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Mount Everest in Danger

Five other famous heritage sites at risk from climate change

Six World Heritage sites, including Mount Everest, could be at risk from the impact of climate change. Urging the United Nations to act quickly, groups like Greenpeace and the Climate Justice Programme, have petitioned to list the locations as being "in danger".

Nations that have signed the UN World Heritage Convention have a legal duty to cut emissions. To date, 184 Nations are signatories of the Convention, which was formed in 1972. The Convention's 21-nation governing committee met in June this year in Christchurch, New Zealand, to review the need for giving more teeth to the global agreement to ensure the long-term protection of important cultural and natural sites.

The petitions have signatories, including Sir Edmund Hillary and Sir David Attenborough.

These world famous six sites are–

1. **Mount Everest:** The mountain is a part of the Sagarmatha National Park in Nepal. Latest findings indicate that Himalayan glaciers can shrink from the present 500,000 sq km. to 100,000 sq km. by 2030s.

2. **Great Barrier Reef:** It is in Australia as the world's largest coral reef system, composed of roughly 3,000 reefs and 900 islands that cover 344,400 sq km.

3. **Waterton-Glacier Park:** Situated on the border between Canada and the USA, offers plant and mammal species and prairie, forest, alpine and glacial features.

4. **Blue Mountains:** The Blue Mountains of Australia are a range of sandstone cliffs surrounding a plateau. It has seven national parks and a conservation reserve.

5. **Huascaran National Park:** Includes the Cordillera Blanca, and is the highest tropical chain of mountains in the world.

6. **Belize Barrier Reef :** This is the largest barrier reef in the northern hemisphere, with several hundred sand cays, mangrove forests, lagoons and estuaries.

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Tulsi or Basil

Thais use it and so do Italians. But Indians are still not making food of it

VIR SANGHVI

Basil–and all its regional variations–seems to have more resonance for Indians as a catchy name for restaurants and shops than it does as a food or a herb. One of Delhi's first trendy restaurants was Basil & Thyme. In the same Santushti complex is the even more trendy Tulsi (which, of course, is the Indian name for basil). And it is now an unwritten rule of the food and beverage business that Thai restaurants should be named after ingredients so, naturally, basil (alongwith lemongrass) comes up regularly as a popular name.

And yet, Indians are not really comfortable with basil. You may see it in the upmarket *subzi* shops but few of us will bother to buy it. When we do use pesto–the famous Mediterranean basil sauce–most of us get it from a jar, quite forgetting how easy it is to make at home. Even when we make Oriental food in our kitchens, we stick to such boring ingredients as soya and chilli (or to readymade pastes), rather than experiment with the exciting taste of fresh basil.

Part of the problem is that basil is not an integral part of Indian cooking. All of us are familiar with *tulsi* but we see it as a medicinal or religious herb rather than a food. And certainly, the variety of *tulsi* that we grow in India does not lend itself to cooking as much as its European and South East Asian cousins.

Which, of course, leads us to the big problem with basil: it is not a single herb. In fact, it is a name for a family of herbs, all of which are related but can, nevertheless, vary greatly in taste.

Make a sauce with Indian *tulsi* and while it can be quite delicious, there will always be a slightly medicinal taste to it. Substitute Italian basil and you will end up with pesto. The problem, alas, is that until recently, few people bothered to grow Italian basil, so it was difficult to make your own pesto.

That is no longer the case and I find that, because pesto is so easy to make, it should end nearly everybody's perennial pasta problem: how do you avoid a heavy sauce? There are thousands of recipes for pesto but a good basic method is to combine basil leaves with a few chopped cloves of garlic, fistful of toasted pine nuts and a little (depending on taste) freshly-grated parmesan cheese. Put all this in the food processor, pour in a healthy glug of olive oil and zap until the sauce has the consistency you want.

The whole process should take under 10 minutes (I reckon I can do it in five) and the sauce that it produces will taste of the freshness of spring. If you have people who cook for you (which I do not), then you can do things properly and use a mortar and pestle, rather than a food processor. A friend of mine has trained her help so well that her kitchen can produce pesto within seconds, though, of course, her staff calls it *'tulsi ki chutney'*.

What you do with the pesto is up to you, but I find that it works best in the following ways: poured on to a bowl of steaming pasta, as a sandwich paste, as a way of enlivening a boring soup (one spoon is usually enough) and, if you like the taste, then you can use it instead of butter when you make toast.

Oriental basil, on the other hand, is much more complicated. Go to a *subziwallah* in Bangkok and you will get Thai basil, Thai holy basil, and even – I kid you not – Thai hairy basil (an oddity in the Far East where bodily hirsuteness is not usually a problem).

The most common of the lot is Thai basil which can fool you because it looks a lot like Mediterranean basil. But just as our own *tulsi* has a different taste, so does Thai basil. All tastes are hard to describe but my guess is that the best way to characterise Thai basil would be to say that it reminds you of *saunf*. Holy basil looks different because its leaves are pointed and have a purple tinge. It doesn't taste a lot like Italian basil either and has what I regard as a slightly medicinal taste but, according to David Thompson, the Australian who is one of the world's great Thai chefs, it has a clove-like intensity. Hairy basil seems to me to taste like holy basil that has missed its waxing appointment. There are many other kinds of basil in Thailand, among them lemon basil where the leaves taste like a God-made mixture of lemongrass and basil – but as these are not easily available (even in Bangkok), I won't waste too much time on them.

Basil is one of the three or four dominant herbs in South East Asian cooking but most of us never quite realise its full flavour because it is an extraordinarily delicate leaf. If you add basil too early to a dish, not only will the aroma dissipate but the leaves themselves may well turn bitter and unpleasant.

In Thai cooking, where one measure of culinary expertise is timing, cooks are judged by when they choose to add each herb to a dish. In the case of basil, you should roughly tear apart fresh leaves with your fingers and add them to a curry about 40 seconds before you remove it from the flame. Holy basil is even more delicate. Like white truffle, it has a

flavour and taste that disappear with the application of heat. When I make a stir-fry that requires the unique flavour of holy basil, I finish cooking the dish, put off the gas, and then add the basil leaves. I leave it in the pan for two minutes and that's enough for the flavour to suffuse the dish.

There are many other things you can do with basil. All members of the basil family–including our very own *tulsi*–work well as tisanes or herb teas. You can buy commercial basil tea (*tulsi* and ginger go well as a combination and are said to be good for digestion) or you can make your own by adding basil leaves to water that has already been boiled.

All basil–whether from Europe or Asia–has a fetish about the tomato. If you want to make a quick tomato salad, then slice the tomatoes into thin round slices, arrange them on a plate, tear basil leaves over them and then drizzle with a good extra virgin olive oil. Within a minute or so, the tomatoes will act like they've been in bed with the basil for years. The same principle applies to tomato soup, which is instantly elevated by the addition of any basil flavour.

If you can't get fresh basil, then you can always use the dried version. Food snobs will tell you that dried herbs make a poor substitute for the real thing and, of course, they are right. But you can't always find the real thing. So, remember that a dried herb–if you are forced to use it – is much more intense than the real thing and remember also that it can often remain hard and chewy during the cooking process. The best thing to do is to soften the dried basil for 20 minutes or so in a little olive oil and to then put the whole thing (herb plus oil) into the pan.

Dried basil works okay for pasta sauces and stews. But you can't make pesto with it and you can't use it in South East Asian cooking. The Thais have their own solution. You can dehydrate whole basil leaves which you add to curries and there are bottled, readymade chilli-basil stir-fry sauces which deliver quite a powerful basil kick. None of these will, however, capture the delicate flavour of fresh basil.

Where do you get basil from? Most good vegetable shops in Bombay and Delhi are now in a position to stock fresh basil leaves. Sometimes the supplies are local and sometimes the basil is flown in. If your *subziwallah* does not have it, look around: it is not that difficult to find. But because it is an alien herb for most Indians, the shopkeeper will not know whether it is Italian or Thai basil that he is selling.

No matter. Part of the fun lies in finding out.

Tulsi : The elixir of Life

Tulsi exists in traditional Hindu households. It means incomparable; and this defines merits of this branched fragrant herb growing in wild and tropics regions. An antiseptic, tulsi balances the body processes.

Dark (Krishna) Tulsi and light (Rama) Tulsi are the two main varieties of basil. The former is higher on medicinal values and is commonly used for worship.

The merits of tulsi are mentioned in Rigvedic texts. Tulsi is considered to be an adaptogen that balanced different processes in the body.

Belonging to Mint family, strong aroma and astringent taste come naturally to this herb. In traditional healing system of Ayurveda, tulsi has found its way through different concoctions – herbal tea, dried powder, fresh leaf or mixed with ghee.

- Chewing on a few sprigs of tulsi increases longevity.
- When down with fever, take the juice of tulsi leaves to bring down fever. Extract of tulsi leaves in fresh water should be given every two to three hours. In children, it is very effective in bringing down the temperature.
- Recent studies suggest that tulsi may be a COX-2 inhibitor, like many modern painkillers, due to its significant amount of Eugenol (1-hydroxy-2-methoxy - 4 - allylbenzene)
- It helps to mobilise mucus in bronchitis and asthma. Chewing tulsi leaves relieves cold and flu.
- For earache a few drops of tulsi extract, if instilled, relieves the symptoms promptly.
- Diabetics can take tulsi for its blood sugar lowering properties.
- Tulsi extract can earn you relief from abdominal colic. Tulsi leaves have properties similar to the currently available anti-TB drugs like Streptomycin and Isoniazide.
- Oil of tulsi has been used as a potent anti-malarial drug. It also has mosquito repellent properties.
- It raises the human body immunity by increasing the antibody production.
- Tulsi has anti-fertility effect by reducing the estrogen hormone levels in females and decreasing the sperm count in men.

A Glimpse of Biodiversity in the Gangetic Plains Ecosystem

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(Continued from Vol. 9, No. 2, p. 49)

Hamilton-Buchanan (1822) described numerous freshwater fishes from the Gangetic system, to which Hora (1928) supplemented by an aid to the study of 'Gangetic Fishes'.

Invertebrates

It is not possible to mention here all the invertebrate animals found in the Gangetic Plains, for they are innumerable in quality and quantity. Only a brief indication is made of some selected groups. The reader is suggested to refer to the book *'Animal Resources of India'* (ZSI, 1991) in this connection. Chaturvedi & Kansal (1991) have enumerated species of Bihar.

Protozoa: West Bengal has been surveyed, while parts of Uttar Pradesh and Bihar have been worked out. All types of species – free living, soil inhabiting, parasitic and symbiotic protozoans have been reported from this region. Species of medical importance (causing malaria, encephalitis, kala-azar, amoebiasis etc.) have been given greater attention.

Platyhelminthes: Species infecting man and domestic animals have been identified. Trematoda and Cestoda comparatively got more attention, than Turbellaria and Monogenea.

Nematoda: District-wise surveys have been completed in West Bengal for the nematodes associated with paddy, jute and citrus. Besides plant and soil inhabiting, animal parasitic nematodes have also been studied from the region.

Mollusca: West Bengal has been surveyed and results published (ZSI, 1992-2001). However, work on Bihar and Uttar Pradesh species is fragmentary. Both land and fresh water molluscans are encountered. The Giant African Snail has got introduced in the region.

Annelida: Earthworms (Oligochaeta) are friends of farmers. They are found both in aquatic and terrestrial habitats of this fertile region. *Pheretima* is of common occurrence. A few species of leeches (Hirudinea) have been reported from the region, more from Shivaliks and other hilly and forested areas. Some species of Polychaeta have also been reported from Gangetic delta (ZSI, 1991), which is otherwise a marine and estuarine group.

Arthropoda: Crustacea: Prawns, Crabs, Shrimps, Lobsters etc. are aquatic generally. Some Ostracods have been described from fresh water bodies. Some *Argulus* parasitic on fishes; some terrestrial Isopods; and two well-dwelling species of *Nicholsia*, belonging to an ancient suborder Phreatoicoides, have been reported from the Gangetic Plains. Of Cladocera, 25 species from Uttar Pradesh, 19 species from Bihar and 41 species from West Bengal have been reported.

Insecta: Insects constitute the largest animal group. Various kinds of insects occur in the Gangetic Plains, but their number of species is not as spectacular as say of North-Eastern India or of Western Ghats. The insect Orders which occur in the Gangetic Plains are : Thysanura, Collembola, Ephemeroptera, Odonata, Orthoptera, Embioptera, Dermaptera, Dictyoptera, Isoptera, Psocoptera, Phthiraptera, Heteroptera, Homoptera, Thysanoptera, Neuroptera, Coleoptera, Siphonaptera, Diptera, Lepidoptera, Trichoptera and Hymenoptera.

Silk moths, honey bees and lac insects are of direct benefit to the man-kind. All these are found in Gangetic Plains. However, a number of pest species also occur. One of them is so common, that it is called 'Bihar hairy caterpillar'.

Some of the insect groups dealtwith in detail exclusively for these States are as follows: Collembolans from U.P. and W. Bengal plains; Ephemeroptera from West Bengal (Srivastava & Sinha in ZSI, 1992); Odonata of Bihar (Prasad & Varshney, 1988) and of W. Bengal (Srivastava & Sinha, in ZSI, 1992); Grylloidea of W. Bengal (Shishodia & Tandon, in ZSI, 1992); Acrididae of West Bengal (Hazra et al., in ZSI, 1992); Carabidae beetles of Calcutta (Saha et al., in ZSI, 1992); Embioptera of Bihar; Isoptera of U.P. and West Bengal; Psocoptera of U.P. and West Bengal; Coccids of Bihar (Ali, 1968) and W. Bengal (Varshney in ZSI, 1992). Thysanoptera of U.P.; Neuroptera of U.P., Bihar and W. Bengal; Coleoptera and Diptera (some families from all three States); Butterflies from U.P., Bihar and W. Bengal; Trichoptera from U.P. and W. Bengal; and Hymenoptera from West Bengal. [All West Bengal studies are covered in ZSI (1992-2001)].

Other Arthropods: Scorpiones of the region have been studied. Among the various kinds of mites, many have been reported from Uttar Pradesh, Bihar and West Bengal. Spiders of West Bengal have been enumerated (Biswas in ZSI, 1992). For all these groups, the book *'Animal Resources of India'* (ZSI, 1991) may be referred to.

Human-Biodiversity Relationship

Gangetic Plains being the most heavily human popu-

lated region of the country, there are marked instances of relationship with the floral and faunal biodiversity of the region. We will confine only to the latter.

A number of animals are utilized in the agriculture directly (e.g. bullock) as well as indirectly (e.g. insects). Food value of certain animals (meat from goat; poultry; fish; milk etc.) is obvious. Besides, the livestock animals (cow, buffalo, goat, horse, pony, pig, sheep, camel etc.) are well utilized in various essential activities.

Hide, Horn, Bone, Teeth, Hair etc. of domesticated animals are also utilized for various purposes, some even at the industry level.

Among the wildlife products, where man uses animal products in good or bad way are : Ivory, Rhino horn, Bear bile, Peacock oil, Uromastix oil, Fat of tiger and other animals, Flesh of animals and birds, Bird feathers, Tanned skins, Stag horns, Tortoise shell, Whale bone etc.

There are some animals, which are harmful to mankind. These include rodents as the foremost enemy. Rats damage food plants in field and the grain in stores tremendously. Insects also damage various crops, stored grains etc.

There are a number of medically important animals. Some are carrier of diseases to man and domestic animals.

Gangetic Plains provide enough instances of such human-animal interactions.

Conservation

In the Upper Gangetic Plains, following Protected areas are notified/proposed:

Shivalik : *Corbett, *Rajaji and *Sonanadi.

Terai/Bhabar: *Dudhwa, *Kishanpur, *Katarniya Ghat, Sohelwa and Sohgibarwa.

Ganga Plains: *Samaspur Lake, *Nawabganj, *Hastinapur, Faizabad, Eastern U.P. grasslands and Western U.P. grasslands.

Among these, the then existing [i.e. 15 years back] protected areas are marked wtih (*) asterisk. Corbett and Dudhwa are National Parks and others are Sanctuaries.

In the Lower Gangetic Plains, following Protected areas are notified/proposed:

Bihar Shivalik/Terai: *Valmikinagar, and * Udaipur.

Bihar Plains : Kabartal, Gogabil, Braitail, Kusheswarsthan, Gangetic Dolphin area, Blackbuck area.

West Bengal Duars: *Neora, *Jaldapara, *Buxa, Badamtan, Birik Rongpo, Dalka, Mal, *Mahananda, *Gorumara, *Chapramari.

West Bengal Plains: Wetlands (*bird sanctuaries), Teesta wetland, Baxiganj wetland, *Deer Park sanctuaries, Gompur.

Orissa Coastal Plains : Ori.

Among these, the then existing protected areas are marked with (*) asterisk. Neora is National Park and others are Sanctuaries. On the status of wildlife in Corbett National Park, see Lamba (1987). For other details Majupuria (1986) may be seen.

Some significant vertebrate species, distributed in the Protected Areas in the Gangetic Plains are as follows:

Animal	Protected Area
Rhinoceros	Dudhwa and Jaldapara.
Elephant	Rajaji, Corbett, Valmikinagar and Jaldapara.
Gaur	Valmikinagar, Neora and Jaldapara.
Wild Buffalo	Jaldapara.
Swamp Deer	Dudhwa.
Hog Deer	Corbett, Dudhwa and Jaldapara.
Tiger	Rajaji, Corbett, Dudhwa, Valmikinagar and Jaldapara.
Lesser Cats	Jaldapara and Neora.
Hispid Hare	Jaldapara.
Blackbuck	Dudhwa.
Bengal Florican	Dudhwa.
Gharial	Corbett.

It is realised that centuries ago this area was rich in wildlife with rhinoceros, elephant, wild buffalo, swamp dear etc., but now these have almost disappeared due to total agricultural land use. Some small relict populations of blue bull, chital, blackbuck, chinkara, peacock etc. are interspersed.

The rich water resources, rivers, lakes, swamps harbour many species of wildlife. Most important of these are the Gangetic Dolphin and Gharial, both of which require greater attention. Whole Ganges valley is a major winter feeding ground for the migratory waterfowl and other birds.

Suggestions for Future

The ecological degradation of the Gangetic Plains is saddening. Mani (1974) states about it :

"The characteristics of the fauna today hardly give any clue to its pattern of diversity and distribution just 5000 years ago. Biogeographically the Plain is now distinguished entirely by negative characters. Either no species were differentiated on the Plains or all have been eliminated by today, so that there is a most striking poverty of endemic elements".

Keeping in view of these facts, it is necessary to take some steps, such as:

- Afforestation
- Protection of habitat areas of endangered species
- Control of pollution, particularly chemical pollution
- More captive breeding programmes
- Periodical monitoring of existing populations
- Interaction between concerned departments / agencies.

It will be in the right direction to establish soon the proposed National Parks and Sanctuaries, and to consolidate, support and if possible, enlarge the existing one such areas. Projects of National, Zonal and State Importances be segregated and dealt with due priority. The wetlands in the region be protected, cleaned and saved from human interference. All efforts be made to conserve natural resources, particularly to save them from the dense and rapidly growing human population.

References

Acharji, M.N. 1958. On a collection of Chelonians and Snakes from Chota Nagpur, Bihar. *Rec. Indian Mus.*, 53 (3-4): 383-392.

Agrawal, V.C. & Chakraborty, S. 1971. New mammal records from Uttar Pradesh. *Labdev. J. Sci. Tech.*, (B) 9 (1): 74-75.

Alfred, J.R.B., Das, A.K. & Sanyal, A.K. 2002. *Ecosystems of India.* ENVIS Centre, Zoological Survey of India, Kolkata: 410 pp.

Alfred. J. R. B., Kumar, A., Tak, P. & Sati, J. P. 2001. *Waterbirds of Northera India.* Zoological Survey of India, Kolkata: 227 pp.

Ali, Salim, 1941. *The Book of Indian Birds.* Bombay Natural History Society, Bombay.

Ali, S.M., 1968. Description of a new and records of some known coccids (Homoptera) from Bihar, India. *Oriental Ins.*, 1: 29-43.

Chaturvedi, Y. & Kansal, K.C. 1991. *Fauna of Bihar: Economic and Employment Potentials: An appraisal.* (Mimeograph). Gangetic Plains Regional Station, Zoological Survey of India, Patna.

Chaudhuri, A.B. 1959. Grasses and Grassland types of the Central Forest Division, West Bengal. *Indian Forester,* 85: 603-606.

Duthie, J.F. 1908. *The Flora of Upper Gangetic Plain.* 2 vols. Botanical Survey of India, Calcutta (Reprinted ed. 1960).

Haines, H.H. 1921-25. *The Botany of Bihar and Orissa.* 3 vols. Botanical Survey of India, Calcutta (Reprinted ed. 1961).

Hamilton-Buchanan, F. 1822. *An account of the Fishes found in the river Ganges and its branches.* Edinburgh & London.

Hora, S.L. 1928. An aid to the study of Hamilton Buchanan's "Gangetic Fishes". *Mem. Indian Mus.*, 9: 169-192.

Jayaram, K.C. 1981. *A Handbook on the Freshwater Fishes of India, Pakistan, Bangladesh, Burma and Sri Lanka.* Zoological Survey of India, Calcutta.

Lamba, B.S., 1987. *Fauna of Corbett National Park.* Zoological Survey of India, Calcutta.

Maheswari, J.K., 1963. *The Flora of Delhi.* C.S.I.R., New Delhi.

Majupuria, T.C. (Ed.) 1986. *Wildlife Wealth of India.* Tecpress Service, L.P., Bangkok.

Mani, M.S. (Ed.) 1974. *Biogeography and Ecology of India.* Dr. W. Junk, The Hague.

Menon, A.G.K. 1974. *A Check-list of Fishes of the Himalayan and Indo-Gangetic Plains.* Inland Fisheries Society of India, Barrackpur.

Misra, R. 1959. The status of Plant community in the Upper Gangetic Plains. *J. Indian Bot. Soc.*, 38: 1-7.

Nath, B. 1976. On the occurrence of Great Indian Rhinoceros, *Rhinoceros unicornis* Linn. from the prehistoric site of Chirand, Saran district, Bihar. *Newsl. Zool. Surv. India,* 2 (3): 86-87.

Prain, D. 1903. *Bengal Plants.* 2 Vols. Botanical Survey of India, Calcutta (Reprinted ed. 1963).

Prasad, M. & Varshney, R.K. 1990. The Odonata of Bihar, India. *Rec. Zool. Surv. India, Occ. Paper* No. 110: 1-47.

Rodgers, W. A. & Panwar, H.S. 1988. *Planning a Wildlife Protected Area Network in India.* Vol. I and II. Wildlife Institute of India, Dehra Dun.

Roonwal, M.L. 1987. Recent advances in Rodentology in India. *Rec. Zool. Surv. India, Occ. Paper,* 105: 126 pp.

Roy, G.P. 1996. Indo-Gangetic Plains. In : *Flora of India, Introductory Volume,* Part 1 (Eds. P.K. Hazra et al.). Deep Printers, Delhi : 220-224.

Saha, S.K., Mukherjee, A.K. & Sengupta, T. 1992. Carabidae (Coleoptera : Insecta) of Calcutta. *Rec. Zool. Surv. India, Occ. Paper,* 144: 63 pp.

Shankaranarayanan, K. A. & Dabadghao, P.M. 1970. Ecological studies on the Grasslands of Jhansi, U.P. *Ann. Arid Zone,* 9: 54-63.

Sinha, Y.P. 1986. The Bats of Bihar - Taxonomy and Ecology. *Rec. Zool. Surv India, Occ. Paper,* 77: 60 pp.

Smith, M. A. 1943. *The Fauna of British India including*

Ceylon and Burma. Reptilia and Amphibia - Serpentes. Vol. 3. Taylor & Francis, London.

Srivastava, G. J. 1968. *Fishes of Eastern Uttar Pradesh.* Varanasi.

Talwar, P.K. & Jhingran, A.G. 1991. *Inland Fishes of India and adjacent countries.* 2 vols. Oxford & IBH Publ. House, New Delhi.

Tikader, B. K. & Sharma, R. C. 1985. *Handbook–Indian Testudines.* Zoological Survey of India, Calcutta. (2nd ed. 1998) : 156 pp.

Udvardy, M.D.F. 1975. A classification of the Biogeographical provinces of the world. *I.U.C.N. Occ. Paper* No. 18: 49 pp.

Venkateswarlu, T. 1972. Fauna of Bihar State (India). 1. Fishes. *Indian J. Zootomy,* 13 (3): 119-128.

Venkateswarlu, T. 1972. Fauna of Bihar State (India). 3. Reptilia. *Indian J. Zootomy,* 13 (3): 131-137.

Venkateswarlu, T. 1975. Fauna of Bihar State (India). 5. Mammals. *Indian J. Zootomy,* 14(2) (1973): 127-133.

Venkateswarlu, T. & Murty, T.S.N. 1972. Fauna of Bihar State (India). 2. Amphibia. *Indian J. Zootomy,* 13 (3): 129-130.

Venkateswarlu, T. & Raghunathan, M.B., 1975. Fauna of Bihar State (India). 4. Birds. *Indian J. Zootomy,* 14(2) (1973): 111-126.

Zoological Survey of India, 1991. *Animal Resources of India, Protozoa to Mammalia, State of the Art.* : 694 pp.

Zoological Survey of India, 1991a. *Faunal Resources of Ganga. Part I (General Introduction and Vertebrate Fauna):* 145 pp.

Zoological Survey of India, 1992 - 2001. *Fauna of West Bengal.* State Fauna Series No. 3, Vols. 1 to 12.

Zoological Survey of India, 1997. *Fauna of Delhi.* State Fauna Series, No. 6: 903 pp.

Zoological Survey of India, 2002. *Fauna of Kabar Lake Wetland (Bihar):* 134 pp.

Zoological Survey of India, 2004. *Fauna of Bihar (including Jharkhand).* State Fauna Series, No. 11: 213 pp.

New Publications

1. **Bengaliidae du Monde (Insecta: Diptera)** by Andy Lehrer, 2005. Pensoft Series Faunistica No. 50. ISSN 1312-0174, ISBN 954-642-244-4. 165×240, B/W Drawings, Descriptions of New Taxa, Keys, References, Index. In French with keys and Summary in English, Hardback, 192 pp. Price : Euro 58.80.

This monograph reveals spectacular and previously unknown, taxonomic diversity of the new myrmecophilous dipteran family Bengaliidae. The type and sole genus, *Bengalia,* has hitherto been placed in the family Calliphoridae. Based on a thorough revision and a detailed study of its morphology, Bengaliidae is now a distinct family. The new family comprises four subfamilies, 12 genera and 70 species, of which three subfamilies, ten genera and 49 species are described as new. All Bengaliidae appear to be associated with ant nests in the Afrotropical and Oriental regions.

The monograph is richly illustrated with b/w line drawings, and keys to all the taxa of Bengaliidae. The male genitalia are depicted for each of the new or revised species. The phylogeny of Bengaliidae and its position within Diptera is also discussed. Dr. Andy Z. Lehrer is one of the globally leading specialists on Sarcophagidae and Calliphoridae, the author of numerous papers on the taxonomy and biogeography of dipterans.

2. **Fascinating Insects. Some aspects of insect life** by Pierre Jolivet & Krishna K. Verma , 2005. ISBN 9546422428. 165×240, Illustrated by B/W and Colour Photos, Graphs and Drawings, Indexes. In English, Hardback, 310 pp. Price : Euro 34.95.

This book on the insects, deals with some interesting aspects of insect life, which are often ignored in Entomology text books, such as ants making "slaves", insect migrations, cemical defence strategies, parental care, ants-plants relationship etc. It also includes first hand experiences with insects of the traveller-naturalist Prof. P. Jolivet, who narrates the emergence in large numbers of the 17 year cicada in USA in May 2004, after years of underground life, occurrence of insects on the great tepuys of Venezuela, marching of army ants in the tropical Africa, beetles carrying a "forest" on their back in New Guinea etc. It has the nature of a popular reading, which provides an insight into the interesting but often untold facets of insect life to the common reader.

3. **Illustrated Catalogue of the Genus *Carabus* of the World (Coleoptera: Carabidae)** by T. Deuve 2004. Pensoft Series Faunistica No. 34. ISSN 1312-0174, ISBN 9546422002 In English, hardback, 460 pp., Euro 120.00.

4. **Bibliographia Systematica Orthopterorum Saltatoriorum.** Systematic Bibliography of Saltatorial Orthoptera from Linnaean Times to the End of the 20th Century (about 1750 to 2000), by S. Ingrisch & F. Willemse, 2004. Pensoft Series Faunistica No. 37. ISSN 1312-0174. ISBN 9546422061. In English, hardback, 480 pp., Euro 80.00.

Above all 4 books are published by Pensoft Publishers, Geo Milev Str. 13, 1111 Sofia (Bulgaria).

An Inventory of the Orthoptera Insects of Himachal Pradesh

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Zoological Survey of India,
Saproon, Solan –173 211 (H.P.).

Himachal Pradesh is bound between 30°22' to 33°12' North Latitude and 75°47' to 79°04' East Longitude. To the east, it forms India's border with Tibet, to the north lies state of Jammu and Kashmir, Uttar Pradesh in the south-east, Haryana in south and Punjab in the west. The entire territory of Himachal Pradesh is mountainous with altitude varying from 350 to 7000 metres above the mean sea level.

Orthoptera probably evolved during the middle of carboniferous period and are by now distributed throughout the world. The numbers of known species of Orthoptera are more than 20,000 species worldwide and 1750 are known from India. Economically, they are important as some species do considerable damage to crops, vegetables and forest plantation. Some important pests are marked by asterisk (*) in the list.

Many authors like Bolivar (1917), Henry (1940), Chopard (1969), Tandon & Shishodia (1974, 1976), Bhowmik (1967, 1970, 1977, 1985), Hazra *et al.* (1993), Julka *et al.* (1982), Bhowmik & Halder (1984). Mehta *et al.* (2002) and Shishodia *et al.* (2003) studied the Orthoptera of Himachal Pradesh. However, no consolidated list is available so far.

The present authors examined the material collected from different parts of State at the High Altitude Zoological Field Station, ZSI, Solan. A list which includes 140 species from two suborders, 7 families and 88 genera is given as follows:

Order : Orthoptera
Sub Order : Caelifera
Family : Acrididae

1. *Acrida exaltata** (Walker)
2. *Acrida turrita** Walker
3. *Acrida gigantean* Hbst.
4. *Acrida lugubris* Burr.
5. *Acrida indica* Will.
6. *Ceracris versicolor* Brunn.
7. *Ceracris deflorata* Brunn.
8. *Ceracris nigricornis nigricornis* Walker
9. *Aswathamanus cylindricus* Kirby
10. *Holopercna darjeelingensis* (Bolivar)
11. *Orthochtha indica* Walker
12. *Phlaeoba infumata** Brunn.
13. *Phlaeoba panteli* Bolivar
14. *Phlaeoba antennata** Brunn.
15. *Phlaeoba cinctialis* Kirby
16. *Paraphlaeoba simony* Bol.
17. *Madurea cephalotes* Bol.
18. *Aelopus tamulus* Fabr.
19. *Gonista sagitta* (Walker)
20. *Trilophidia annulata** (Thunberg)
21. *Chorthipus indicus* (Uvarov)
22. *Chorthipus (Glyptobothrus) hammerstrei* (Miram)
23. *Pusana laevis* (Uvarov)
24. *Sphingonotus longipennis* (Saussure)
25. *Sphingonotus octofasciatus* (Serville)
26. *Oedaleus abruptus** (Thunberg)
27. *Oedipoda himalayana* Uvarov
28. *Aiolopus thalassinus thalassinus** (Fabricius)
29. *Aiolopus thalassinus tamulis** (Fabricius)
30. *Gastrimargus africanus africanus** (Saussure)
31. *Gastrimargus transverses* (Yhnberg)
32. *Gastrimargus africanus sulphureus* (Bei-Bienko)
33. *Gastrimargus mermoratus* Thunberg
34. *Acrotylus humbertianus* Saussure
35. *Acrotylus insubrircus* (Walker)
36. *Scintharista blachardiana* (Saussure)
37. *Scintharista notabilis pallips* Uvarov
38. *Spanthosternum prasiniferum prasiniferum** (Walker)
39. *Mesopis cylindricus* (Kirby)
40. *Hieroglyphus banian* *(Fabricius)
41. *Hieroglyphus concolor* (Walker)
42. *Oxya hyla hyla** Serville
43. *Oxya fuscovittata** (Marschall)
44. *Oxya velox* Fab.
45. *Oxya intricate* Stal
46. *Dnopherula (Aulacobothrus) lutipes** (Walker)
47. *Dnopherula (Aulacobothrus) sinensis* (Bolivar)
48. *Eucoptacra saturate* (Walker)
49. *Eucoptacra praemorsa* (Stal)
50. *Choroedocus robustus** (Serville)
51. *Choroedocus illustris* (Walker)
52. *Heteracris nobilis* (Uvarov)
53. *Chleobra grossa* Sauss.
54. *Chleobra bramina* Sauss.
55. *Quiroguesia blanchardiana* Sauss.
56. *Heteropternis respondus* Walk.
57. *Heteropternis partite* Walk.
58. *Eyprepocnemis alacris alacris* *(Serville)
59. *Eyprepocnemis rosea** Uvarov

60. *Tylotropidius varicornis** (Walker)
61. *Pachyacris vinosa* (Walker)
62. *Xenocatantops humilis humilis** (Serville)
63. *Xenocatantops karnyi** (Kirby)
64. *Catantops pinguis innotablis** (Walker)
65. *Catantops simlae* Dirsh
66. *Gelastorrhinus laticornis* Serville
67. *Paraconophyma scabra* (Walker)
68. *Paraconophyma pcalra* (Walker)
69. *Chondracris roea** (De Geer)
70. *Pachyacris violascens* (Walker)
71. *Patanga succinata** Johansson
72. *Cyrtacanthacris tatarica* (Linn.)
73. *Oxyrrhepes obtuse* (De Haan)

Family : Pyrgomorphidae

74. *Aularches miliaris* (Linnaeus)
75. *Aularches punctatus** Drury
76. *Atractomorpha crenulata crenulata** (Fabricius)
77. *Chrotogonus (Chrtotogonus) trachypterus trachypterus** (Blanchard)
78. *Poikilocerus pictus** (Fabricius)

Family : Tetrigidae

79. *Hedotettix costatus* Hancock
80. *Hedotettix attenuatus* Hancock
81. *Hedotettix gracilis* (De Haan)
82. *Ergatettix dorsiferus* (Walker)
83. *Ergatettix guenthari* Steinmann
84. *Pseudotettix histricus* Brunner
85. *Eucriotettix grandis* (Hancock)
86. *Euparatettix tenuis* Hancock
87. *Teradorus frontalis* Hancock
88. *Coptotttix conspersus* Hancock
89. *Fieberiana pachymera* (Fieber)

Family : Tridactylidae

90. *Xya* sp.
91. *Tridactylus thoracicus* Guerin

Sub Order : Ensifera

Family : Gryllotalpidae

92. *Gryllotalpa africana* (Beauvois)
93. *Gryllotalpa fossor* Scudder

Family : Gryllidae

94. *Loxoblemus detectus* (Serville)
95. *Loxoblemus equstris* Saussure
96. *Loxoblemus taicoun* Saussure
97. *Loxoblemus fascipes* (Walker)
98. *Loxoblemus macrocephalus* Chopard
99. *Modicogryllus facialis* (Walker)
100. *Modicogryllus blennus* (Saussure)
101. *Turanogryllus histrio* (Saussure)
102. *Turanogryllus jamuensis* Bhowmik
103. *Trigonidium himbertianum* (Saussure)
104. *Gryllus bimaculatus* *De Geer
105. *Gryllus brunneri* Saussure
106. *Plebeiogryllus gutteventris* (Walker)
107. *Pteronemobius fascipes* (Walker)
108. *Pteronemobius taprobanensis* (Walker)
109. *Pteronemobius pantelchopardorum* Shishodia & Varshney
110. *Pteronemobius csikii* (Bolivar)
111. *Teleogryllus mitratus* (Burmeister)
112. *Teleogryllus blennus* (Serville)
113. *Turanogryllus* sp.
114. *Acheta domesticus* Linnaeus
115. *Gryllodes sigillatus** (Walker)
116. *Velarifictorus dehradunensis* Tandon & Shishodia
117. *Velarifictorus lambai* Shishodia [Nomen nudum-Ed.]
118. *Xenogryllus* sp.
119. *Gryllus maculatus* Chopard
120. *Modicogryllus confirnutes* (Walker)
121. *Telogryllus testaceus** (Walker)
122. *Trilonidum cicindeloidea* (Ramberg)
123. *Teleogryllus occipitalis* (Serv.)
124. *Platygryllus melanocephalus* (Serville)
125. *Acanthoplistus birmanus* Saussure
126. *Gotvendia albipennis* Chopard
127. *Gymnogryllus kashmirensis* Bhowmik
128. *Homoeogryllus cincticornis* (Walker)

Family : Tettigonidae

129. *Lentana megastridula* Ingrisch
130. *Lentana linearis* Walker
131. *Lentana despecta* (Brunner)
132. *Elimaea (Orthelimaea) securigera* (Brunner)
133. *Isopsera pedunculata* Brunner
134. *Plicigera himalayana* Uvarov
135. *Ducetia japonica* (Thunberg)
136. *Conocephalus maculates** (Le Guillou)
137. *Euconocephalus pallidus* (Radtb.)
138. *Neoconocephalus palustris** (Blatchley)
139. *Holochlora indica* Kirby
140. *Mecapoda elongata** (Linnaeus)

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References

Bhowmik, H.K. 1967. Six new species of Gryllidae from India. *Proc.55th Indian Sci. Cong.*, Part B: 491-492.

Bhowmik, H.K. 1970. The Gryllid fauna (Orthoptera:Insecta) of the Great Nicobar Island, India. *J. Zool.Soc. India*,

22 (1 &2): 69-86.

Bhowmik, H. K. 1977. Studies on Indian crickets (Orthoptera : Insecta) with descriptions of two new species. *Rec. zool. Surv. India,* 73: 23-39 .

Bhowmik, H.K. 1985. Contribution to the Gryllidae fauna of the Western Himalayas (Orthoptera : Gryllidae). *Rec. zool. Surv. India, Occ. Paper* No. 73: 1-74.

Bhowmik, H. K. & Halder, P. 1984. Preliminary distribution with remarks on little known species of Acrididae (Orthoptera : Insecta) from the Western Himalayas (Himachal Pradesh). *Rec. zool. Surv. India,* 81 (1&2) :167-191.

Bolivar, I. 1917. Contribution al concocimento de la fauna India. *Rev. Acad. Cienc. Madr.,* 16 : 278-412.

Chopard, L. 1969. *Fauna of India, Orthoptera, Grylloidea,* Vol. 2. Zoological Survey of India, Calcutta: 421 pp.

Hazra, A. K., Tandon, S.K., Shishodia, M.S., Dey, A. & Mondal, S.K. 1993. Acridoidea (Insecta: Orthoptera). *In: State Fauna Series 3, Fauna of West Bengal* , Part 4: 287- 354.

Henry, G. M. 1940. New and little known south Indian Acrididae (Orthoptera). *Trans. R. ent. Soc. Lond.,* 90 : 497-540.

Julka, J. M., Tandon, S.K., Halder, P. & Shishodia, M.S. 1982. Ecological observation on the Grasshoppers (Orthoptera: Acrididae) Dist Solan (H.P.), India. *Oriental Ins.,* 61: 63-71.

Mehta, H.S., Mattu, V.K. & Thakur, S.K. 2002. Orthopteran diversity of Kalatop Khajjiar Wild Life Sanctuary, Chamba, Himachal Pradesh. *Bionotes,* 4(3): 60.

Shishodia, M.S., Mehta, H.S., Mattu, V.K. & Thakur, S.K. 2003. Orthoptera (Insecta) from Pong Dam Wetland, District Kangra, Himachal Pradesh, India. *Zoos' Print J.,* 18(3): 1047-1048.

Tandon, S.K. & Shishodia, M. S. 1974. Description of two new species of *Velarifictorus* (Orthoptera : Grylloidea) from India. *Oriental Ins.,* 8(3): 299-302.

Tandon, S.K. & Shishodia, M. S. 1976. On a collection of Acridoidea (Orthoptera) from Rajasthan, India. *Newsl. zool. Surv. India,* 2: 7-11.

Books Bound in Human Skin

Providence, Rhode Island: Brown University's library boasts an anatomy book that combines form and function in macabre fashion. Its cover – tanned and polished to a smooth golden brown, like fine leather – is made of human skin.

In fact, a number of USA's finest libraries, including Harvard's, have such books in their collections. The practice of binding books in human skin was not uncommon in centuries past, even if it was not always discussed in polite society. The best libraries belonged to private collectors then. Some were doctors who had access to skin from amputated parts and patients whose bodies had gone unclaimed.

Wealthy bibliophiles acquired skin from executed criminals, medical school cadavers and people who died in the poor house. Nowadays, libraries typically keep such volumes in their rare book collections and do not allow them to circulate. But scholars can examine them.

Brown University's John Hay Library has three books bound in human skin – the 1568 anatomy text by the Belgian surgeon Andreas Vesalius, and two 19th-century editions of *'The Dance of Death'*, a medieval morality tale.

One copy of *The Dance of Death* was rebound in 1893 by Joseph Zaehnsdorf, a master binder in London. A note to his client reports that he did not have enough skin and had to split it. The front cover, bound in the outer layer of skin, has a slightly bumpy texture, like soft sandpaper. The spine and back cover, made from the inner layer, feel like suede.

'The Dance of Death' is about how death prevails over all, rich or poor. As with many other skin-bound volumes, "there was some tie-in with the content of the book", said Sam Streit, Director of the John Hay Library. Similarly, many of the volumes are medical books. The College of Physicians of Philadelphia has books bound by Dr. John Stockton Hough, who diagnosed the city's first case of trichinosis.

A photograph of the Title page of Lidolatrie Huguenote, a 400-year old book bound in human skin, was released to the press in January 2006.

Utility of Bio-Gas and Its Socio-Economic and Environmental Impacts

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Energy is a means for performing activities. For the humanity, energy is a vital component of development. There are two types of energy sources on the earth:

(i) Conventional energy sources

(ii) Non-conventional energy sources.

Conventional energy is attained from a static storage such as fossil fuels, nuclear reactions etc. It remains static bound in position until it is released by human actions. These are finite and non-renewable. On the other hand, non-conventional energy is obtained from natural resources, which can continuously form a current in the environment. These sources are known as renewable sources of energy. Solar energy, wind energy, geothermal energy and bio-energy fall into this category. Non-conventional energy is pro-rural, centralized and locally available, and safe when out of action.

There are several factors that prompted scientists to search for non-conventional form of energy; the oil crisis of 1970's, the realization of exhaustiveness of conventional source of energy, problem of pollution and a concern for developing appropriate energy sources for rural population are a few of those factors. The key concerns that such alternative energy sources need are to be renewable, safe, local, specific, cheap, decentralized and appropriate. Biogas, as an important source of alternative energy, finds its place here.

Production of Biogas

It is produced by means of a process known as anaerobic digestion. It is a process whereby organic matter is broken down by microbiological activity and as the name suggests, it is a process which takes place in absence of air. It is a phenomenon that occurs naturally at the bottom of ponds and marshes and gives rise to marsh gas or methane, which is a combustible gas.

There are two common technologies for obtaining biogas. The first (which is more wide-spread) is the fermentation of human/animal waste in specially designed digesters. The second is more recently developed, for capturing methane from municipal waste landfill sites. The scale of simple biogas plant can vary from a small house hold system to large commercial plants of several thousand cubic meters (Fig. 1). Biogas is a mixture of methane, carbon-di-oxide and numerous trace gases. The most prominent constituent of biogas is methane (50%-80%); followed by carbon-di-oxide (20%-50%); trace levels of other gases such as hydrogen, CO, N, O_2, and hydrogen sulfide.

The digestion of animal and human waste yields several benefits:

(i) The production of methane for use as a fuel;

(ii) The waste is reduced to slurry, which has a high nutrient content that makes an ideal fertilizer; and

(iii) During the digestion process, bacteria in manure are killed, which is a benefit to the environmental health.

The waste is fed into the digester via the inlet pipe and undergoes digestion in the digestion chamber. The temperature of the process is quite critical, methane producing bacteria operate most efficiently at temperatures between 30-40°C or 50-60°C, and in colder climates heat may have to be added to the chamber, to encourage the bacteria to carry out their function. The product is a combination of methane and CO_2, typically in the ratio of 6:4. Digestion time ranges from a couple of weeks to a couple of months, depending on the feedstock and the digestion temperature. The residual slurry is removed at the outlet and can be used as a fertilizer.

Table 1. Total Fuel Replacement Value of Biogas Plants.

Particulars	Benefits assumed per biogas plant	Benefits assumed for 20157 plants on per annum basis
Fuel replacement value, assuming Rs. 10/litre of kerosene for a $2M^3$plant	Rs. 7300	7300×20,157= Rs. 14,71,46,100
Less Operational Cost of BGPs	Rs. 3980	3980×20157= Rs. 8,02,24, 860
Total monetary gain on the above assumption in Rs.	Rs. 3320	Rs. 6,69,21, 240

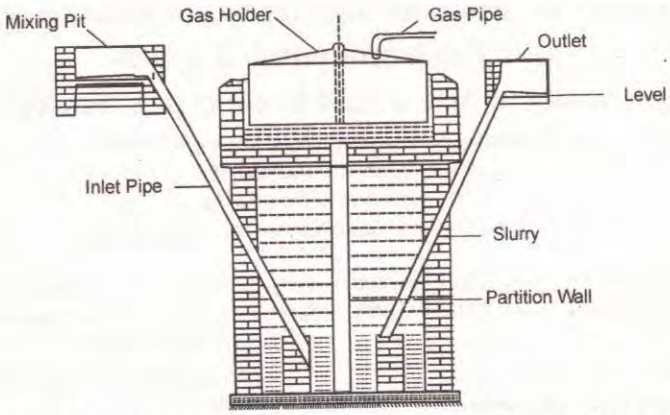

Fig. 1. Cross sectional inner view of digester with floating gas holder.

Biogas is used in lighting, cooking, fuel replacement, shaft power, electricity generation etc., which results in considerable economy (Table 1).

Impact on Environment

Although much of the biogas requirement for energy production can be met through utilizing residues from the food industry, from agricultural waste, animal waste or from commercial activity, careful planning of energy cropping is required to prevent undue stress on the environment, with the recent global call to reduce CO_2 emissions, there is a strong case for promoting the use of sustainable biomass-to-energy technologies world-wide.

The deforestation for domestic fuel supply and other commercial purposes add to the environmental crisis. Some of the dimentions of this crisis manifest in scarcity of fuel, scarcity of water, change of microclimate and sustainability threats to agricultural activities. This in turn jeopardizes the livelihood of the rural population.

Impact on Society

The most prominent comments received on use of biogas were the following:

(i) Kitchen works become much easier,

(ii) Smoke inhalation has reduced,

(iii) Time for dish washing has reduced,

(iv) Cooking for meals has become much easier,

(v) Since the work time has reduced to a considerable rate, the time thus saved can be utilized to earn livlihood or to look after family,

(vi) Women are involving more in agriculture related activities,

(vii) Drudgeries to collect and store firewood have reduced which was an uphill task earlier,

(viii) The over all impact of the biogas plant is that the health of the women has improved.

The most significant contribution of biogas plant to the women in society is that it is giving them more leisure and time to relax as well as concentrate on other works. Annual return and life return from a bio-gas plant is approximately calculated in Table 2.

As per report by Himabinu et al. (2003), the utilization of biogas has:

(i) Improved the health of women and reduced the drudgery of cooking,

(ii) Helped to reduce the consumption of fire wood,

(iii) Cattle rearing has become possible to make the same profitable,

(iv) Slurry is used as a major fertilizer,

(v) More attention is paid to agriculture,

(vi) Reduced the rate of chemical fertilizers considerably, and

(vii) Women are getting more time for social interaction and relationships.

Table 2. Annual Returns on Biogas Plant at Life Cycle basis.

Particulars	1 M^3	2 M^3	3 M^3
Net Annual Returns after interest on capital, depreciation and annual operating costs	Rs. 780	3320	5400
Net Life Returns at current rate	Rs. 19500	83000	1,35,000

The use of biogas also generates substantial employment in the process of construction and commissioning of the plant, which is the main objective (Theodore & Onyeche, 2003).

Trends and Potential Use

Thousands of vehicles, lorry, LCV are being run on biogas. Electricity is being generated at several places using biogas. 45% of energy source in Sri Lanka comes from biogas. Most of the vehicles in Sweden have started running on biogas, including some trains. Sweden is the first country to standardize storage and transportation of biogas as fuel.

To conclude, biogas is the alternative to fossil fuels and wood. Biogas programme makes great economic and ecological sense. It improves the comfort level and livlihood of villagers. Its social relevance is beyond doubt and is probably the only affordable source for the small and marginal farm lands, which suffer continuous out-flow of nutrients. Biogas and bio-manure can help these farms in maintaining fertility, productivity and sustainability.

As 65% of Indian population is dependent on agriculture, use of biogas would help in gigantic ways.

References

Himabinu, V., Sriniwas, S., Vutukuru, D.S., Suman Raj & Anjaneyulu Y. 2003. Municipal solid waste management practices in various municipalities of Andhra Pradesh–A case study from the Indian subcontinent. *Eighteenth Int. Conf. on Solid Waste Technology and Management.* Philadelphia (USA), March, 23-26.

Theodore, I. & Onyeche 2003. Increased energy production and sewage sludge reduction after mechanical disruption at waste water treatment plant. *Eighteenth Int. Conf. on Solid Waste Technology and Management.* Philadelphia (USA), March, 23-26.

SPIDERS !!

'Yikes!' is a typical response to the spider, never mind its celebration in prose, verse and movies. Unlike popular perception, most of these eight-legged 'monsters' that trigger arachnophobia in people don't even have jaws strong enough to pierce your skin. Of the ones that do, only a very few actually have harmful venom (and even this can be used to treat sick people!). The world's biggest spider – the hairy tarantula that could easily cover a large dinner plate–is a shy creature that hides in burrows and hardly ever bites. So the more we know about spiders, the less startling–and more amazing they seem.

Around even before the dinosaurs, and with over 36,000 different species documented on every continent except Antarctica, spiders keep other pesky insects under control. Minute hair, or setules, on the spider's feet, for instance, generate enough electricity to support an astonishing 175 times the creature's weight, enabling it to defy gravity, and cling, clamber and swing. If technology can replicate this, it'll open up exciting possibilities for future astronauts to attach themselves to their spacecraft in zero gravity.

Spider experts David Penny of the University of Manchester and Vicente Ortuno of the University of Alcala, Spain, recently discovered the world's oldest arachind: a 120-million-year-old fossil, preserved in an ancient chunk of amber in a Spanish museum. The find, described in *Science,* confirms the wheel-shaped web as the earliest structure used by spiders to capture prey.

A spider's web is spun with its 'silk', a protein whose molecules create intricate bonds with neighbouring molecules. When spiders secrete this protein, it hardens and pulls taut, crystallising into a strong cable able to withstand the impact of a hurtling fly. Eight times stronger than steel fibre of equal diameter and incredibly 'stretchy', it's tougher than Kevlar but weighs only a third as much.

This makes it ideal for applications like extremely thin sutures in eye or neuro-surgery, artificial ligaments and tendons, bullet-proof vests, and fishing nets. So unique is the web's geometry – balancing stresses and tensions, and distributing forces across its surface – that, taken on a human scale, it could catch a jetliner!

It also holds valuable lessons for engineers who build tent-like structures with many cables. But attmpts to make spider silk synthetically pale before nature's undisputed high performance polymer fibre, fine-tuned by millions of years of evolution.

Once the genetic coding for spider silk is sequenced, researchers will be able to unravel its molecular architecture and spin some remarkable scientific yarn of their own.

- Prakash Chandra

Lemon for the Good Health

Compounds in Citrus fruits prevent diseases such as Cancer, Osteoporosis and Heart problems

SANCHITA SHARMA

Fruits make you indomitable, literally. Several studies show that eating five helpings–five cupful–of raw fruit prevent cancers, heart disease, diabetes and osteoporosis. In citrus fruits such as oranges, mandarin and lemons, the health benefits lie in of the presence of pectin, a natural compound that helps prevent prostate and other cancers, reports a study in the *Journal of Agriculture and Food Chemistry.*

The study was conducted by Dr. Bhimu Patil, Director of Texas A&M University's Vegetable and Fruit Improvement Centre, and colleagues. During a stop in New Delhi, Patil spoke about his groundbreaking work that proved pectin worked against cancer cells and held promise as a dietary preventative for disease.

"Pectin is a complex carbohydrate found in many plants, but is most abundant in citrus fruits. It has already been shown to reduce cholesterol and blood sugar. While our study focused mainly on prostate cancer, pectin may show similar benefits in inhibiting other types of cancer", said Patil.

Another study conducted by Patil's team shows that orange and grapefruit juice prevent osteoporosis, a debilitating disease that causes bones to become brittle with age and finally, break. The study was published in *Nutrition,* which ran the research as its lead article.

Few people are aware about the health benefits of fruits on bone health. "One of the reasons for reduced bone density is the increase in cell-damaging oxidants produced by the body's metabolic process. Our studies showed that both grapefruit and orange juice increased antioxidants in the rats' systems, which protects the bone cells from damage," he explains.

Earlier studies have shown that pectin can also help reduce levels of artery-blocking "bad" cholesterol (low density lipoprotein or LDL) in the blood and maintain blood sugar at a healthy concentration.

"Citrus fruit are a vast reservoir of anti-carcinogens and a storehouse of health-promoting nutrients," says Patil, who received his undergraduate degree at the University of Agricultural Sciences in Bangalore, before moving to the USA.

If locally grown, a whole fruit packs in a lot more nutritional punch than its juice. The fibre in a whole fruit also fills people up, so they tend to eat less. "Fruits need to be stored at temperatures below 15 degrees centigrade – 9 degrees in the case of citrus – to ensure they retain their nutritional value. Up to 60 per cent Vitamin C is lost within two months of the fruit being plucked, which is the time it takes for artificially-ripened fruit to reach the market in many parts of the world," says Patil.

If you are not sure about how fresh the produce is, it may be a good idea to opt for juices for the nutritional value and get the fibre from other sources, recommends Patil.

The nutritional components of many packaged juices are preserved because the fruit is freshly picked and juiced. Some, like mandarins and oranges, are squeezed with the skin to maximise nutritional content. "Independent studies that compared commercially squeezed juice with domestic squeezed juice found the levels of beneficial phytochemical and flavonoid to be higher in commercially squeezed juice" says a nutrition specialist.

But don't go for citrus alone. "In general, people should eat differnt coloured fruit to get all of the beneficial compounds. And make sure you eat them fresh", says Patil.

Citrus Helps Lose Weight

Grapefruit, the large round yellow citrus fruit, helps lose weight.

A 12-week study of 100 obese patients conducted at the Scripps Clinic in San Diego, USA, found that people who ate half a grapefruit before each meal lost an average of 3.6 pounds (1.6 kg) and those who drank 8 ounces (220 gm) of grapefruit juice before meals lost an average of 3.3 pounds (1.5 kg), though some lost over 10 pounds (4.5 kg). People who did neither, lost an average of half pound only.

None of the study subjects altered his or her diet in any other way.

Researchers speculate that grapefruit lowers insulin levels, and help in reducing fat storage.

Some words of warning though: grapefruit juice can interact with medicines, including some antihistamines, antidepressants and anti-anxiety drugs.

Research Notes

DENSITY AND RELATIVE ABUNDANCE OF MACROINVERTEBRATES IN VEMBAKOTTAI RESERVOIR, DIST. VIRUDHUNAGAR, TAMIL NADU

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Macroinvertebrate communities are commonly used as tools for making an integrated assessment of water quality in rivers (Metcalfe & Smith, 1994; Karr, 1991). Biological assessment methods using macroinvertebrates are based on the assumptions: (1) the species present (e.g., the elimination of sensitive species and the appearance of tolerant ones); (2) the total number of species (e.g. a decrease); and (3) the number of individuals in some species and consequently the relative proportion of different species within the community. Many aquatic insects and gastropod species have some tolerance power against the extremes of pH, alkalinity, free CO_2, dissolved oxygen and temperature and to industrial wastes and pesticides or have broad tolerance for environmental perturbations or polluted environments. Hence, these are also named as bio-indicators or pollution indicators (Bath & Kaur, 1998).

The necessity of water quality from micro-organisms to human beings is a serious problem to-day, because all water resources have reached to point of predicament due to unplanned urbanization and industrialization. It is very essential to formulate a sound public policy for water quality improvement. Therefore, the present study was made to assess the density and relative abundance of some macroinvertebrates (like insects, molluscs and crustaceans) in order to measure the status of water quality in Vembakottai reservoir, Virudhunagar district, Tamil Nadu.

Specimens were collected and number of individuals per square meter were counted and the average value was recorded from October 2002 to April 2003. All the collected specimens were preserved in 70% alcohol. The macroinvertebrates were identified by using standard keys of Sivaramakrishnan et al. (1998) and IAAB (1998). Density and Relative abudance of macroinvertebrates were calculated using the formula of Michael & Sharma (1988). These are presented in the Table 1.

The study revealed that insects were comparatively more abundant than molluscs and crustaceans. In Class Insecta, the mayfly nymph, stonefly nymph, *Chironomus* larva, *Eristalis, Ranatra linearis, Gerris* sp., *Belostoma indica, Laccotrephes cinerae* and *Notonecta glauca* were observed. Freshwater prawn and crab were identified in the Class Crustacea. In the Phylum Mollusca, *Gabbia stenothyroides, Indoplanorbis exustus, Thiara scabra, Thiara tuberculata, Lamellidens marginalis* and *Lymnea luteola* were noted (Table 1).

Mayfly nymph, water stick insect *Ranatra linearis* and *Gabbia stenothyroides* were present during the entire study period. High value of density and relative abundance were recorded in the freswater prawn (11.7%), followed by mayfly nymph (11.5%) and *Gabbia stenothyroides* (7.5%). It is interesting to note that the macroinverterbrates diversity was higher during March and April, whereas it was low during October. It suggests that the diversity of the aquatic organisms is related to seasonal fluctuation in the water level and food availability. Martin et al. (2000) reported that the abundance of high organic substances and high temperature might have influence on the diversity of aquatic organisms.

Michael & Sharma (1988) reported that the number of cladoceran species occurring in polluted water is low, but some of the tolerant species show remarkable abundance. This relationship may be expressed as the diversity index, or as a simple biotic index. Since the degree of pollution is reflected in such indices (i.e. class I, II & III insect organisms), these insects may be used to compare the extent of pollution in water body. In the present investigation, the *Chironomus* larva is considered as class III organism and stonefly nymph and mayfly nymph were class II organisms. Generally pulmonate snail, leech. mosquito larva, *Chironomus* larva, mussel, rat-tail maggot and *Tubifex* are grouped as class III organisms. Class II organisms include like, caddisfly larva, mayfly nymph, stonefly nymph, whirling beetle and *Dytiscus marginalis*. In the present study, biotic index calculated was found to be 4, indicating the very low level of water polluted. The results suggest that the water has not exceeded the permissible limit of water quality standard values and is suitable for irrigation and fish culture.

Acknowledgements: We are grateful to Dr. G. Sivasubramanian (Former Principal) and the Management of the Ayya Nadar Janaki Ammal College, Sivakasi, for facilities and encouragement.

References

Bath, K.S. & Kaur, H. 1997. Crustacean population in relation to certain physico-chemical factors at Harike reservoir (Punjab). *Envir. Ecol.*, 15(4): 954-957.

IAAB, 1998. *Methodology for Water Analysis.* Hyderabad.

Karr. J.R. 1991. Biological integrity: a long neglected aspect of water resource management, *Ecol. Applic.*, 1: 66-84.

Martin, P., Haniffa, M.A. & Arunachalam, M. 2000. Abundance and diversity of macroinvertebrates and fish in the Tamiraparani river, South India. *Hydrobiologia*, 430: 59-75.

Metcalfe & Smith, J. L. 1994. Biological water-quality assessment of rivers: Use of macroinvertebrate communities. In: (Calow, P. & Petts, G.E. Ed.) *The Rivers Handbook*, Vol. II. Blackwell Scientific Publication, U.K.

Michael, R. G. & Sharma, B.K. 1988. *Fauna of India and adjacent Countries–Crustacea: Cladocera.* Zoological Survey of India, Calcutta: 262 pp.

Sivaramakrishnan, K.G., Madhyastha, N.A. & Subramanian, K.A. 1998. *Lifescape.* Indian Academy of Sciences, Bangalore.

Table 1. Some macroinvertabrates collected from the Vembakottai reservoir. (No./m²).

Organisms	Oct. 2002	Nov. 2002	Dec 2002	Jan. 2003	Feb. 2003	Mar. 2003	Apr. 2003	D	RA
Phylum Arthropoda									
Class Insecta									
Ephemeroptera									
1. Mayfly nymph	1	5	6	4	3	3	2	3.4	11.2
Odonata									
2. Dragonfly nymph	-	2	3	4	2	1	1	1.9	6.1
Plecoptera									
3. Stonefly nymph	1	2	1	3	1	-	-	1.1	3.7
Diptera									
4. *Chironomus* larva	1	-	-	-	2	4	5	1.7	5.6
5. *Eristalis*	-	-	-	1	1	3	3	1.1	3.7
Hemiptera									
6. Water stick, *Ranatra linearis*	1	3	1	1	1	2	1	1.4	4.7
7. Pond skater, *Gerris* sp.	1	4	3	-	1	3	3	2.1	7.0
8. Giant waterbug, *Belostoma indica*	-	-	-	1	4	8	8	3.0	9.8
9. Water scorpion, *Laccotrephes cinerae*	-	-	2	1	1	2	1	1.0	3.3
10. Water boatman, *Notonecta glauca*	-	9	2	1	-	-	-	1.7	5.6
Class Crustacea									
11. Fresh water prawn	-	-	1	4	4	8	8	3.6	11.7
12. Crab	-	1	-	1	-	1	-	0.4	1.4
Phylum Mollusca									
13. *Gabbia stenothyroides*	1	2	3	2	2	3	3	2.3	7.5
14. *Indoplanorbis exustus*	-	1	2	2	-	1	1	1.0	3.3
15. *Thiara scabra*	2	1	1	2	-	1	1	1.0	3.3
16. *Thiara tuberculata*	2	1	2	2	-	1	-	1.1	3.7
17. *Lamellidens marginalis*	-	2	2	1	1	1	2	1.3	4.2
18. *Lymnea luteola*	1	1	-	1	2	1	3	1.3	4.2
Total number of individuals	11	34	29	31	24	43	41	30.3	100.0

D=Density, RA=Relative Abundance.

ADDITION TO THE FRESHWATER DECAPODA (CRUSTACEA) FROM NATH-SAGAR WETLAND, MAHARASHTRA

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The Class Crustacea constitutes prawn, crab, shrimps, wood lice, fish lice, barnacles, lobsters etc. All these animals have jointed bodies as well as jointed legs. Majority of them are aquatic, breathing through gills or general surface of the body. Decapoda is a highly evolved and largest Order of Crustacea with about 8500 species. Recently Venkataraman & Krishnamoorthy (1998) have stated that estimated number of world species of Decapoda is 10,000 belonging to marine, freshwater and terrestrial habitats.

For domestic consumption and also for export, culture of prawns and crabs in India has gained much importance in recent years. Families Palaemonidae and Potamonidae constitute major fisheries of India. Majority of them are marine forms. The body is cylindrical, segmentation of the body is conspicuous in all forms, except in smaller forms. They are characterized by having two pairs of antenna of which one pair is called antennules. Earlier contributions on freshwater decapods from Maharashtra are by Tiwari (1995) and Patil (2002).

The Nathsagar wetland is situated 40 kms. south of Aurangabad at Paithan. This town is situated on the right bank of river Godavari and is in latitude 19^0 9' 19" North and longitude 75^0 26' 2" East. The name itself shows Pratisthan or Capital city. In Godavari river, the ashes of dead bodies are brought for ritual performance. The depth of water is 1 to 20 meters. The pH range was between 6.5-7.8. CO_2 was not detected in water on most of the time, when detected it was always above 30 mg/L. D.O. content was between 5.0 to 7.6 mg/L. Hardness was above 50 mg/L. All the collections were made with the help of water net and preserved in 70% rectified spirit. Hydrobiological and faunistic studies of this Wetland were carried out by Patil (2005).

Crustacean collections of Nathsagar Wetland reveal the existence of one species of family Atyidae, two species of family Palaemonidae and two species of family Gercarcinuidae for the first time from this Wetland, as there is no record of the same from this area earlier. Following species of Decapoda were identified from Nathsagar Wetland area:

Class : Crustacea
Order : Decapoda
Infraorder : Caridea
Family : Atyidae

1. *Caridina* sp.

Family : Palaemonidae

2. *Macrobrachium lamarrei* (Edwards)
3. *Macrobrachium kistnensis* (Tiwari)

Infraorder : Brachyura
Family : Gercarcinucidae

4. *Barytelphusa (Barytelphusa) cunicularis* (Westwood)
5. *Liotelphusa laevis laevis* (Wood–Mason).

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References

Patil, S.G. 2002. Records of freshwater Decapoda (Crustacea) from Ujani Wetland, Maharashtra. *Zoos Print J.*, 17(10): 918.

Patil, S.G. 2005. Hydrobiological investigations of a freshwater wetland Nathsagar, Dist. Aurangabad. In: *Zool. Surv. India, Wetland Ecosys. Ser.*, No. 7: 7-62.

Tiwari, K.K. 1955. New species and sub-species of Freshwater Prawns. *Rec. Indian Mus.*, 52(1&2): 297-300.

Venkataraman, K. & Krishnamoorthy 1998. Faunal Diversity in India: Crustacea. In: *Faunal Diversity in India.* ENVIS Centre, Zoological Survey of India, Kolkata : 133-144.

Malaria Herb

The World Health Organisation has launched a new global effort to find a vaccine against malaria by 2015. In the meantime, artemisinin-based combination therapies (ACTs) remain the most effective cure for the disease.

Artemisinin is extracted from the *Artemisia annua* shrub or Sweet Wormwood.

Chinese herbalists have used its leaves to treat malaria for more than 1,500 years.

Scientists identified the plant's antimalarial ingredient, Artemisinin, in the late 1960s.

Artemisinin is used in combination with other drugs to slow down any development of resistance. The treatment is called ACTs.

ACTs is 95% effective in curing the disease.

THREATENED FISHES OF NORTH BENGAL REGION OF WEST BENGAL

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To study the biodiversity of a geographical area, it is important to locate the status of a species in that particular region. The status of any species can be classified into several categories, like - extinct, critically endangered, endangered, vulnerable, rare and safe. Among these critically endangered, endangered and vulnerable species draw our attention, to ensure conservation of the threatened species.

A number of rivers are flowing in different parts of Northern West Bengal, like Teesta, Torsa, Mahananda, Jaldhaka, Raidak, Sankosh, Muchi, Balasan, Kaljani, Lis, Ghis, Murti, Vima, Gadadhar etc. These have gifted North Bengal high fish diversity.

A list of threatened fish species of North Bengal is given below (Table 1), based on Talwar & Jhingran (1991), Sen (1992), Menon (1999) and Khan (2003).

Table 1. Threatened Fish Spp. of North Bengal.

Scientific Name	Local name
Critically endangered	
1. *Tor putitora* (Ham. Buch.)	Mahashol
2. *Badis badis* (Ham. Buch.)	Bot Koi
3. *Labeo gonius* (Ham. Buch.)	Kurchi
4. *Labeo nandina* (Ham. Buch.)	Nandi
5. *Cyprion semiplotus* (Mc Clelland)	Chapatti/Badangi
6. *Nandus nandus* (Ham. Buch.)	Bheda
7. *Aplocheilus panchax* (Ham. Buch.)	-
Endangered	
1. *Labeo pangusia* (Ham. Buch.)	Loni
2. *Labeo dero* (Ham. Buch.)	Guldi
3. *Tor tor* (Ham. Buch.)	Mahashol / Mahasheer
4. *Barilius barna* (Ham. Buch.)	Ghol/Bhola
5. *Barilius vagra* (Ham. Buch.)	Boroli
6. *Raiamus bola* (Ham. Buch.)	Bola / Ghol
7. *Neolissochelus hexagonolepis* (Mc Clelland)	Katli / Bharkul
8. *Danio devario* (Ham. Buch.)	Laupati / Banspata
9. *Olyra kempi* (Choudhury)	Bot singhi
10. *Esomus danricus* (Ham. Buch.)	Darke/Darkina
11. *Puntius sarana* (Ham. Buch.)	Saral punthi/Sarna punthi
12. *Pangasius pangasius* (Ham. Buch.)	Pangus
13. *Batasio batasio* (Ham. Buch.)	Teenkanta/Batashi
14. *Bagarius bagarius* (Ham. Buch.)	-
15. *Ompok pabda* (Ham. Buch.)	Pabda
16. *Ompok bimaculatus* (Bloch)	Pabda
17. *Xenentodon cancila* (Ham. Buch.)	Kakle / Bogo
18. *Mastacembeles armatus* (Lacepede)	Ban
19. *Notopterus notopterus* (Pallas)	Folui
Vulnerable	
1. *Danio dangila* (Ham. Buch.)	Nipati
2. *Garra gotyla* (Gray)	Gutum / Budena
3. *Chaca chaca* (Ham. Buch.)	Chaga
4. *Balitora brucei* (Gray)	Tit kabri / Nau machh
5. *Puntius ticto* (Ham. Buch.)	Tit punthi
6. *Puntius phutunio* (Ham. Buch.)	Phutuni punthi
7. *Botia dario* (Ham. Buch.)	Laupati / Bou sohagini
8. *Botia almorhae* (Gray)	-
9. *Oreinus richardsonii* (Gray)	Asla
10. *Wallago attu* (Schneider)	Boyal
11. *Heteropneustes fossilis* (Bloch)	Singhi
12. *Rita rita* (Ham. Buch.)	Ghagra / Rita
13. *Clupisoma garua* (Ham. Buch.)	Garun / Garua
14. *Ailia coilia* (Ham. Buch.)	Kajoli
15. *Colisa fasciatus* (Schneider)	Kholisa / Chapra
16. *Amblypharyngodon mola* (Ham. Buch.)	Mourala
17. *Setipinna phasa* (Ham. Buch.)	Phasa
18. *Chagunius chagunio* (Ham. Buch.)	Jerriah / Jerruah
Rare	
1. *Danio horai* Barman	-
2. *Osteobrama bakeri* (Day)	-
3. *Poropuntius clavatus* (Mc Clelland)	-
4. *Puntius guganio* (Ham. Buch.)	Gujani putti

References

Khan, R.A. 2003. Fish faunal resources of Sunderban Estuarine system with special reference to the biology of some commercially important species. *Rec., Z.S.I., Occasional paper,* No. 209:1-150.

Menon, A.G.K. 1999. Checklist of Freshwater Fishes of India. *Rec. Z.S.I., Occasional paper,* No. 175:1-366.

Sen, T.K. 1992. Freshwater Fishes. *In: Fauna of West Bengal, Part-II. Zoological Survey of India, State Fauna series* No. 3: 101-242.

Talwar, P.K. & Jhingran, A.G. 1991. *Inland Fishes*, Parts I & II. Oxford IBH Publ. Co. (P) Ltd., New Delhi : 1158 pp.

BIODIVERSITY AND WATER QUALITY OF POTTERU BARRAGE, BALIMELA, ORISSA

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Hydrologists and hydrobiologists say "Water is Life". Our very existence depends on it. With this in mind this field survey was undertaken at the Potteru Barrage. Flora and Fauna of the barrage area were observed. To correlate it, the pH of water as well as water temperature and air temperature at the site were also noted. The study was conducted in 2006.

Methodology was simple. Using flora and fauna literature, plants and animals present in area were identified. Water analysis was done at 10 different sites of the barrage, which include measuring of pH and temperature. Hardness of water and presence of halogen were also investigated. All the observations recorded on flora, fauna and chemical analysis of water are given in Tables 1, 2 and 3.

Interesting observations were as follows: Rare crocodile seen in the barrage waters. An interesting insectivorous plant *Utricularia stellaris* was abundantly present. A Bager fish weighing about 60/70 kg was found. *Catla catla* are abundant. In most of the plants enlisted presence of hormone oryzin has been earlier reported (Pradhan 1999, 2001). Rice ecosystem of the area is studied by Mohapatra (2005).

The desirable limit of pH for safe drinking purpose ranges 6.5 to 8.5 (Singh et al., 2006) but Potteru Barrage water pH falls below 6.5 at all the 10 sites where readings were recorded. This water is still being used for drinking purposes by the local villagers.

The abundance of Mahua *(Madhuca indica)* Kendu/ Tendu *(Diospyros melanoxylon)*, Teak *(Tectona grandis)* and Tamarind *(Tamarindus indica)* in the area of investigation is interesting, since the area is forest like.

From this investigation two suggestions are made– crocodile shall be conserved, and economic and medicinal utility of *Catla catla* should be exploited for curing diabetes by the "insulin" manufacture.

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References

Mahapatra, I. C. 2005. Rice Research–Holistic approach. *Oryza,* 42 (4): 336-342.

Pradhan, Sushil 1999. Hormone Oryzin and its ubiquitousness in angiospermic plants. *Bionotes,* 1 (2): 35-37.

Pradhan, Sushil 2001. Further studies on the ubiquity of oryzin in angiospermic plants. *Bionotes* 3 (4): 87.

Singh, K.K., Singh, R.B., Singh S.K., & Singh, A.P. 2006. Quality of drinking water at platforms of Patna Junction. *Bionotes,* 8 (4): 113-114.

Table 1. Plant species biodiversity of Potteru Barrage area.

Botanical Name	Family	Popular Name
Achyranthes aspera	Amaranthaceae	Apamaranga
Aegle marmelos	Rutaceae	Bael
Albizzia lebbeck	Mimosaceae	Sirish
Azadirachta indica	Meliaceae	Neem
Basia latifolia (Madhuca indica)	Sapotaceae	Mahua
Bombax malabaricum	Malvaceae	Simuli
Borassus flabellifer	Palmaceae	Tal
Butea monosperma	Papilionaceae	Palash
Calotropis procera	Asclepiadaceae	Arakh
Caryota urens	Arecaceae	Salap
Clitoria ternatea	Fabaceae	Aparajita
Cuscuta reflexa	Convolvulaceae	Nirmuli
Diospryros melanoxylon	Ebenaceae	Kendu/Tendu
Ficus glomerata	Moraceae	Fig
Hollarhena antidysenterica	Apocynaceae	Kurain
Ipomoea carnea	Convolvulaceae	Amari
Leucas aspera	Lamiaceae	Gayash
Mangifera indica	Anacardiaceae	Mango
Mimosa pudica	Mimosaceae	Lajakuli/Touch me not plant
Opuntia dilleni	Cactacaceae	Saptapheni
Phoenix sylvestris	Palmaceae	Khajuri
Pistia stratiotis	Arecaceae	Pisia
Ricinus communis	Verbenaceae	Joda
Solanum xanthocarpum	Solanaceae	Bheji baigan
Tamarindus indica	Caesalpiniaceae	Tamarind/Tentuli
Tectona grandis	Verbenaceae	Teak/Saguan
Thevetia nerifolia	Apocynaceae	Karabir
Urena lobata	Malvaceae	Jatajatia
Vanda roxburghii	Orchidaceae	Vhanda
Ziziphus jujuba	Rhamnaceae	Berkoli

Table 2. Animal species biodiversity of Potteru barrage Area.

Zoological Name	Animal Group	Popular Name
Annabas scandens	Pisces	-
Anas sp.	Aves	Hansa
Bufo melanostictus	Amphibia	Toad
Catla catla	Pisces	Bhakur
Clarius batrachus	Pisces	Magur
Carciuns maenus	Arthropoda	Kankada
Calotes versicolor	Reptile	Enduo
Chamaleon zeylanicus	Reptile	Bahuroopi
Corvus splendens	Aves	Crow
Cuculus varius	Aves	Koel
Egretta garazetta	Aves	Bok
Gavialis gangeticus	Reptile	Ghadial (Crocodile)
Ichythyopis sp.	Amphibia	Pila
Labeo rohita	Pisces	Rohi
Mentis religiosa	Arthropoda	Pangupala
Milbas migrangocinda	Aves	Chilo
Naja naja	Reptile	Naga
Palaemon sp.	Rustacea	Prawn
Pheretima posthuma	Annelida	Earthworm
Psittacula eupatria	Aves	Parrot
Passer domesticus	Aves	Sparrow
Rana tigerina	Amphibia	Frog
Sturnus contra	Aves	Bani
Streptopelia chinensis	Aves	Dove
Tyto alba	Aves	Owl
Wallago attu	Pisces	Balia

Table 3. Water pH, Water Temperature and Air Temperature at Potteru Barrage.

Month	pH	Water (°C)	Air (°C)
June	5.49	34.7	37.9
July	5.50	33.15	36.29
Aug.	6.21	32.82	33.13
Sep.	5.43	27.9	27.42
Oct.	5.95	26.9	25.2

Letters

I am happy to see the volume of 'BIONOTES' which I understand, you have been publishing for the last nine years. Again, I am not an expert in the field but your coverage seems very good to a layman like me. I do hope that you are getting good response to this journal.

– Prof. J.V. Narlikar

Inter-University Centre for Astronomy and Astrophysics, An Autonomous Institution of the University Grants Commision, Pune - 411 007.

●●●

Greetings and hope you are in good health and cheer. I have been sent only *Bionotes* Vol. 1 Nos. 2 & 3, Vol. 2 Nos. 1 &2, Vol. 3 No. 1 and Vol. 7 No. 2. I would like the complete published set please and also to subscribe for the current volume. Information on availability and payment would be appreciated. Thanks and kind regards,

– Dr. Kumar Ghorpade

P.G. Teacher & Research Associate in Systematic Entomology, University of Agricultural Sciences, Krishi Nagar, Dharwar - 580 005.

●●●

Dr. Guenther Kohler (Jena) send me your e-mail with the notes to your journal. At this way I want to ask you, if you are interested in exchange of our journal *"Veroffentlichungen des Naturkundemuseums Erfurt"*, where we published since several years also about Himalayan insects.

In attachment I send you also the first circular of our 3rd International Symposium about Biodiversity and Natural Heritage of the Himalaya.

– Matthias Hartmann

Erfurt (Germany), [on e-mail.]

●●●

I am writing this letter to inform you that there is a sensational news item published under the caption 'Not Snakes - but Lizards', in a Telugu newspaper *"Enaadu"* dt. 28.05.2007 (cutting enclosed).

The news is from Basundara, a Biological Institute at Bhubaneswar (Orissa). They discovered these animals ("for the first time in the world") from a marshy area of Khandadari riverine system. The animals are without legs, snake like, with skin suspended with bones under the neck region. They belong to the Lizard group, live in marshy area, feed on worms in the soil, greenish in colour.

I recollect that they belong to the group of 'Limbless Lizards' - *Ophiosaurus gracile* (Gray), under the family Anguidae. Tikader & Sharma (1992) in their 'Handbook of Indian Lizards' refer them under 'Indian Glass Snake' It may be either *Ophiosaurus gracile* or *Berkudia insularis* Anandale, 1917, discovered from the Barkuda island in the Chilka lake.

– K.V. Surya Rao

Dy. Director (Retd.) Z.S.I. and Project Collaborator AICOPTEX, Visakhapatnam - 530 002.

HYMENOPTERA FROM THE MANGROVE FOREST OF PALAYAKAYAL, TAMIL NADU

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Hymenopterans, the "membrane-winged" insects, include bees, ants, and a large number of other insect taxa collectively referred to as wasps. The Hymenoptera include famous examples of social insects, such as honeybees and ants. These insects have developed regimented social systems in which members are divided into worker, drone, and queen castes. Such social hymenoptera may live together in nests or hives, containing thousands of individuals, all descended form a single queen. Not all hymenoptera are social, however, many live a solitary life, coming together only for a brief mating.

Mangrove forests are among the world's most productive ecosystem. They enrich coastal biodiversity, yield commercial forest products, protect coastlines and support coastal fisheries. Fauna and floral species of mangrove ecosysem are in threatened status. Hence, all the components of the mangrove ecosystem need to be conserved (Kathiresan, 2004). India has a total area of 4,482 km^2 under mangroves. The present study aimed to survey of Hymenopteran insects in Palayakayal mangrove forest, Tamil Nadu.

The Palayakayal mangrove forest is located in the mouth of Thamirabarani river, enter into Bay of Bengal. It is located 25 km away from Tuticorin, Tamil Nadu. Surveys of Hymenoptera insects were carried out in from December 2004 to April 2005. Adult Hymenopteran insects' collection and mounting method was followed by Dennis (1973) method. Collected insects were examined and identified up to species level with the help of field guide by Linsenmaier (1972).

In the present study 27 species of Hymenoptera reported belong to seven families (Table 1). Maximum species (14) were recorded in Vespidae. Rajmohana & Narendran (1999) reported that most of the diversity of Hymenopteran species is determined by vegetation, soil, soil aeration, salinity, temperature and moisture holding capacity.

Table 1. Hymenoptera in Palayakayal mangrove forest.

S.No.	Name of the species
	Order: Hymenoptera
	Family: Pompilidae
1	*Hempepsis barbara*
2	*Pepsis staudingeri*
3	*Pepsis smaragdina*
4	*Pepsis* sp.
	Family: Xylocopidae
5	*Xylocopa acsluans*
6	*Xylocopa violaceus*
7	*Chalicodoma muraria*
	Family: Apidae
8	*Apis (Zaraea) aurulenta*
9	*Apis unicolor*
10	*Apis indica*
	Family: Vespidae
11	*Crocisa bistrionicus*
12	*Tibula beros*
13	*Hemipentbes morio*
14	*Pempbredon lugens*
15	*Pterrocheilus diversicolor*
16	*Panurgues banksianus*
17	*Gorytus spilosternus*
18	*Exaereta frontalis*
19	*Caenocryptus* sp.
20	*Synoeca* sp.
21	*Lestrodryinus formicarius*
22	*Sceliphron destillatorius*
23	*Stenogaster depressigaster*
24	*Diodontus minutus*
	Family: Thysanidae
25	*Gasteruption pedemontanum*
	Family: Sphecidae
26	*Chlorion labatum*
	Family: Formicidae
27	*Odonotomachus chelifer*

References

Dennis, C. D. F. 1973. *Laboratory manual for introductory Entomology.* Anchor Press, Essex: 1-68.

Kathiresan, K. 2004. Biodiversity in mangrove ecosystem of India: Status, Challenges & Strategies. *Proc. Nat. Workshop on 'Biodiversity resources mangement and sustainable use'.* Dept. of Energy, Madurai Kamaraj Univ., Madurai: 243-254.

Linsenmaier, W. 1972. *Insects of the World.* Droemersche Verlagsanstalt Publication Th., Switzerland: 1-392.

Rajmohana, K. & Narendran, T.C. 1999. Species diversity in Diaprrine genera (Hymenoptera: Proctotrupoidea) of India. *Entomon,* 12 (1): 20-24.

Statins do not cure Cancer

Statins, the most common type of drugs prescribed to lower cholesterol levels and reduce the risk of heart attacks, do not have any cancer-protective effects. Earlier studies suggested that they help lower the rates of breast, prostate and colon cancers. Analysis of 26 studies involving 87,000 patients concluded that the drugs had no impact on cancer rates, according to the *Journal of the American Medical Association.* The studies found no increased risk of cancer as well, among the people using statins.

EFFECT OF GAMMA RAYS ON LENGTH OF FRUIT IN *CAPSICUM ANNUUM*

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Capsicum annuum, a common condiment, is a herbaceous plant of 2-3 feet in height. Pusa Jwala is one of the varieties of *Capsicum annuum* which has fruits oriented downwards. In the present work gamma rays were used as physical mutagen, and its effect on the length of fruits in Pusa Jwala variety of *Capsicum annuum* is studied.

Healthy seeds of Pusa Jwala variety of *Capsicum annum* L. were used as plant material. These seeds were grown separately. Different doses of gamma rays were used as physical mutagen. These doses were 10kR, 20kR, 30kR, 40kR and 50kR. Healthy, dry and dormant seeds of Pusa Jwala variety were grown separately and irradiated at above mentioned different doses of gamma rays.

At the time of maturity the fruits were harvested from both treated and untreated plants of M 1 generation and collected separately. Length of fruits without stalk was measured in centimeter and noted down (Table 1).

Seeds of M 1 generation were collected to raise M2 generation. In M2 generation also the fruits', length were measured. All the data obtained were statistically analysed.

It has been observed that length of fruit was affected by different doses of gamma rays in a very interesting way. There was decrease in the average length of fruit at 10 kR as compared to control. At 20 kR the fruits were longer than 10 kR but smaller than control. Further, there was gradual decrease in length of fruit up to 40 kR. In M 1 generation at 50 kR there was no fruit setting inspite of flowering throughout the season. M2 generation showed less reduction in length of fruit. There was highly significant and negative correlation between length of fruit and gamma ray doses in both generations (M1 and M2).

Thus, in the present investigation it was observed that mutation created by gamma rays was not beneficial and it caused decrease in fruit length. Similar observations were also made by Girhe & Choudhary (2002) who found reduced pod length in gamma rays induced mutants of *Lathyrus sativus.* Earlier there were several reports about effect of irradiation on the size, shape and color of seeds. For example, small size grain in mutant rice crop was observed by Ghosh et al. (1981).

References

Ghosh, Hajra, S. & Halder, S. 1981. Bu-99-A promising small grain mutant in rice. *Genet. Agr.,* 35: 327-338.

Girhe, Shilpa & Choudhary, A.D. 2002. Induced morphological mutants in *Lathyrus sativus* L. *J. Cytol. Genet.,* 3 (N.S.) : 1-6.

Table 1. Effect of gamma rays on fruits of *Capsicum annuum,* Var. Pusa Jwala.

Gamma rays doses (in kR)	M1 Generation		M2 Generation	
	Average length of fruits	Correlation Coefficient	Average length of fruits	Correlation Coefficient
Control	7.88±0.316	-0.8782412**	7.79±0.313	-0.8719731**
10	6.44±0.458		6.58±0.449	
20	7.49±0.449		7.60±0.448	
30	5.20±0.372		5.46±0.396	
40	4.33±0.348		4.53±0.344	
50	Fruit setting is not observed		No Plant growth	

** Highly significant.

A PRELIMINARY REPORT ON THE GEOMETRID MOTHS OF DIST. SOLAN, HIMACHAL PRADESH

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Lepidoptera comprising moths and butterflies is the third largest Order in the insect world (McGavin, 2001). The family Geometridae of this Order is one of the largest families of moths in terms of species richness and numerical abundance. The word Geometridae has been derived from two Latin words : Geo i.e. earth and Metridae means to measure. Their caterpillars exhibit looping movements and hence are also known by the name 'inchworm', 'measuring worm', or 'looper'. These moths are generally of small to medium size, with cryptic colours. These are easily recognized from their sitting posture. When at rest, their wings are laid horizontally and pressed against the surface. In the forewing, vein 3A forms a basal fork with 2A.

Hampson (1895) classified the family Geometridae of Indian region into six subfamilies, namely Boarmiinae, Geometrinae, Orthostixinae, Acidaliinae, Oenochrominae and Larentiinae. According to Scoble (1999), the family Geometridae is divided into nine sub families viz., Geometrinae, Ennominae, Sterrhinae, Oenochrominae, Orthostixinae, Archiearinae, Larentiinae, Alsophilinae and Desmobathrinae.

During the present studies, collection-cum survey tours were conduct in district Solan (H.P.), from August to November, 2004. A total of 20 species belonging to 3 subfamilies were collected from two localities of district Solan, namely Nauni and Sábathu. All these species have been identified with the help of relevant literature and by comparison with the reference collections lying at the Entomology Division, Indian Agricultural Research Institute, PUSA, New Delhi.

A list of Geometrid species collected in the present studies is given below:

Order: Lepidoptera

Family: Geometridae

Subfamily: Ennominae

1. *Dasyboarmia delineata* (Walker)
2. *Psilalcis inceptaria* (Walker)
3. *Ectropis crepuscularia* (Denis and Schiffermuller)
4. *Heterostegane bilineata* (Butler)
5. *Heterostegane subtessellata* (Walker)
6. *Hypomecis infixaria* (Walker)
7. *Biston suppressaria* (Guenee)
8. *Ascotis imparta* (Walker)
9. *Gnophos tephrosaria* Moore
10. *Peratophyga hyalinata* (Kollar)
11. *Petelia medardaria* Herrich-Schaffer
12. *Oxymacaria temeraria* (Swinhoe)
13. *Hyperythra lutea* Stoll

Subfamily : Geometrinae

14. *Comibaena cassidara* (Guenee)
15. *Omphacodes directa* (Walker)
16. *Agathia hilarata* Guenee
17. *Pelagodes falsaria* (Prout)

Subfamily: Sterrhinae

18. *Problepsis vulgaris* Butler
19. *Somatina purpurascens* Moore
20. *Traminda mundissima* (Walker)

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References

Hampson, G.F. 1895. *Fauna of British India–Moths,* 3: 1-546.

McGavin, C.G. 2001. *Essential Entomology.* Oxford University Press, Mumbai: 1-318.

Scoble, M.J. 1999. *Geometrid Moths of World– A Catalogue (Lepidoptera: Geometridae).* Vol. 1: 5-482, Vol. 2: 485-1016.

Loving Animals and Birds

When Steve Irwin, the famous crocodile hunter was killed by a sting ray in September, last year, I concluded that only Australia produced daredevils who could capture dangerous animals like crocodiles, etc.

Many Indians have been doing so. Among the most famous was Reuben David of Ahmedabad. He not only captured crocodiles and snakes but also had tigers, lions, langoors, bears and a variety of birds in his home and the zoo he set up. He formulated his own herbal medicines to keep his friends in good shape. His life has been written by his daughter Esher David, *My Father's 200* (Rupa). Her line drawings illustrate how close he was to birds and beasts: he had been living with them, he sat by a female crocodile while she was laying her eggs and helped her to incubate them. It is a true life-story of how harmonious human-animal reltionships can be. The book is specially meant for teenagers but makes an equally fascinating read for grown-ups. The only things about the book that irritated me were the compliments paid to her father by celebrities printed at the end of every chapter.

– Khushwant Singh

HAEMATOLOGICAL STUDIES ON THE TOXIC PROFILE OF NICOTINE IN THE ALBINO RAT, *RATTUS NORVEGICUS*

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Synthetic pesticides are toxic chemicals which are used to increase agricultural production. Along with this, they affect ecosystem and human beings badly as compared to the natural pesticides. They are best due to their low toxicity and less damage to environment and man. Nicotine which is a natural pesticide, is obtained from tobacco leaves. It is toxicant but also used for cure of all kinds of ills like caries of teeth, skin diseases etc. It is laxative tonic and mental stimulant and also used for mosquito control but mostly it is used in cigarette, bidies and chewing tobacco because of fashion now a days. Excess use of these products may cause various dreadful diseases like thrombosis, cardiovascular disease etc. Keeping this in view the present study was undertaken to estimate the effect of nicotine on morphological parameters in the blood of albino rat.

The experimental adult albino rats of both sexes were acclimatized for one month, taken from animal house of the Zoology Department, Khandari Campus. They were housed in polypropylene cages maintained at 28+1°C temperature and photoperiod of 10 hrs/day. They were fed with animal balanced food, vegetables and water was provided ad libitum. Nicotine was taken from nearby fields of nicotine and extracted for experiment. ED_{50} was determined to decide the experimental dose. Two doses were selected as 0.8 mg/kg and 1.6 mg/kg body weight. Rats were divided into 6 groups, each group containing 4 rats in which 2 groups considered as control group which were given only distilled water and balanced food. Rest 4 groups were treated as experimental group which were given nicotine solution orally through cathedral tube for 15 and 30 days. Rats were fasted overnight separately on each dose on 15th and 30th day. On next day experimental rats were sacrificed and blood was collected from their body.

The results show that total erythrocyte count (TEC) non-significantly increases after 15 days at dose 0.8 mg/kg body weight and significantly after 30 days at same dose. Increase in TEC has been also reported by some other workers including Akela et al. (1993) who also observed same findings in albino rat after treatment with opium. This increase in TEC is due to toxic effect of nicotine.

TLC (total leucocyte count) increases non-significantly at dose 0.8 mg/kg after 15 days and significantly increases at 1.6 mg/kg body weight. After 30 days highly significant increase has been found at 0.8 mg/kg and very highly significant at 1.6mg/kg body weight. An increase in TLC has also been reported by Friedman et al. (1964) after tobacco treatment and by Andrew et al. (1996) on smoking in humans. Increase in leucocyte count may involve the mechanism of nicotine effect as nicotine enhances the neutrophil responses to chemotactic peptides. Haemoglobin concentration significantly increases at dose 0.8 mg/kg body weight after 15 days and highly significant after 30 days at both doses which is correlated with increase in TEC. The same has been reported by Galer et al. (1985) and Hommand et al. (1995).

Table 1. TEC, TLC, Hb. Conc. in *Rattus norvegicus* after nicotine treatment.

Parameters	Treatment days	Control set	0.8 mg/kg b.wt.	1.6 mg/kg b.wt.
TEC	15	5.37 ±0.06	5.43 ±0.02[a]	5.56 ±0.02[a]
	30	5.40 ±0.05	5.57 ±0.027[b]	5.73 ±0.07[d]
TLC	15	7.37 ±0.06	7.46 ±0.05[a]	7.56 ±0.02[b]
	30	7.42 ±0.06	7.71 ±0.03[c]	7.76 ±0.04[d]
Hb. Conc.	15	13.1 ±0.27	14.0 ±0.21[b]	14.7 0.32[d]
	30	13.5 ±0.20	14.8 ±0.09[d]	15.5 0.15[d]

Values are mean of 4 individuals.
a=p>0.05, b=p<0.05, c=p<0.01, d=p<0.001

References

Akela, B.P., Kumari, A., Kumar, A. & Kumari, A. 1993. Effect of opium on haematology of albino rat. *Environ. Ecol.*, 11(2): 482-484.

Andrew, D, Urrula, K.C. & Naser, D.S. 1998. The influence of acute smoking on leucocyte, platelet and endothelium. *Atherosclerosis*, 143: 193-239.

Friedman, G.D., Seigebnab, A. B., Feldman, S.R. & Collin, M.F. 1973. The irritant effect of cigarette smoke on the leucocyte count. *Arch. Environ. Hlth.*, 26: 137.

Galea, G. & Davidson, R.J.L. 1985. Haematological and haemorheological changes associated with cigarette smoking. *J. Clin. Pathol.*, 38: 978-984.

Hommand, E. C., Gorfinkel, L., Seidman, H. & Lew., C.A. 1995. Tar and nicotine content of cigrette smoke in relation to death rate. *Environ. Res.*, 12: 263-271.

EFFECT OF MALATHION AND BHC ON TOTAL HAEMOLYMPH PROTEIN AND FAT BODY OF THE LARVA OF *SPODOPTERA LITURA*

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In the present investigation observation is made on the changes caused due to sublethal doses of Malathion and BHC in the total protein level in haemolymph and fat body of the larva of the tobacco caterpillar, *Spodoptera litura* Fabr. The tobacco caterpillar is a important polyphagous pest, hence an attempt has been made to study the effect of pesticides on the protein contents of its caterpillar.

Malathion and BHC induced changes against the ontogeny of *S. litura* as well as on the levels of glycogen and total free aminoacids in haemolymph and the fat bodies of the larva of this pest. Earlier glycogen and total free amino acids in haemolymph and fat bodies of the larva of *Corcyra cephalonica* have been reported by Tiwari & Bhatt (1989).

Insecticides were used as follows: malathion 5% w/w W.P., and BHC 50% w/w W.P. Sub-lethal doses of BHC (0.001, 0.002 & 0.003%) and malathion (0.006, 0.008 & 0.010%) were prepared of dietary media, to see effect on egg laying and their hatching, larval rearing etc. up to 20 days, and then transfer into sub lethal doses of malathion and BHC, to allow them to feed till next 10 days. Each experiment was replicated six times and the data so obtained were statistically calculated as per Campbell (1967). The total protein content was estimatd in both treated and untreated leaves as described by Lowrey et al. (1951).

Protein levels in haemolymph were reduced to 77%, 56% and 25% of the control values, while these levels in fat body were reduced to 87%, 55% and 42% of the control values, following treatment with 0.001, 0.002 and 0.003% of BHC respectively. In the similar way, protein levels in haemolymph were reduced 86%, 75% and 49% of control values while these levels in fat body were reduced to 87%, 59% & 45% of control values following treatment with 0.006, 0.008 and 0.010% of malathion respectively. Sub lethal doses of BHC and malathion caused a dose dependent ($P<0.001$) reduction in the protein level of haemolymph and fat body of the larvae of *S. litura* (Table 1).

The reduction in protein content was observed in all stages of larvae. It is due to insecticidal inhibition of amino acids suggested by Agosin et al. (1965) in *T. infestans* in relation to DDT, and by Singh (1982) in *Dysdercus koenigii* with malathion. The protein synthesised in a early instars of larval fat body is released into surrounding blood. Simmons & Mitchell (1962) suggested that in *Drosophila* sp. amino acids are first incorporated into peptides and later into proteins.

Table 1. Variation in the total protein in haemolymph and fat body of the larva of *S. litura*.

Insecticide & % dose level	Haemolymph (%)	Fat Body (%)
Control (Untreated larvae)	70.390±1.919 (100)	13.890±0.384 (100)
BHC (Treated larvae)	53.896±1.089	12.091±0.428
0.001	(77)	(87)
0.002	38.467±1.007 (56)	6.823±0.286 (55)
0.003	16.458±0.125 (25)	4.654±0.128 (42)
Malathion (Treated larvae)	58.950±0.957	11.398±0.226
0.006	(86)	(87)
0.008	49.190±1.125 (75)	6.835±0.239 (59)
0.010	32.692±1.048 (49)	5.230±0.225 (45)

Units are µg/mg ± S.E. of six replicates.
In perentheses = % change with control values taken as 100% ($p<0.001$).

References

Agosin, M., Aravena, L. & Neghma, A. 1965. Enhanced protein synthesis in *T. infestans* treated with DDT. *Exp. Para.*, 16: 318-324.

Campbell, R.C. 1967. *Statistics for Biologists.* Cambridge Univ. Press, London: p. 242.

Lowrey, O.H., Rosebrough, A.L.F. & Randell, R.J. 1951. Protein measurement with the foline phenol reagent. *J. Biol. Chem.*, 193: 265-275.

Singh, Rambha 1982. Effect of malathion on the free amino acids in haemolymph of *D. koenigii* (Hemiptera). *Entomon,* 7: 253-256.

Simmons, J.R. & Mitchell, H.K. 1962. Metabolism of peptides in *Drosophila* sp. *In: Amino Acids Pools* (Holden, J.T. Ed.). Elsevier, Amsterdam: 147-155.

Tiwari, S.K. & Bhatt, R.S. 1989. Effect of BHC and malathion on the total free amino acid level in the haemolymph and fat body of the larvae of rice moth *C. cephalonica* St. (Lepidoptera). *Entomon,* 14 (1&2): 133-137.

THREE HOUR CATCH OF ARCTIID MOTHS AT JATINGA VILLAGE OF NORTH CACHAR HILLS, ASSAM

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The village Jatinga, situated in the North Cacher Hills, Dist. Haflong, Assam, made headlines during the eighties, in the printed and electronic media, for a unique phenomenon of the birds committing suicide. The authors have extensively and intensively surveyed North-Eastern States since 1981, for the collection of moths belonging to three families, namely Pyralidae, Arctiidae and Geometridae. Due to the unique climate and location of Jatinga village, this locality is of much importance for insect diversity in North-East India. It has been observed that the bird watching towers are ideal spots for the collection of nocturnal insects. During one survey-cum-collection tour in 2002, as many as 25 species of moths of Lepidopteran family Arctiidae, were collected during merely 3 hours period between 8 pm to 11 pm on a single night (10.9.2002).

The moths of family Arctiidae are commonly known as hairy caterpillars and are of utmost economic importance. These insects can be easily recognized from their sitting posture. When slightly disturbed, these moths fell down and feign as dead. They can also be recognized from their wing venation, as vein $Sc+R_1$ always anastomoses with discal cell near or beyond its middle part and is always separate from vein Rs. The identification of collected species were made with the help of relevant literature (Hampson, 1894, 1900, 1901, 1914) and by comparison with the identified specimens at Punjabi University, Patiala, and the Zoological Survey of India, Kolkata.

The list of collected species is as follows:

Order: Lepidoptera

Family: Arctiidae

Subfamily: Arctiinae

1. *Agalomorpha plagiata* (Walker)
2. *Amerila astreus* (Drury)
3. *Amerila arthusbetrandis* (Guer.)
4. *Arctata arctata* Walker
5. *Arctata carrisimma* Moore
6. *Areas galactina* Walker
7. *Areas orientalis* Walker
8. *Areas trigonalis* Walker
9. *Argina syringa* Walker
10. *Creatonotos transiens* Walker
11. *Creatonotos ananthakrishanani* Kirti & Kaleka
12. *Nyctemera variens* Walker
13. *Trypheromera adversata* (Schaller)

Subfamily: Lithosiinae

14. *Spilarctia leopardina* (Koller)
15. *Agrisius fuliginosus* Walker
16. *Agrisius guttivitta* Walker
17. *Barsine defecta* Walker
18. *Barsine pretiosa* Moore
19. *Barsine thomasi* Kaleka
20. *Chionaema alborosea* Walker
21. *Chionaema bianca* Walker
22. *Chionaema catorhoda* Hampson
23. *Chionaema dohertyi* Elwes
24. *Chionaema effracta* Walker
25. *Castabala roseata* Walker

Acknowlegement: Authors are thankful to the Department of Science and Technology, Govt. of India, New Delhi, for funding the project "Taxonomic Revision of Indian Arctiidae (Lepidoptera)."

References

Hampson, G.F. 1894. *Fauna of British India, including Ceylon and Burma–Moths.* Vol. 2. Taylor & Francis Ltd., London: 609 pp.

Hampson, G.F. 1900. *Catalogue of the Arctiidae (Nolinae, Lithosiinae) in the British Museum Collection.* Natural History Museum, London: 590 pp.

Hampson, G.F. 1901. *Catalogue of the Lepidoptera Phalaenae in the British Museum.* Vol. 3, Taylor & Francis Ltd., London: 690 pp.

Hampson, G.F. 1914. *Catalogue of the Lepidoptera Phalaenae in the British Museum.* Suppl. Vol. I. Taylor & Francis Ltd., London: 858 pp.

Number of Moles

People with a large numbers of moles on their skin may age slowly. Scientists from King's College, London, compared key ageing DNA with the number of moles a person had, in a study of 1,800 twins.

A mole is a spot on the skin that is usually round or oval in shape and may range in colour from pink, brown, red or black. The experts found that the more moles a person had, the more likely their DNA was to have the properties to fight off ageing, reported the BBC News.

In the study, experts found that those with more than 100 moles had longer telomeres than those with fewer than 25. Telemores are the part of certain chromosomes linked to ageing. The difference between the two mole groups was equivalent to six to seven years of ageing.

FIRST RECORD OF *CROCE FILIPENNIS* (NEUROPTERA : NEMOPTERIDAE) FROM MADHYA PRADESH

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Neuroptera is an important order of predaceous insects. These insects are recognized by the specialized network of veins, generally transparent wings and well developed antennae. The neuropterans are rarely abundant and mostly weak in flight. They feed in their larval and adult stages on soft-bodied insects including pests

The family Nemopteridae includes very unusual and highly specialized insects. They are cmmnly known as Thread-winged or Spoon-winged Lace-wings. Adults look like large mosquitoes; with normal fore wings and typical neuropteran structure; hind wings very narrow, thread-like and longer than the body. Antennae are moderately long, not clubbed or thickened at the end. The head is prolonged into a rostrum.

While working on Neuroptera of Madhya Pradesh, an interesting specimen of Spoon-winged Lace-wing was collected at dusk, which was identified as *Croce filipennis* (Westwood, 1841). The body length of the specimen was measured 6 mm. The thread-like hind wings are more than three times as long as the body. It flies with the long hind wings streaming in the air much in the manner like May flies. It normally haunts houses and flies at dusk. The larvae are found among dust and refuse on floors, feeding on small insects like psocids. The life history is generally completed in a year (Imms, 1911).

Globally, the family Nemopteridae is represented by 12 genera and about 50 species (Essig, 1982). However, only four genera and six species are reported from India (Ghosh, 1988). *Croce filipennis* (Westwood) is so far known from Bihar, Gujarat, Maharashtra, Orissa, Uttar Pradesh and West Bengal (Ghosh & Sen, 1977). Since, the family Nemopteridae is not recorded from Madhya Pradesh, this report constitutes the first record of *Croce filipennis* in particular and family Nemopteridae in general from the State.

Brief particulars of classification and material studied are as follows:

Order : Neuroptera

Family : Nemopteridae

Tribe : Crocini Navas.

Genus : *Croce* MacLachlan

Type species : *Nematoptera filipennis* Westwood, 1841

Material examined : 1 ex, India, Madhya Pradesh, Jabalpur, Wright Town. 10.v. 2007, Coll. K. Chandra.

Acknowledgement: The authors are thankful to the Director, Zoological Survey of India, Kolkata, for providing the facilities and encouragement.

References

Essig, E.O. 1982. *College Entomology* (Indian Print). Satish Book Enterprise, Agra.

Ghosh, S. K. 1998. Neuroptera. In : (Alfred, J.R.B. et al. eds.) *Faunal Diversity of India.* ENVIS Centre. Zoological Survey of India. Kolkata 252-257.

Ghosh, S. K. & Sen. S, 1997. Checklist of Indian Planipennia (Order Neuroptera). *Rec. zool. Surv. India,* 73: 277-326.

Imms, A. D. 1911. On the life history of *Croce filipennis* Westwood. *Trans. Linn. Soc. London,* 2(1): 151-160.

(Contd. from p. 95)

The best part of the book are its coloured diagrams (prepared by Mr. Tapas Kumar Mondal, "an outside artist"). They are beautiful and soft-coloured. Besides, they have been printed excellently on the imported art paper. That is why the book attracts the reader.

A close check-up, unfortunately, reveals that these diagrams have not been drawn scientifically perfectly. There is much artist's imagery, being drawn free-hand. An evident example of this observation can be seen on comparing the title photograph and the artist's figure (p. 36) of the species *Leucauge decorata.* The two look completely different. While the photograph truly shows the long and jointed legs, the drawing shows the legs comparatively smaller and curved smoothly like threads. The colours and markings of the body are also different. Such wrong depiction of legs is visible in many other species. Thus, though the diagrams are beautiful, but I fear they may not match the original natural colour of that species and the diagrams in general are not scientifically accurate (in *Theridion indica* only six legs are shown).

The production of the book is superb. There are some proof mistakes (e.g., "35. *C. himalyensis"* on p. 3; "88. *P. suchimitae"* on p. 5; "78. *Pardesa"* on p. 96; "Family TETRAGNATHA" on p. ix and p. 132). The price of the book is exorbitant to the Indian pockets.

– R.K. Varshney

EFFECT OF AN ORGANOCHLORINE INSECTICIDE ON THE GROWTH OF YEAST, *SACCHAROMYCES CEREVISIAE*

DEVENDRA PAL SINGH and R.S. SAXENA

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Among organochemicals, chlorinated insecticides constitute a major component in agriculture and have been found to cause much health hazards. These compounds being highly lipophylic, facilitate their rapid accumulation in fat tissues. Dieldrin, a cyclodiene organochlorine insecticide, was first synthesized in 1884 by epoxidation of aldrin. The vapour pressure of dieldrin is significantly lower then aldrin. Low volatility and chemical stability makes Dieldrin more resistant to physico-chemical changes in the environment.

The baker's yeast *Saccharomyces cerevisiae*, is cosmopolitan in distribution and has an unique capacity of brewing and baking. It is also a rich source of protein and vitamins. Because of its rapid growth rate and resistance to the foreign chemicals, it has been used in toxicological studies. *Saccharomyces* has been instrumental in bringing about degradation of many recalcitrant insecticides. Therefore, some direct action of yeast must be responsible for the degradation of organochlorine insecticides as reported for deltamethrin (Fatichenti et al., 1983). Microbes form the primary link in biological degradation of soil humus and other complex organic material. In essence, microbes in soil and water facilitate many basic biological processes which are essential for the sustenance of the higher living components of any ecosystem.

Organochlorine insecticide (Dieldrin) and an yeast *Saccharomyces cerevisiae* were used in the present study. The stock culture of yeast were maintaines on agar slants, containing 2% agar in Y.G. medium. Simultaneously, appropriate quantity of dieldrin was transferred to obtain concentrations of 1, 10, 50, and 100 ppm. Cultures were incubated at 30°C in a BOD incubator. Growth was followed at regular intervals of 2 hours up to 12 hours, by measuring the optical density at 550 nm with spectrophotometer (Pringle & More, 1975).

In the present investigation, the growth response of *Saccharomyces cerevisiae* to the presence of dieldrin has drastic toxic effect. The growth was inhibited by 9.36 percent in the presence of 1 ppm dieldrin after 2 hours. In this treatment a maximum inhibition of growth by 11.14 percent was observed after 6 hours. The percent inhibition with 10 ppm dieldrin varied between 6.68 and 23–72, till 8 hours of treatment. After 10 hours, the toxic effect on the population of *Saccharomyces* was severe, showing an inhibition of 23.72 percent with 10 ppm dieldrin. However, between 10 to 12 hours, efficient growth rate was restored and the inhibition was reduced to 6.88 percent. Dieldrin at 50 ppm was further toxic to the yeast and after 2 hours of insecticide treatment the growth was suppressed maximum by 28.2 percent. At 100 ppm dieldrin, the growth was reduced to approximately half of the control 48.2 percent just after 2 hours of treatment. The percent inhibition of *Saccharomyces*, treated with 100 ppm dieldrin varied from 28.55 to 51.8. Yeast recovered from the toxic effect of dieldrin, when applied up to 10 ppm. However complete recovery was never achieved even after 12 hours of treatment. The percent inhibition after 12 hours was 4.6, 6.9, 18.7 and 30.7 respectively, with 1, 10, 50 and 100 ppm dieldrin.

The present study indicates that the growth of yeast was inhibited by dieldrin between 4.6 and 52 percent. Dieldrin at 1,10,50 and 100 ppm produced a maximum inhibition of 11.14, 23.72, 28.18 and 51.82 percent respectively. Many organophosphorus insecticides, like fenitrothion and chlorpyrifos inhibited the grwoth at all treatment levels (Lal & Lal, 1987). The inhibition of growth ranged from 3 to 42 and 25 to 78 percent in cultures of *Saccharomyces* treated with fenitrothion and chlorpyrifos respectively.

References

Fatichenti, F., Farris, Meloni, M. & Pirisi, F.M. 1983. A preliminary investigation in the effect of *Saccharomyces cerevisiae* on pesticide concentration during fermentation. *J. Appl. Micro. Biot.*, 18: 323-325.

Lal, S. & Lal, R. 1987. Bioaccumulation, metabolism and effects of DDT, fenitrothion and chlorpyrifos on *Saccharomyces cerevisiae*. *Arch. Envir. Conta. Toxi.*, 16:12-15.

Pringle, J.R. & More, J.R. 1975. Methods for monitoring the growth of yeast cultures and dealing with problems. In: *'Methods in Cell Biology'* (Prescott, D.M. ed.), 11:131-168.

Algae to Help the Blind

People born with inherited blindness could have their vision at least partially restored in future using chemicals extracted from an algae. The researchers of Wayne State University in Detroit, USA, identified a protein in green algae which converts light into energy in the same way as cells in the human retina. Injections of the protein were used to treat mice born with a debilitating eye disease.

The mice used in the experiments were bred to develop a degenerative eye condition in which vital light-sensitive cells in the retina die off, leading to permanent blindness. The condition is similar to *retinitis pigmentosa* which with other retinal diseases causes full or partial blindness in one in 1,000 people world wide. Tests showed that after treatment, nerve cells in the animals' eyes that are not normally sensitive to light began sending signals to the brain's vision centres, suggesting they were helping to restore sight.

Conferences

National Seminar on 'Prospects of Ethnobotanical Researches in India: Vision 2020'

A National Seminar on 'Prospects of Ethnobotanical Researches in India: Vision 2020' was organised during 24th-25th February 2007 at the Nalanda Open University, Biscomaun Bhawan, Patna, by the Organising Secretary Prof. Usha Singh.

The seminar was inaugurated by H.E. Sri R.S. Gavai, Governor of Bihar and Chaired by Sri V.S. Dubey, Vice-chancellor, Nalanda Open University. Delegates from different Universities like Netaji Subhas Open University, Kolkata, Banaras Hindu University, Patna University, Magadh University and Research organizations like Baidyanath Ayurved Bhawan, National Botanical Research Institute, Lucknow , etc. participated and presented their research papers. A Souvenir was published and released on the occasion.

The Key note address was delivered by Prof. Sunil Saran, Chairman, Amity University, Noida . The main objective of the seminar was to have a comprehensive documentation of Ethno-medicinal uses of the plants being used by the tribals for the cure of different diseases like Cancer, Aids, Skin, Rheumatoid etc. Today's burning problem of population explosion was also nicely being tackled by the tribals using certain medicinal herbs. So it is high time to record all the informations which they possess, as with the passage of time slowly it will vanish. Other countries like China, and Africa have already started the work. Govt. of India is also giving more stress on this issue and research organisations should come forward to undertake this project.

– Dr. B. Krishna
Member, Organizing Committee.

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ISSRS Fellowship 2007

The Indian Society of Salinity Research Scientists proposes to award Fellowships for recognizing outstanding contributions of scientists to promote agricultural researches in the disciplines of aridity, salinity, and environment. Applications or nomination on plain paper including biodata of the candidates, a copy of the list of publications and a set of five best publications during last ten years should reach to the Secretary, ISSRS, 23/287, CHB, Pal Road, Jodhpur–342 008, India, before September 30,2007.

So far 21 Indian agricultrual Scientists have been elected Fellows during the years 1999-2006.

– Dr. I.C. Gupta
Secretary.

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Coming Events

(1). The 3rd International scientific meeting on "Biodiversity and Natural Heritage of the Himalaya".

To be held from April 18th to April 20th 2008, at the Natural History Museum of Erfurt. Conference venue: Historical town hall of the Thuringian capital Erfurt. Organizer : Naturkundemuseum Erfurt, Große Arche 14, D-99084 Erfurt (Germany).

Presentations to all field of Botany, Zoology, Ecology, Geology, Geography and Anthropology are invited (e.g. systematics/taxonomy, phylogenetics, faunistics, biogeography, plant sociology, soil sciences). Poster presentations will be arranged. Conference language will be in German and English. The length of the presentations may vary from 15 to 30 minutes.

Original scientific papers can be submitted probably up to 30.04.2008, also written in any other than the conference languages.

Contact: Matthias Hartmann, Naturkundemuseum Erfurt, Große Arche 14, D-99084 Erfurt (Germany), or per e-mail: matthias.hartmann@erfurt.de

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(2). The 4th International Conference on Environmental Education.

To be held at Ahmedabad (Gujarat), from 26th to 28th November 2007.

First UNESCO-UNEP Confernce on Environmental Education was held at Tbilisi (Georgia) in 1977, Second at Moscow in 1987, and Third at Thessaloniki in 1997.

Fourth such Conference, cosponsored by UNESCO and UNEP is being organized by the Centre for Environment Education, Ahmedabad (Govt. of India), with preconference events beginning 24th November, 2007. Theme is 'Environmental Education towards a Sustainable Future–Partners for the Decade of Education for Sustainable Development'.

Contact: www.tbilisiplus30.org.

TRAINING PROGRAMME ON CONSERVATION OF THE WILDERNESS IN THE RURAL AREAS OF TAMIL NADU

S. ANAND and V. KALAIARASAN

WWF India, Tamil Nadu State Office,
TTK Road, Alwarpet,
Chennai – 600 018.

With a noble vision to develop the awareness and ensure their commitment for the nature conservation and sustainable development, the student's community is being targeted to provide more exposure to outer world. The rural students live closer to the natural wilderness like forest, wetlands, mountains and desert ecosystems. With a view to protect the ecosystems and sustain the web of life stronger, rural society inherit the sustainable development values from their ancestors and continue further for their betterment.

The WWF-India, Tamil Nadu State office, has launched a project on 'Awareness Programmes on Biodiversity and Environment for Rural School Students' for the students of Government Schools in and around Chennai with the partnership of Madras School of Social Work (MSSW).

The objectives of the programmes are as follows:

1. To raise awareness on environmentnal conservation and sustainable development through young volunteers in rural schools with small financial grants and reach out the mass through the wildlife educators.

2. Providing them a choice in career of conservation in nature conservation and sustainable development.

Under this project 30 undergraduate students of the Bachelor of Social Work from the NSS unit of the MSSW were selected for the reach out purpose. The programme consisted of both theory and field sessions. The resource materials containing information on the importance of ecosystems starting from elementary to higher education level and species-specific booklets; posters and details of flora and fauna of Chennai were provided. Apart from series of lectures on biodiversity conservation, ranging from importance of forests, wetlands, biodiversity and economics of ecology, sustainable development, global warming and its impact on society and vulnerability of the species extinction and a wildlife photo exhibition has been conducted. The role of Zoos in conservation education and sustainable development has brought out awareness among the students. Earlier they thought zoos are only recreational centres and for an outing purpose. Now the students have come to know the potential conservation opportunities of the Zoological Parks. A keynote address on Floral Diversity of India and the need for conservation coupled with general wildlife of India and conservation was given. As the volunteers are experts in street play, they conducted the green classes with more innovative techniques in imparting conservation message.

The participants were taken to a field visit to Vedanthangal Bird Sanctuary followed by the indoor session. They were explained more about the migratory birds and the purpose of Wetland Conservation. They also learnt about the role of Vedanthangal Bird Sanctuary as migratory and breeding grounds for many wintering birds coming from across the world. The students were taken to herbal garden maintained by the Irula Tribal Women Co-operative Society at Thandarai, Chengalpet, and given exposure to tribal community and their role in biodiversity conservation. The students discussed about the Irula tribal community and their life style associated with nature preservation. They were exposed to the conservation measures taken to protect the biodiversity of the forest through preserving tribal community in the region.

Followed by the training the students were divided into different groups and conducted periodical participatory for greening the surroundings in rural areas wherever they have gone for camps. They were taught matters related with nature conservation. The WWF India Tamil Nadu State Office assessed the Conservation Education awareness programmes' reach out, and evaluated the effectiveness of the programme. The trained students became volunteers of MSSW and assured that they would conduct similar "Green Classes" whenever they will undertake projects in rural areas. It is hoped that this kind of programme shall be replicated by other conservation agencies to reach out general mass to accelerate efforts to protect the wilderness in rural areas.

Acknowledgements: The WWF-India's Tamil Nadu State Office is grateful to the Tamilnadu State Council for Science and Technology for their financial support. They are also thankful to the Principal, Madras School of Social Work, Chennai, for support.

Expedition to the Arctic

Under the auspices of National Centre for Antarctic and Ocean Research, Ministry of Earth Sciences, Government of India, the month-long expedition will begin from Delhi on August 5. The duration of Earth Sciences studies would last till September. This expedition to the North Pole will have five Scientists to study Earth Sciences.

Lucknow University Reader, Dr. Dhruv Sen Singh, of Geology department has been selected for study of Earth Sciences. He said "While my job would be to study rocks and sediments, the other four would analyze the climate and several other aspects."

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