The chemicals were detected positive in at least one of the endpoints measured. The data indicates the feasibility of combining the *in vivo* rat bone marrow micronucleus assay and *in vivo* comet assay. The dosing protocol (0h, 24h and 45h) and sacrifice at 48h post first dose appears to be a promising approach in reducing animal usage in routine genetic toxicology investigations.

G-O-04

**SEQUENCE ANALYSIS, EXPRESSION AND
PURIFICATION OF RECOMBINANT TYPE IV FIMBRIAL
SUBUNIT PROTEIN OF PASTEURELLA MULTOCIDA
SEROGROUP B:2 IN ESCHERICHIA COLI**

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Keywords: Haemorrhagic septicaemia, *Pasteurella multocida*,
Recombinant fimbriae.

Pasteurella multocida serogroup B:2, a causative agent of haemorrhagic septicemia (HS) in cattle and buffaloes of India, is known to possess a type IV fimbriae (pili) as one of the virulent

factor. In the present study, *ptfA* gene encoding for type IV fimbrial subunit of *P. multocida* serogroup B:2 (strain P52), as Indian HS vaccine strain, has been analysed and over-expressed in recombinant type IV fimbrial subunit protein is discussed. Comparative *ptfA* gene sequence analysis revealed marked heterogeneity on carboxyl terminal due to host specific adaptability and indicated the potential use of recombinant fimbrial protein in developing HS subunit vaccine.

G-O-05

BACTERIOSTATIC ACTIVITY IN KANHERI AND RUI

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Keywords: bio-efficacy, Kanheri (*Nerium odoruna*), Rui (*Calotropis gigantea*), Streptomycin, Co-trimxazole.

In the process of fouling, the formation of bio-film takes place through bacterial colonization. Among them *Clostridium* & *Bacillus* strains were found in abundance. The present study was undertaken to screen the bio-efficacy of Kanheri (*Nerium odoruna*) & Rui (*Calotropis gigantea*) alcoholic extracts against these fouling microbes. The assay was done by turbidity method using Streptomycin and Co-trimxazole as standard antibiotics. It was observed that in the first few hours of incubation (up to 6 hrs) growth rates of these bacterial strains showed a marginal inhibition. Thereafter the inhibitory effect was found declining and bacterial growth was enhanced in case of *Clostridium* were as, in case of *Bacillus* inhibitory effect of extract of Rui continued unabated and after 48hrs of incubation showed a bacteriostatic effect. None of the extract showed the bactericidal activity. Confirmatory experiments are underway.

G-O-06

**THE PRESENT SENARIO AT SUKHANA RIVER, IN
INDUSTRIAL AREA OF AURANGABAD, (M.S.) INDIA**

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Keywords: Physico-chemical parameters, seasonal variations, f test (ANOVA), pollution, Sukhana River.

The present study deals with comparative study of past and present status of water quality of Sukhana River, Aurangabad (MS) India. The physico-chemical characteristics were studied and analyzed during January- December 1987 and presently January-December 2010. Seasonal variations in the past and present study of Sukhana River in MIDC Aurangabad (MS) India were observed. The results revealed that the water quality of this River has shown increase in pollution year by year confirm by f test (ANOVA). Today all parameters are beyond the permissible limit according to WHO and ISI standards for drinking purpose.

G-O-07

**GROWTH PROMOTING EFFECTS OF CURRY LEAVES
(*MURRAYA KOENIGII*), MINT LEAVES (*MENTHE
ARVENSIS*) AND CORIANDER LEAVES (*CORIANDRUM
SATIVUM*) ON *MACROBRACHIUM ROSENBERGII* POST
LARVAE**

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Key words: *Macrobrachium rosenbergii*, *Murraya koenigii*,
Mentha arvensis, *Coriandrum sativum*, Proximate composition,
Digestive enzymes, Vitamins.

In the present study, the Indian native medicinal plants, such as Curry leaves (*Murraya koengii*), Mint leaves (*Mentha arvensis*) and Coriander leaves (*Coriandrum sativum*) were incorporated (10%) with basal ingredients, such as soy bean meal (45%), groundnut oil cake (25%), wheat bran (5%), cow gram (5%) and maize bran (5%). Tapioca flour (5%) and egg albumin (7%) were used as binding agents. 2 ml sunflower oil was added as lipid source. Vitamin B-complex (1%) and a pinch of salt were also mixed. Diet without herbal incorporation was served as control. Post larvae of *M. rosenbergii* were subjected to feeding trail for a period of 60 days. The final day of the study, the herbal incorporated feed fed groups gained appreciable growth when compared with control. Similarly, the food indices parameters, such as survival rate, weight gain, specific growth rate and protein efficiency ratio were higher in herbal incorporated feed fed groups when compared with control. The biochemical constituents, (total protein, amino acid, carbohydrate and lipid), digestive enzymes (protease and amylase) were elevated in herbal supplementation diet fed PL when compared with control. Among the three herbs tested, *M. koengii* was produced better performance followed by *C. sativum* and *M. arvensis*. Therefore, these herbs can be incorporated as supplements in feed formulation for promoting sustainable aquaculture of freshwater prawns.

G-O-08

ASSESSMENT OF RELATIVE TOXICITY OF PLANT EXTRACTS AGAINST *CORCYRA CEPHALONICA* UNDER LABORATORY CONDITIONS.

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Key words: *Corcyra cephalonica*, *Argemone mexicana*, *Semecarpus anacardium*

Extracts from two plants, leaves of *Argemone mexicana* and cotyledons of *Semecarpus anacardium* tested against larvae of *Corcyra cephalonica*, resulted in blackening and death of the larvae. Chloroform extracts showed high protective effect against *C. cephalonica* larvae. In the present study *C. cephalonica* larvae exposed to the extracts of *Semecarpus anacardium* at 0.5, 1, 1.5 and 2 ml/Kg rice showed highest mortality rate at 120 hours in 2ml chloroform extract. *C. cephalonica* larvae exposed to the extracts of *Argemone mexicana* at 0.5, 1, 1.5, and 2 ml/Kg showed highest mortality rate after 120 hours in 2 ml extract. Adults emerged from the exposed larvae were mostly abnormal and hence further generation may be controlled. *Semecarpus anacardium* cotyledons being edible, the extracts are safe to use for effective control of *Corcyra cephalonica* in the stored grains.

GENERAL (POSTER)

G-P-01

**BIOCHEMICAL CHANGES INDUCED BY BRODIFACOUM
TO CONTROL MERIANES HURRIANAE JERDON.**

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Biochemical studies revealed deleterious effect, various abnormalities and diseases caused by the toxicants. Investigation indicates that the anticoagulant stored in the liver hampers the activities of hexokinase and glucokinase, which further effect the carbohydrate metabolism. Alteration in serum glucose which results in dysfunction of liver parenchyma. The increase in serum protein may be due to increase of enzyme immunoglobulin and malfunctioning of kidneys under stress conditions. The increase in cholesterol and alkaline phosphatase, decrease in urea, acid phosphatase is due to the toxic action of anticoagulant and the animal seems to be exhausted and sluggish.

G-P-02

**BIODIVERSITY FISHES IN THE MAJALGAON DAM
RESERVOIR ON SINDPHANA RIVER IN MAHARASHTRA
STATE, INDIA.**

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Key Words : Majalgaon Dam, *Catla catla*, *Cyprinus carpio*, *Notopterus Chital*.

The present investigation was carried out to study the aquatic vertebrate animals with special reference to fish fauna of Majalgaon dam reservoir water during the year 2009-2010 (June to May). The Majalgaon dam water is mainly used for drinking, irrigation and fishing purpose and also establishes Hydroelectric Project on left

canal from this 2.5 Mega/Hz power production. During the study period 11 Species observed on different order and family. Order Cypriniformes, Ophiocephaliformers, cyprinsformes, Osteoglossiform, Mastacembeliformes, Cypriniformes, family. Cyprinidae belong to five species observed i.e. Labeo rohita belong to families Siluridae, Mastacembelidae, Notopteridae, Channidae and Bagridae. In the reservoir culture of the fish and production of Catla catla.

G-P-03

**ROLE OF PLANKTON IN THE CONSERVATION OF
NATURAL BIODIVERSITY OF A FRESH WATER
ENVIRONMENTAL**

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Several studies have been made in recent years, on the ecology and Environment of fish ponds I India by workers like, George (1986), Quadri and Yusuf (1978). They have investigated on fish production and their management and they have also confirmed that nutrient enrichment of water by natural and artificial means affects the hydro chemical balance of water and it triggers the quantitative changes in both phyto and zoo plankton number of the medium. Further physic chemical factors of the medium like temperature. PH, dissolved oxygen contents also affects the distribution and species diversity of these various plankton genera. Dr. Michael (1962) and Dr. Chakravarty (1980) observed specie diversity in the genera Daphina and Brachionus. This investigation on the study of these various plankton species, their management and utilization have been carried our in a perennial fish pond of Bhagapur in the different seasons of the year, 2006. The city of Bhagalpur is located on the southern bank of river Ganges with 26.07° North longitude and 87.02° East longitudes.

G-P-04

**THE ROLE OF PHYSIO-BIOCHEMICAL PARAMETERS IN
DAMAGING
NATURE OF RHIZOPERTHA (FABRICIUS)**

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Keywords - Lesser grain borer, grain hardness, oviposition, physio-biochemical parameters, infestation.

Rice is damaged by a number of stored grain pests, in which the chief pest in store is *Rhizopertha dominica* (Fabricius) (Coleoptera, bostrichidae) Which commonly known as lesser grain borer has an important position among the stored grain pest, which is observed causing considerable damage to rice storage. In physical characters of grain, the hardness play an important role in resistance to insect pests in rice. Certain characters like hardness of grain and site for oviposition on rich affects its reproductive behavior in stored rice. For the safe storage of grains from the attack of different insect pests, it is essential to determine the sources of physio - biochemical resistance techniques from the systematic research approaches, so that resistance factors can be utilized in breeding programme to save the grains by pest infestation.

India is the main growing country covering about 45 million hectares of land with about produce of 65 million tones of rich. Girish et al. (1990) declared that about 70 to 80 million tones rice grain are utilized in the country. As per economic survey government of Indian ministry of finance 2004-05 reported the area of rice 42.2 million hectares, and production 87.0 million tones and productivity 20.51 quintal/hectares for

G-P-05

**HERBAL FOLKLORES FOR MALE SEXUAL DISORDERS
& DEBILITIES IN DEHRADUN DISTRICT OF
UTTARAKHAND**

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Key words - Herbal folklores, Dehradun district, Uttarakhand

This study is an effort to document such notable crude knowledge lying with rural herbalist regarding some herbal formulations utilized in male sexual disorders & debilities prevalent in the study area.

Study was conducted in the rural areas of the Dehradun district of Uttarakhand. Local medicine men & traditional healers known as Vaidya in the study area were interviewed extensively to gather the empirical information. Every village of the district was explored thrice to ensure the location of maximum number of plant species. A questionnaire was designed to elicit information. Every village of the district was explored thrice to ensure the location of maximum number of plant species. A questionnaire was designed to elicit information on botanical and vernacular names of the plant, family, parts used as drug, mode of preparation and administration, ailment treated, combination with other herbs and food restriction if any.

From each village more than 10 informants known for their ethnobotanical acumen were interviewed. Specimen and their local names were collected from each location with the help of local informants.

A male person deficient in sexual process carries a stigma throughout his life, therefore, the medicines and preparations supposed to increase virility, curing different sex linked disorders and debility are in great demand. Present study brought to light 30 plants species used for treatment to sex-linked complaint of males in the study area. Most of the plant species have been tested

pharmacologically to explain the mechanism of action claimed to improve the male sexual function.

Virility largely depends on general health, hence the plants like Gazar (*Daucas carota*), may enhance virility by improving general health of a person. Pharmacologically, extracts of paiz (*Allum cepa*) and lahsun (*Allium Sativum*) were found to possess testosterone like effect in tested animals. This might be the reason of their local uses in the study area. Bathua (*Chenopodium album*) proved CNS depressant. Tulsi (*Ocimum sanctum*) showed adaptogenic antistress activity. In weight gain in tested animals. Chaulai (*Amaranthus spinosus*), Purnarnava (*Boerhavea diffusa*), Bhindi (*Abelmoschus esulantus*) and chhoti Gokhru (*Tribulus terrestris*) used by the old people need special attention under the light of latest phytoparmacological investigations.

G-P-06

EFFECT OF CODOX-661 ON GERMINATION AND SEEDLING GROWTH OF WHEAT CREOP IN SALINE-ALKALINE BLACK SOIL

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Keywords : Codx-661, salinity, soil treatment, seedling growth.

Saline alkaline-black cotton soil contains many types of salt which may affect germination of seed and seedling growth. In present study, the germination of wheat (*Triticum aestivum*) under the salt stress and soil treated conditions with different Codex-661 concentrations of (10 ppm) was studied under laboratory conditions. Lowest germination (0.6 ± 0.26) was observed in 10 PPM after 24 hours while the least germination (5 ± 0.89) was observed in control consisted of saline-alkaline black cotton soil without any treatment. After 7 days in control the lowest (1.1 cm) root length and (1.5 cm) shoot length was observed while in 70 ppm, highest root length up to (3.6 cm) and shoot length up to (5.8 cm) was observed. After 15

days lowest root length (1.10 cm) and shoot length (3.1 cm) was observed in control while highest root length observed was (4.4 cm) and shoot length was (9.7 cm) in 70 ppm.

G-P-07

CARBON SEQUESTRATION POTENTIAL OF MANGIFERA INDICA IN ITS GROWTH PHASES

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Key words : Carbon sequestration rate, Carbon storage, Climate change, *Mangifera indica*.

Carbon is sequestered by the plant photosynthesis and stored as biomass in different parts of the tree. Carbon sequestration rate has been estimated for samples of different age groups. The carbon content in Aboveground and belowground one year, two year, five year and ten year age group *Mangifera indica* species was estimated. The percentage of carbon sequestration was observed higher in ten year *Mangifera indica* than five year, two year and one year it was 30.54mg/tree, 25.66gm/tree, 17.99gm/tree and 4.48gm/ tree respectively.

G-P-08

HISTOLOGICAL CHANGES IN CERTAIN TISSUES OF AMUD CRAB, SCYLLA SERRATA (FABRICIUS, 1798) DUE TO HEAVY METALS CONTAMINATION IN ENNORE CREEK, TAMIL NADU

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Key words : *Scylla*, Mud crab Heavy metals, Histology, Ovary, Brain, Thoracic ganglion.

Ennore creek is one of the important aquatic regions within city limits; the study area of this present investigation is 30 kms away from the Chennai city. *Scylla tranquebarica*, is one of the most economically important crabs and holds a prime position in estuarine food chain and it has been appropriately used as a bioindicator of heavy metal contamination. The tissue such as brain, thoracic ganglion, ovary and gills were subjected to histological analysis and it was inferred that the NSCs in both brain and thoracic ganglion was less, very similar in size, indistinguishable into different types. The ovarian oocyte morphology was entirely different from that of the normal ovary and the oocytes. All the oocytes showed very less, very similar in size, indistinguishable into different types. The ovarian oocyte morphology was entirely different from that of the normal ovary and the oocytes. All the oocyte showed very less ooplasmic substances and distances are intermingled due to the rupture of oogenetic pouch and most of the oocytes are highly vacuolated and were previtellogenic stage. The histological changes in the gill lamellae of the crabs affected with heavy metals shows notable alterations. The haemocytes are accumulated more in the haemocoelic space and the gill lamellae. The interlamellar space has increased; necrosis is seen in most of the gill rachis. The epithelial lifting and disrupted pillar cells are very common. Most of the gill lamellae show hyperplasia with more haemocytes. inflammatory changes were highly seen. The tip of the gill lamellae shows abnormalities and peculiar malformations resulting on clubbing of the tip of the lamellae and were found to be obliterated by the proliferated and infiltrated haemocytes, causing distension and gross enlargement of the gill lamellae, epithelial lifting is seen in the crabs due to the heavy metals contamination.

G-P-09

ENVIRONMENTAL PHENOMENONS OF URBAN MIGRATION

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Key words : Urban, Migration, Slums, Settlers, Social, Immigrants,
Poverty, Solid Waste, Recycling, Planning.

Rural-urban migration is the migration of people from rural areas into cities. The movement of people from rural communities into cities is considered the main cause of urban growth, especially in developing countries. Rural migrants are attracted by the possibilities that cities can offer, but often settle in shantytowns and experience extreme poverty.

In addition, there is a continuing trend towards ever-larger urban agglomerations. By next ten years 465 cities in developing countries will have populations over 1 million, compared with 213 in the mid 1990s. In 1994, there were 14 so-called "mega-cities", defined as cities with at least 10 million inhabitants. Their number is expected to double by 2015. Population of city like Visakhapatnam has grown from mere 16000 in nineteenth centuries to about 15 lakhs today. A small fishermen village has grown up into a great city.

However, with growth population problems related to socio-economic conditions, issues related to environmental aspects are frequently emerging out. The present topic is a bird's-eye view on various such aspects related to environmental issues taking the city of Visakhapatnam as unit to understand the various impacts of urbanized migration.

G-P-10

**ZOOPLANKTONS AS BIOINDICATORS OF TROPHIC
NATURE**

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Key words : Chemical factors, dO_2 content, Eutrophic, Heavy metals, Indicators, Limnetic, Oligotrophic, pH level, Zooplanktons.

Limnology is the study of structural and functional relationship and productivity of organisms found in inland aquatic ecosystems. The study of pond ecosystem is essential because of the interaction of several factors, which are all together responsible for the primary productivity and energy flow within the ecosystem, Various aspects of the study of limno-planktons are of paramount importance since these serves as food for many larger organism (e.g., fish) and play an important role in food cycle of a pond. Some of these planktons are specific to the environment in which they stay and necessarily not found elsewhere. Among the planktons the zooplanktons especially the species belonging to Mastigophora, Rotifera, Cladocera, Copepoda, Ostracoda are best indicators of trophic nature of a given environment.

Some of the species of Rotifera are considered as best indicators of water quality and aquatic pollution. The abundance of zooplanktons has a direct relation with the hydrography, physico-chemical factors and availability of phytoplankton. Biotic factors such as quality and quantity of food, interference competition, predation and ecological conditions induce plankton communities favoring one species over another. They are more susceptible to the physicochemical changes due to their small size and permeable integument. The temperature and pH tends to be positively related to species diversity while conductivity and salinity tend to be negatively related.

G-P-11

**KARYOLOGICAL ANALYSIS AND NORs STUDY OF
Halcyon Smyrnesis (ALCEDINIDAE : AVES).**

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Key Words : Alcedinidae, Coraciiformes, Aves.

The karyological analysis of *Halcyon Smyrnesis* shows the modal diploid chromosome number $2n = 86 \pm$. The bimodal karyotype is differentiated 20 macros and 66 microchromosomes. A single large metacentric pair is well distinguished from the rest of the macrochromosomes. The 10 pairs of macrochromosomes include 9 pairs of autosomes and one pair of sex chromosomes. Out of them 6 pairs are metacentric, 2 pairs are submetacentrics and one pair is subtelocentric. The Z chromosome is submetacentric and occupies 3rd position in karyotype but the W chromosome is subtelocentric which is biarmed and smallest among the macrochromosomes. The microchromosomes are either acrocentric or dot shaped in nature. The total chromosomal length is $42.13 \mu\text{m}$. By applying N-banding method for the first time it is found that a pair of microchromosomes constitutes NORs in this species which is similar to some other avian species of this order. Although the modal diploid value in Coraciiformes ranges between $2n = 76 \mu$ in *Dacelo gigas* to $2n = 132 \pm$ in *Alcedo attis*, the diploid value of most alcedinid species shows $2n$ number between $84-86 \pm$. Since the limited karyological data are deficient to derive any conclusion on the interrelationship and the evolution of the order Coraciiformes, it is apparent that the order Coraciiformes is not only morphologically heterogeneous but also karyological.

G-P-12

**STUDIES ON HIGHER INFESTATION PERIOD OF
BACTROCERA CORRECTA(BEZZI) IN GUAVA CROP**

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Key words : Fruit fly, infestation, Guava.

Guava fruit fly *Bactrocera correcta* (Bezzi) is widespread in India, Pakistan, Srilanka, Nepal, Myanmar, Thailand and China. Recorded host include common guava (*Psidium guajava* L.), mango (*Mangifera indica*), citrus, ber, peach (*Prunus persica*), rose apple (*Psidium guajava* L.) mango (*Mangifera indica*), citrus, ber, peach (*Prunus persica*), rose apple (*Syzygium jambos*). In India, this fly infests mango, peaches, orange etc. *Bactrocera correcta* lives in the company of *B. Zonata* (Peach fruit fly). Guava fruit fly used to cause serious damage to the guava crop orchards. It was not found from 3rd week of April to 3rd week of June. In the month of July it showed statistically at par results. Maximum value 24.061 per unit was followed by 2nd week of March 22.362 in the 3rd week of January 22.160 and 2nd week of February. In the crop mean a range of variation was found to range from 15.952 to 21.483 per unit in variety Allahabad safeda and Lucknow -49 showed at par results during present investigations. Similarly variety apple colour and Red flesh exhibited statistically at par

G-P-12

**MERCURY TOXICITY : A GLOBAL PROBLEM-
PROTECTION BY COMBINATION THERAPY - A NOVEL
APPROACH**

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Mercury is one of the most common heavy metal, which is used for more than 3000 years in medicine, industries and also used therapeutically as a cathartic, diuretic, antiinflammatory and in dental amalgam as well as folk remedies. Present investigation was conducted to assess the effects of NAC along with Zn/Se in blood biochemical alterations. Acute mercury exposure revealed elevation in AST, ALT, ALP, LDH activities, however, changes were noticed in LPO, GSH, AChE, and AChE variables. Chronic dimethylmercury exposure produced alterations in LPO, GSH, GR, GPx, G-6-PDH, AChE, ATPase, mercury concentration. NAC showed recoupage when compared to toxicant exposed group. To further enhance the efficacy of NAC, it was supplemented with Zn and Se. NAC+Zn +Se proved to be most efficacious in mercury mobilization thus, showed recoupage in biochemical variables. Histopathological, Ultrastructural/DNA damage observations substantiated above findings.

G-P-13

COMBINED EFFECT OF DOSE-DEPENDENT ELECTRON BEAM IRRADIATION AND COLD STORAGE ON THE LIPID PROFILE OF THE MUD CRAB MEAT.

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Key words : Irradiation, electron beam, *Scylla Serrata*, total lipid, fatty acids.

The present study on the combined effect of dose dependent electron beam irradiation and cold temperature was conducted with a view to optimize the irradiation dose for the long term preservation of meat derived from mud crab, *Scylla serrata*. Vacuum packed individual live crabs grouped in three sets and subjected to irradiation in a dose dependent manner (0.5kGy, 1kGy and 2kGy) using 8.6 MeV electrons at the rate of 3.6k Gy per hour. Soon after irradiation, one set of sample was processed for the quantification of total lipid and fatty acids through soxhlet extraction and GC-FID respectively. The two remaining sets were refrigerated at -8⁰C and -20⁰C for 20 days before subject to analysis of total lipid and fatty acids. The results on lipid quantification are the following. a) Soon after irradiation at dose either 0.5kGy or 1.0 kgy, the sample showed the quantity of total lipid significantly comparable with that of fresh non-irradiation doses 0.5 kGy and 1.0kGy and kept in -20⁰c did not undergo any change in their quantity and is found to be similar with that of fresh non-irradiated sample c) The lipid profile of the 1.0kGy irradiated and -8⁰C preserved sample is also found to be comparable with that of fresh non irradiated tissue. d) However, the cold storage of 0.5kGy irradiated sample at -8⁰C caused significant decline in the total lipid profile when compared to that of the sample kept at 20⁰ C and fresh non-irradiated one). Interestingly, the cold preservation of the non-irradiated sample kept either in -8⁰C or -20⁰c did not help to

maintain the normal lipid level and showed significant decline compared to that of irradiated sample either in fresh or preserved in cold condition. The quantity of total fatty acids of the samples receiving the radiation doses 0.5kGy and 1kGy is also found to be almost comparable to that of fresh non-irradiated one. However, if the irradiation dose is increased to 2kGy the quantity of total fatty acid profile showed a statistically significant declining tendency comparing to fresh non irradiated sample. The overall results of the present study encourage us to suggest that the optimum irradiation dose required to preserve the normal lipid profiles of crab meat under the cold temperature (ranging from -8°C and -20°C) is 1.0 kGy. The present paper also discusses the effect of irradiation to reduce the transfat content in the meat of candidate crab species.

G-P-14

LAC CULTIVATION AS A RURAL EMPLOYMENT FOR WOMEN RESIDING AROUND SIMILIPAL BIOSPHERE RESERVE, ODISHA, INDIA.

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Keywords: Lac insect (*kerria lacca*), resin, shellac, seedlac, button lac, Kusmi, Rangeeni, Aghani, Jethwi, Katki, Baisakhi, broodlac, phundi

Lac is the only resin of animal origin, the secretion of a tiny scale insect, *Kerria lacca* Kerr. The scientific method of lac culture in peripheral and buffer zones of Similipal Biosphere Reserve (SBR) are superior than the traditional way on its primary host plant like palas (*Butea monosperma*) and Kusam (*Schleichera oleosa*). Resin productivity of buffer zone was more than the peripheral zone in both Kusmi and Rangeeni strains (Kusmi strain for Kusam and Rangeeni for Palas), and resin production was more in Kusmi strain

than that of the Rangeeni strain. The contribution of women were 40-45% of total man power.

G-P-15

**INSECTICIDAL BIOEFFICACY OF CERTAIN
BOTANICALS AGAINST *SPODOPTERA LITURA* FABR,
(*LEPIDOPTERA: NOCTUDAE*) UNDER LABORATORY
CONDITION**

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Keyword: *Spodoptera litura* *Annona squamosa* and *Melia azedarach*

A laboratory experiment was conducted to test bioefficacy of toxicity of the plant extracts, by dry film technique against the 3rd instar larvae of *Spodoptera litura* Fabr. It was thus, evident from the results obtained that the extract of *Melia azedarach* was significantly most effective among all the selected plant extracts. It caused 77.50% mortality of the larvae of *Spodoptera litura* Fabr. as compared with control. The mean mortality percentage of different concentration of extracts can be expressed as *Melia azedarach* (77.50%) > *Jatropha curcas* (71.78%) > *Annona squamosa* (62.63) > *Aragemone mexicana* (59.79) > *Aconitum ferex* (59.10%) > *Tylophora asthmatica* (56.58%) > *Crotan tiglium* (55.52%) > *Embelia ribes* (55.15%) > *Spipanthes acmella* (46.81%) > *Butra frondosa* (46.27%). The Concentrations of 0.5, 1.0 and 2.0% of each extracts were effective in causing mortality of the third instar larve of *S. litura*. With increase in concentration there is an increase in percentage mortality and results were best with 2.0 per cent.

G-P-16

FIELD EVALUATION OF CERTAIN NATURALLY OCCURRING PLANT EXTRACTS AGAINST LARVAE OF *SPODOPTERA LITURA* FABR, (LEPIDOPTERA: NOCTUDAEE) ON *SOLANUM MELONGENA* LINN.

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Key Words : Plant extract, *Melia azedarach*, insecticidal properties, *Spodoptera litura*, *Solanum melongena*

A field experiment was conducted to test bioefficacy of toxicity of the plant extracts, by dry film technique against the 3rd instar larvae of *Spodoptera litura* Fabr. It was thus, evident from the results obtained that the extract of *Melia azedarach* was significantly most effective among all the selected plant extracts. It caused 77.50% mortality of the larvae of *Spodoptera litura* Fabr. as compared with control. The mean mortality percentage of different concentration of extracts can be expressed as *Melia azedarach* (77.50%) > *Jatropha curcas* (71.78%) > *Annona squamosa* (62.63) > *Aragemone mezicana* (59.79) > *Aconitum ferex* (59.10%) > *Tylophora asthmatica* (56.58%) > *Crotan tiglium* (55.52%) > *Embelia ribes* (55.15%) > *Sippanthes acmella* (46.81%) > *Butra frondosa* (46.27%). The Concentrations of 0.5, 1.0 and 2.0% of each extracts were effective in causing mortality of the third instar larva of *S. litura*. With increase in concentration there is an increase in percentage mortality and results were best with 2.0 per cent.

G-P17

**ECOLOGICAL ANALYSIS OF CHIRONOMID ARBVAE
(DIPTERA: CHIRONOMIDAE) IN HARSUL TANK,
AURANGABAD (INDIA)**

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Keywords: Chironomid larvae, Harsul dam, distradution, diversity.

In present study, Chironomid larvae were sampled and studied periodically during one year (from Oct.2009 to Sept.2010) from Harsul tank (19⁰55'45"N;75⁰20'10"E). The quantitative data on distribution of chironomid larvae was analyzed in relation to some Physico-chemical parameters at four different localities in the tank. During the study, Chironomidae larvae of 10 different taxa belonging to two subfamilies were found with the density 156 individuals per m². *Chironomus stigmaterus* was dominant species (28.442%). Larval density showed relationship with some of the parameters like dissolved oxygen concentration, nutrient levels, pH and temperature.

G-P-20

**STUDIES ON DIVERSITY OF CHIRONOMIDAE LARVAE
(CHIRONOMIDAE: DIPTERA) FROM MANJARA
RESERVOIR OF MAHARASHTRA INDIA**

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Keywords: Chironomide larvae, Manjara, Chironominae,
Tanypodinae

The present study deals with diversity of larval Chironomids from Manjara reservoir of Maharashtra India. During the study four genera

belonging to subfamily Chironominae and one genus from the subfamily Tanypodinae were observed. The genera *Chironomus* (Meigen, 1803), *Polypedilum* (Kieffer, 1912), *Gyptotendipes* (Kieffer, 1913), *Kiefferulus* (Goetghbuer 1922) are systematically observed in the subfamily Chironominae and the genus *Ablabesmyia* (Johannsen, 1905) was found in the subfamily Tanypodinae.

G-P-21

CHEMICAL AND PHYSICAL ANALYSIS OF EGG QUALITY TRAITS OF DOMESTIC FOWL AND TURKEY

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Keywords : Chicken egg, Turkey egg, Physical characteristics and Chemical composition

Chemical and physical characteristics of turkey (*Malleagris gallopavo*)'s eggs were studied and compared with the eggs of chicken (*Gallus gallus domesticus*). The birds were housed in the government farms of Bhubaneswar and fed with ad libitum. A sample of 50 eggs were analysed of both the species in their 74th week of laying period. The analysis of chemico-physical parameters revealed following significant statistical differences ($P < 0.01$). Apparently turkey eggs weighed more (76.25g) than the chicken eggs (40.20g). The proportion of yolk to total egg weight was higher in turkey (28.4%). Similarly, albumen content was higher in turkey egg (55.48%). Significantly higher shell weight (18.2%) and thicker shell (0.051cm) was recorded in turkey eggs. The analyses of moisture content, percentage of crude protein, crude fat, crude ash, carbohydrate and cholesterol calcium, phosphorous content revealed that the physical characteristics and cholesterol calcium, phosphorous content revealed that the physical characteristics and chemical composition of turkey eggs were comparatively higher indicating more nutrients per egg, considerable dietic value and its acceptability to consumers.

G-P-22

**GENOTOXIC EFFECT OF MIKACIN ON GERM CELLS OF
SHORT HOUNED GRASSHOPPER POECILO CERUS
PICTUS F.**

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Key works : Mikacin, *Poeciloceris pictus* F. and Chromosomal
aberration.

Environmental mutagens are a matter of serious concern. Many
drugs have been reported to have mutagenic in nature. The long
term exposure of humans to different man drugs leads to several
health hazards of which genotozicity is of prime importance. The
investigation on the effect of aminoglycoside compound namely
Mikacin on grasshoppers shows that this compound has induced
chromisomal aberrations significantly with increase in concentration
and duration of exposure to these comounds. Hence, restricted use
of the stated drug is suggested.

G-P-23

**SMALL HOLDER AQUACULTURE BUSINESS FOR
LIVELIHOODS OF THE RURAL PEOPLE OF MADHYA
PRADESH AND THEIR FOOD SECURITY AND POVERTY
ALLEVIATION .**

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Former Professor of Bioscience, B.U. Bhopal & Member, Advisory
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The common constraints faced by aquaculture farmers in Madhya
Pradesh include: pluralities of ownership, lack of credit facilities,
lack of technical know-how, illegal poaching, deliberate poisoning

and inadequate marketing opportunities. The smallholder aquaculture development in this State is the only answer to reduce poverty of the rural poor and guaranty for their food security. A business model of smallholder technology is discussed in this paper

G-P-24

**STUDIES ON PHYSICO-CHEMICAL PARAMETERS OF
NIPANI RESERVOIR FROM BELGAUM DISTRICT
(KARNATAKA). INDIA.**

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Key words:- Reservoir, Physico-chemical parameters, Nipani.

The Physico-chemical parameters of Nipani reservoir were studied and analyzed over a period of two years during Feb.2008 to Jan.2010, To study the seasonal variations four sampling stations were selected from Nipani reservoir. The various Physico-chemical parameters such as Atmospheric temperature, Water temperature, pH, Transparency, Turbidity, TDS, Conductivity, Dissolved oxygen, free CO₂, total alkalinity, Chlorides, Hardness, Sulphate, BOD etc. were studied The results revealed that there were significant seasonal variations in some physico-chemical parameters and most of the parameters were in the normal range and indicated better quality of Nipani reservoir. Hence, water is suitable for human consumption after normal water treatment only.

G-P-25

**STUDIES ON ZOOPLANKTON DIVERSITY OF
SANGMESHWAR MEDIUM ROJECT (UPPER MANJARA
PROJECT) DIST. OSMANABAD (M.S.)”**

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The present paper deals with study of two zooplankton groups in Sangmeshwar Medium Project (Upper Manjara Project. The water body is present in Bhoom taluka of Osmanabad district Maharashtra. The water samples were collected and analysed for one year during July 2008 to Sept. 2009. In the present paper data pertaining to diversity of four major zooplanktonic groups Rotifera, Cladocera, Copepoda and Ostracoda . Detailed microscopic examination of zooplankton has been carried out and the study revealed that 14 genera of zooplanktons belonging to two groups were observed in the water samples. Group Cladocera observed most diversified during winter including five genera. Maximum population of Rotifers was recorded during the summer season. The study of zooplankton species composition, abundance, variation and distribution with respect to biotic and abiotic factors help in future planning for the management of fish culture.

G-P-26

SEASONAL VARIATIONS IN PHYSICO-CHEMICAL CHARACTERISTICS OF RAVIVAR PETH LAKE AT AMBAJOGAI DISTRICT. BEED MARATHWADA REGION, INDIA.

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The present study deals with the assessment of water quality of the Ravivar Peth Lake, Dist. Beed Marathwada Region, India. The physico-chemical characteristics were studied and analyzed during January – December of the year 2005. Seasonal variations at three different sampling sites of the Ravivar Peth Lake were observed Conductivity, pH, Total Dissolved Solids (TDS), Total Suspended Solids (TSS), Nitrate, Sulphate and Phosphate were studied at these studies. The results revealed that the condition of this lake in different seasons showed fluctuations in physico-chemical parameters and showed pollution status of this lake.

G-P-27

STUDIES ON ZOOPLANKTON DIVERSITY OF MANGI RESERVOIR FROM SOLAPUR DISTRICT (MAHARASHTRA)

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Keywords: Biodiversity, Rotifers, Copepods, Cladocerans, Zooplankton, Mangi Reservoir

Diversity of Zooplankton is the most important ecological parameter in the water quality assessment. The important feature of zooplankton is its immense diversity over space and time. Zooplanktons are greatly influenced by seasonal variations of abiotic factors. Qualitative and quantitative study of zooplankton with respect to abiotic factors is necessary. In present paper qualitative and quantitative study of zooplankton from Mangi reservoir was carried out during the period Feb.2008 to Jan2010.

Present investigation reveals ten species of Rotifers, three species of Cladocerans and three species of Copepods. In rotifers *Brachionus* and *Keratella* was dominated in the reservoir. The highest density of rotifers was observed in the month of May.(152&149 org/L) in both the years 2008 & 2009. Rotifers exhibited a positive correlation with temperature, turbidity, TDS, Cladocerans and Copepods, freeCO₂, pH, BOD and negative correlation with transparency. Among the Cladocerans *Moina* was dominated and its maximum density was observed in the month of May and it was 21 and 20 org/L during 2008 and 2009 respectively. They exhibited positive correlation with free CO₂ temperature, pH, transparency, TDS, Alkalinity, Hardness, rotifers and copepods while negative correlation with Chlorides. The copepods like *Cyclops* and *Mesocyclops* were dominated and its maximum density was observed in the month of May 2008 and 2009 which was 58 and 78 org/L. The correlative studies shows similar to that of cladocerans.

G-P-28

**ZOOPLANKTON DIVERSITY FROM FRESH WATER
TANK NEAR HOTAGI, SOLAPUR, MAHARASHTRA**

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The zooplankton occurrence and abundance mainly depend on its productivity which is influenced by amount of nutrient present in

aquatic body. The zooplankton community constitutes many species which are suitable as a live feed in aquaculture practices. The freshwater zooplankton form an important group as most of them feed upon and incorporate the primary producers into their body and make themselves available to higher organisms in the food chain (Michel, 1973). Hotagi tank is one of the important tanks which is made for irrigation. The water of this tank is used for drinking purposes. It has a very rich diversity of aquatic animals. In the present investigation, the data pertaining to the distribution and diversity pattern of zooplankton. Monthly variations in the abundance of zooplankton during the study period from July 2008 to June 2010 were described. Detailed microscopic examination was carried out and revealed that there were a total of four groups of zooplankton in the samples throughout the study period. Among the zooplankton observed, rotifers were found to be the major group, followed by cladoceran, copepods, and protozoan. In the present study, it was observed that there was a definite pattern of seasonal variation in the magnitude of the abundance and distribution of zooplankton. The results are discussed in the light of available literatures.

G-P-29

**SEASONAL VARIATIONS AND BIODIVERSITY OF
PHYTOPLANKTON IN HARSOOL-SAVANGI DAM
AURANGABAD, INDIA.**

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Key Words: Phytoplankton, Seasonal variations, biodiversity indices.

The present study concerns seasonal variations, correlation coefficient and biodiversity indices of phytoplankton during January to December 2008 in the Harsool-Savangi dam, Aurangabad India. A total of 35 genera were recorded of which 15 were Chlorophyceae, 7 Bacillariophyceae, 7 Cyanophyceae and 6 Euglenophyceae. Present study revealed maximum percentage wise compositions of Chlorophyceae at north site 41.91 %, Bacillariophyceae at west site 32.70 %, Cyanophyceae at south site 19.50 % and Euglenophyceae at west site 11.47 %. Minimum percentage wise compositions Chlorophyceae at south site 37.80 %, Bacillariophyceae at east site 28.15 %, Cyanophyceae at west site 17.47 % and Euglenophyceae at north site 10.57 %. Margalef's index (R_1) and Menhinick index (R_2) values (4.12 and 0.56) were found to be the highest at south site and lowest values (3.77 and 0.38) were found at north site. Simpson's index (λ) values (0.30) were found to be the highest at north site and lowest values (0.29) were found at south, east, and west sites. Shannon – Weiner index (H') values (1.26) were found to be the highest at south, east, and west sites and lowest values (1.24) were found at north site. Maximum species evenness was recorded at south site; minimum at north site. Maximum population density of Chlorophyceae, Bacillariophyceae, Cyanophyceae and Euglenophyceae (1923, 1173, 889 and 541 organisms/liter) were recorded at north site in summer and minimum (108, 195, 67 and 24 organisms/liter) were recorded at south site in monsoon respectively.

G-P-30

TOXICITY AND BEHAVIORAL CHANGES IN FRESH WATER FISH *PUNTIUS STIGMA* EXPOSED TO ROGOR PESTICIDE FROM SUKHANA RIVER, DIST. AURANGABAD, (M.S.) INDIA.

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Key Words: Toxicity, Rogor, behaviour, *Puntius stigma*, Sukhana River.

The present study has been designed to determine the LC₅₀ values of pesticide Rogor and relative behavioural changes in fresh water fish *Puntius stigma* exposed for 24, 48, 72 and 96 hrs. The LC₅₀ values for *Puntius stigma* were found at 9ppm, 8.31ppm, 7.8ppm, and 7.1ppm respectively. Fish show increased opercular moment, loss of equilibrium, increased surface activity, over secretion of mucous, irregular swimming activity, rapid jerky movements and aggressiveness were observed.

G-P-31

**LENGTH WEIGHT RELATIONSHIP IN INDIAN MAJOR
CARP *CATLA*
CATLA FROM GODAVARI RIVER NATH SAGAR DAM
PAITHAN, DIST.
AURANGABAD.**

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Key words: Length weight relationship, *Catla – catla*, Godavari
River

The length-weight relationship in *Catla catla* was studied from the Godavri River between June 2008 - May 2009. The exponential value of fishes indicates allometric growth pattern in the natural habitat. The logarithmic regression equation was obtained in *Catla catla* male is $\log W = - 2.901 + 2.385 \log L$. For female $\log W = - 6.626 + 2.734 \log L$. The coefficient of correlation for male was $r = 0.867$ and for female $r = 0.976$ which shows the correlation factor revealed positive correlation between length and weight.

G-P-32

**“COMPARATIVE STUDY OF SYNTHETIC HORMONES
OVAPRIM AND CARP PITUITARY EXTRACT USED IN
INDUCED BREEDING OF INDIAN MAJOR CARPS”.**

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Key words: Synthetic hormone ovaprim, carp pituitary extract,
Indian major carps and fish breeding.

In present study during 2008- 2009 observed the spawning response of ovaprim compared with pituitary extract in Indian major carps, at fish breeding center at Jaikwadi, Paithan Dist. Aurangabad (M.S) India. Total ten trial doses of ovaprim were used in induced breeding and ten trial doses of Carp Pituitary Extract (CPE) used for induced breeding in Indian major carps i.e *Catla catla*, *Labeo rohita* and *Cirrhinus mrigala*. The percentage of fertilization ranged (88.11 - 97.94%) was found with ovaprim treatment. and (53.19 - 85.48%) with pituitary extract treatment. The percentage hatchling ranged (74.70 - 95.92%) with ovaprim treatment and (60 - 58.82%) with pituitary extract treatment.

G-P-33

OZONE AS A DESTRUCTOR AND PROTECTOR

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Key Words: Ozone depletion, Troposphere, Stratosphere, Protector,
Destructor.

Since the inception of Ozone by SHOE BEIN in 1840, at present it has become a serious global problem because of its diminution in thickness popularly called as Ozone hole. Ozone at ground surface (Troposphere) acts as a harmful pollutant for flora and fauna including man. It is also responsible for the formation of the potentially more hazardous pollutant the smog, through a series of photochemical reactions involving oxides of nitrogen, hydrocarbon and other pollutant tropospheric ozone is an extremely reactive molecule. When ozone occurs in concentration above normal level, it creates pollution and may damage human health also. On the other hand at stratosphere, the ozone acts as an umbrella to protect us from the harmful solar radiations. It filters out all solar radiation below 320nm. which are biologically harmful and there by controlling the thermal budget of the earth. Any large scale depletion of ozone in stratosphere content may exert catastrophic influence on biotic system including plants. In the last 25 years, there has been much hue and cry about the depletion of stratospheric Ozone. In nut shell, it may be concluded that Ozone is destructor at troposphere and protector at stratosphere. Present paper deals with aforesaid logics and its remedial measures.

G-P-34

STUDY OF PLANKTON DIVERSITY OF UJANI WETLAND

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Key words: - Phytoplankton, Zooplankton, Plankton and Ujani
Wetland

The name plankton is coined by Henson et al., (1966 & 1970) Plankton are pelagic, floating organisms that have very flexible locomotory organs and simply drift with the water currents. Plankton diversity studies were undertaken during 2005-2009 to census an important live fish feed .The results of present

investigation reveal the occurrence of 65 plankton species belonging to phytoplankton and zooplankton. Among the observed species of phytoplankton inhabited in river Bhima Chlorophyceae -10 species was most dominated followed by, Bacillariophyceae -6 species, Myxophyceae -five species, Euglenophyceae-2 species of the total phytoplankton species. The zooplankton inhabited in river Bhima water belong to four main taxonomic groups. Among the observed species of zooplankton the Rotifera-20 species, was most dominated followed by, the Cladocera-14 species, the Copepod-5 species & Ostracoda-3 species of the total plankton species.

G-P-35

EFFECT OF SEDATIVE DRUGS ON THE DEVELOPMENT OF *CHRYSOMYA RUFIFACIES*, THE CALLIPHORID FLY OF FORENSIC IMPORTANCE.

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Key words: *Chrysomya rufifacies* , Diazepam , Alprazolam

Calliphorid fly, *Chrysomya rufifacies* is important fly to determine the post mortem interval. The development of the fly takes place on the putrefying dead body of any animal. If we know the standard time durations of its developing stages, with respect to the variations in the temperature, one can predict the exact time since death. Many times deaths of the victims are due to the intake of overdoses of the sedative drugs. Under such conditions, the presence of sedative drugs can alter the duration of the life cycle stages. To find the effect of sedative drugs on the duration of the life cycle stages for correct determination of PMI, the larvae of *Chrysomya rufifacies* were exposed to different concentrations of diazepam and alprazolam in chopped putrefying meat and were allowed to grow. The variations were observed in the size and durations of the life cycle stages. The details are discussed in the paper.

G-P-36

LIMNOLOGICAL EVALUATION OF THE FISHERIES POTENTIALS AND PRODUCTIVITY OF THE WETLANDS OF UPPER STRETCHES OF RIVER BRAHMAPUTRA.

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Key words : Fisheries potential, wetlands, Brahmaputra River

The flood plain wetlands cover a surface area of *ca.* 1.0 lakh hector i.e. 72.45% of the total lentic area of the state and the 50% of these are present in the upper stretches of Brahmaputra valley. Two wetlands were selected for the study, one connected seasonally to Brahmaputra River and the other is closed type. Physico-chemical parameters were evaluated monthly from the samples collected from three stations of each wetland from 2007 onwards. Annual fish yield were recorded Morphometric and physico-chemical parameters of the wetlands were used to estimate the potential fish yield according to morpho-edaphic index (MEI).. The mean depth and alkalinity values were used to estimate the MEI.. For high potential fish yield and sustainable exploration of the fisheries, effective management of the wetlands should be adopted. The connecting channel of the open type wetland should be maintained properly so that the auto stocking from the river is possible. In the closed type wetland, management practices for fish culture and conservation of indigenous fish species should be implemented. .The present paper deals with the assessment of fisheries potential and the co-efficient of co-relation with other abiotic variables which were done using SPSS software package.

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