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Bionotes

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FORGETTING INDIAN SCIENTISTS

Bose, was he J.C. or S.N. ?

Trinity College, Cambridge, witnessed pioneering mathematical research by Srinivasa Ramanujan between 1914 and 1919. Eight decades later, the dean at Trinity is an Indian Nobel laureate in Economics [Amartya Sen]. Yet, there seems to be little being done to remember Ramanujan for his genius.

The media crying hoarse over 'modifications' in history textbooks, have taken very little note of omissions in our science curriculum. The NCERT syllabi have never emphasised the contribution of Indian scientists to modern Physics. Biology and Cosmology.

The Standard XI biology textbook contains a list of scientists who had contributed to the understanding of life processes in plants. It encompassed theories of even non-botanists like Aristotle and Lavosier. But sadly, there's scant mention of Jagdish Chandra Bose, the man who scientifically proved that plants too are living creatures. All we get about him is a five-line profile in our Class XII textbook.

(Incidentally, we're still to be informed whether or not J.C. Bose had indeed transmitted radio waves before Marconi.)

Now try this little scientific experiment. Walk down any public school and ask a Class XII student if he or she has heard of P.C. Ray, Meghnad Saha, S.N. Bose, U.N. Brahmachari, Yalapragada Subbarao and Vikram Sarabhai ? Chances are they won't have a clue. Now ask the same lot if they have heard of Maxwell, Boltzman, Lord Kelvin, Davy and Faraday? You're likely to get a very different response.

You might say our scientists were not up to the mark. After all, it may seem that 'Indian science' produced very little apart from the hocus-pocus of Ayurveda and Vedic mathematics.

Consider the fact that the *Charak-Sanhita* elucidates the exact nature of blood circulation between the foetus and its mother – 1,500 years before William Harvey. Or how generations before Simpson, plastic

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surgery was performed by the school of Shusruta — and diagrams of the surgery equipments used have a bearing to the ones used today.

Or that 400 years before Newton and Leibnitz came up with Integral and Differential Calculus, this particular branch of mathematics was used by Bhaskaracharya II.

But let's restrict ourselves to India's contribution to modern science. S.N. Bose independently laid out a system of statistical quantum mechanics known as the Bose-Einstein statistics. A class of fundamental atomic and subatomic particles have been named after him — bosons. But least publicised is the fact that he solved 64 equations of the Unified Field Theory left unsolved at Einstein's death, when Nobel laureates Enrico Fermi and Paul Dirac had opined that not even half of them could be solved.

But thanks to the NCERT, our students would probably think the two Boses — J.C. and S.N.— to be the same person.

It's another story when it comes to physicist Meghnad Saha. He was the father of India's atomic age. He installed the first cyclotron machine at Calcutta. As an MP, he had genuine differences with Nehru. So perhaps like all proscribed anti-Nehruvians, Saha —the only Indian scientist to work with Madam Curie —seems to have been banished from the curriculum.

– Priyadarsi Dutta

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I, Dr. R.K. Varshney, hereby declare that the particulars given above are true to the best of my knowledge and belief.
Sd/- Dr. R.K. Varshney
Dated the Ist March, 2002. Signature of the Publisher

News of Members

1. **Dr. Lakshmi Kanta Ghosh** (Kolkata) has been awarded the degree of D.Sc.(Zoology) by the Gorakhpur University in 2001, for his outstanding contribution on the Indian aphid insects. He is an expert in identification of all kind of bugs (Hemiptera) and has published 130 research papers. Earlier the 'Bibek Shiromony Award' for 2001 was also given to him by the Bibek Bikash Samaj Kalyan Kendra, Kolkata.

2. **Dr. Sushil Pradhan** (Balimela) has been made a Fellow of the Indian Botanical Society in 2001. Earlier he was inducted as a 'Foreign Fellow Member' of the Hungarian Society for Plant Physiology and the European Federation of Plant Physiologists, in 2001.

3. **Dr. P.K. Gupta** (New Delhi) was conferred with 'Young Scientist Award' for his contributions in Soil Chemistry, by the Bioved Research Society, Allahabad, in February 2002, in 4th Indian Agricultural Scientists and Farmer's Congress held at C.C.S. University, Meerut.

4. **Ms. Sumita Srivastava** (Agra) has been selected as a Research Associate in January 2002, in the project, 'Studies on Faunal Diversity in Thar desert of Rajasthan', being conducted in the Desert Regional Station, Zoological Survey of India. Jodhpur, under Dr. Q.H. Baqri.

Change of Address

[Following are the new addresses of our some members, which came to our notice. -Ed. *Bionotes.*]

1. **Gangetic Plains Regional Station,** Zoological Survey of India, Road No. 11-D, Behind Telephone Exchange, Rajendra Nagar, Patna - 800 016 (Bihar).

2. **High Altitude Zoology Field Station,** Zoological Survey of India, Opp. Saproon Gurudwara building, Saproon, Solan - 173 211 (Himachal Pradesh).

3. **Dr. Mrs. Kunjani Joshi,** ARK Niwas, Naya Baneswor, P.O. Box 2486, Kathmandu (Nepal).

4. **Dr. R.M. Sharma,** Scientist-C, Zoological Survey of India, High Altitude Zoological Field Station, Opp. Saproon Gurudwara, Solan - 173 211 (Himachal Pradesh).

5. **Ms. Gauravi Yadav,** 296, Civil Lines, Etah-207 001 (U.P.).

6. **Ms. Twinkle Razdan,** 418/18, Kabir Colony, Tallab Tilloo, Jammu Tawi - 180 002 (J. & K.).

7. **Dr. Sujit Chakraborty,** IA-28, Sector III, Salt Lake, Kolkata - 700 097.

8. **Dr. P.K. Gupta,** Karnataka Agro Chemicals, 3/11727, 2nd floor, Satnagar, Karol Bagh, New Delhi -110005.

9. **Mr. Keshav Singh,** 51, Narsipuram, Mathura-281006 (U.P.).

Letters

Thank you very much for the very kind review of the Butterfly booklet in *Bionotes*. Also, thank you for the honour of including my name in the 'Directory of Determiners'. In this connection, I would like to draw your attention to Prof. Y.P.S. Pangtey, Head, Deptt. of Botany, D.S.B. College, Kumaon University, Nainital-263002. He is an authority on Himalayan flowering plants and ferns. He has published a number of papers and some books on the subject.

I am sure the 'Directory' will prove a very useful tool to researchers. It has certainly solved one of the major problems of multidisciplinary research.

- Peter Smetacek,
P.O. Bhimtal,
NAINITAL-263136 (Uttaranchal).

◆

Thank you for sending the complimentary copy of *'Bionotes'* to our library. Meanwhile I would like to inform you that due to paucity of funds we are unable to subscribe the above newsletter to our library.

- Principal Scientist,
Project Directorate of Biological Control (ICAR),
Hebbal, BANGALORE - 560024.

◆

This periodical is undoubtedly a good one, which includes many a information on various disciplines of Biology. I heartily wish that it should continue. You are devoting much time for it, for which you deserve appreciation. I have deposited my subscription with Mr. Sanjit Ghosh for 2002.

- Dr. L.K. Ghosh,
Emeritus Scientist, Z.S.I.,
Nizam Palace complex,
KOLKATA - 700 020.

◆

Please renew our subscription to 'BIONOTES', for the year 2002 and send us invoice in triplicate for payment.

– Scientist 'C',
Botanical Survey of India,
Industrial Section, Indian Museum,
1, Sudder Street, KOLKATA-700 016.

◆

Environmental Challenges

A.A. SIDDIQUI

Council of Scientific and Industrial Research,
Anusandhan Bhavan, Rafi Marg, New Delhi-110 001.

Environmental pollution was experienced earlier also but it has become major problem due to rapid industrialization and population growth. Generally pollution is caused by natural activities i.e. vegetation decay and forest fire. In addition to these natural pollutants there are man made pollutants like gas, mists and industrial wastes. At present the position has been changed due to urbanization i.e. concentration of people or human activities in densely populated area.

The Department of Environment is a nodal agency for all environmental issues including national utilization and management of natural resources. These can be broadly classified into :

- Renewable resources like land, soil, water and wildlife.
- Non-Renewable resources like minerals, oils and gas.

In India more than two-third of the persons are engaged in agriculture. Lack of management in urbanization and industrialization which are encroaching the good agriculture land leading to the environmental disbalance. The current growth of population is a serious problem for global environment. New technology is not totally a success in controlling the population growth. The amount of cropped land available per person is falling in the less developed countries because of population growth and millions of hectares of land are being lost due to combined problems, viz encroachment on land, soil erosion, depletion of nutrients and acidification. Large area of forest has been destroyed for agriculture and development of industries resulting not only in the loss of wild life habitat but has also led to ecological disaster.

Water pollution is a serious environmental hazard which affects human health. The major source of pollutants of water are community wastes and industrial effluents. Proper attention is required for waste and effluent's management.

Effects on the enviroment should be taken into account at the earliest possible stage in all technical planning and decision making processes. It is therefore necesary to evaluate the effects on the quality of life and on the natural environment of any measure. The urgent and renewed efforts are required to be undertaken by all countries for the development and benefit of present and future generations.

The major environmental challenges of the 21st century are:

1. There is an urgent need for reinvigorated international cooperation based on common concerns and a spirit of international partnership and solidarity.
2. There is an alarming discrepancy between commitments and action, goals and targets agreed by the international community in relation to sustainable development.
3. The evolving framework of international environmental law and development of national law provide a sound basis for addressing the major environmental threats of the day.
4. Environment programme provides a compelling assessment of the serious nature of the environmental threats faced by international community. Special attention should be paid to unsustainable consumption patterns. Environmental setwardship is lagging behind economic and social development and rapidly growing population is placing increased pressures on the environment.
5. Environmental threats resulting from the accelerating trends of urbanization and development of megacities, freshwater crisis and its consequences for food, uncontrolled deforestation, increasing environmental urgencies, risk of human health and the environment from hazardous chemicals.
6. We must integrate environmental considerations in mainstream of decision making and also intensitfy our efforts in preventive action and concerted response including national and international rule of law.
7. We should encourage a balanced and integrated approach to trade and environmntal policies in pursuit of sustainable development.
8. Governments, the private sector and civil society, must be emphasized in addressing the environmental policies in pursuit of sustainable development.
9. They must also be emphasized in addressing the environmental challenges of 21st century.
10. Civil society has found new and effective modes of expression of popular sentiments and concern. It provides a powerful agent for promoting shared environmental purpose and value. Civil societies play an important role in bringing emerging environmental issue to the attention of policy makers. The role be strengthened and Government should promote conditions to facilitate the ability of all parts of society. There is a need for independent and objective media at all levels and enhancing awareness and developing shared environmental values in global society.

Science provides the basis for environmental decision making and there is need for intensified research and scientific cooperation on emerging environmental issues, as well as improved avenues for communication between the scientific community, decision makers and other stake holders.

Biodiversity and Related Issues

RAGHAVENDRA GADAGKAR

Centre for Ecological Sciences,
Indian Institute of Science, Bangalore - 560 012.

Until some 10-15 years ago, it was believed that we share this planet with some 5 to 10 million other species of living organisms. This turned out to be a gross underestimate. Today it is believed that we may have 30 million or more species of living organisms on earth. Taxonomists, the world over, have catalogued a mere 1.5 million species of this rich biological diversity. A striking feature of this biodiversity is that it is heavily concentrated in the tropical, poor, underdeveloped regions of the world. India is one of the mega-diversity countries of the world and it is time we realise the advantage and hegemony that this can potentially give us in international relations. But this can only happen if we also become world leaders in documenting and monitoring our biodiversity. In some ways this is a daunting task — India itself probably has over a million species. Yet, there is no reason for despair. To do a reasonable job of documenting and monitoring our biodiversity, we fortunately need, relative to other major enterprises, modest financial resources. We however need a very substantial human resource, something we fortunately have. What is needed to accomplish this task is an efficient organisation, management and training our human resources.

While the Ministry of Environment and Forests, Government of India, is already engaged in significant efforts in this direction, clearly a great deal more needs to be done. In this era of globalisation and liberalisation, there is a new sense of urgency. India is a signatory to the International Convention on Biological Diversity and a party to various Intellectual Property Rights related International Agreements. In this climate, unless we can show documentary evidence that we possess various elements of our biological wealth, in a manner acceptable to the international community, we can potentially lose rights to use our own biological wealth.

Establishment of Research Museums

Even by the most conservative estimate we have at least 400,000 species of living organisms in the country which have not yet been documented and named, let alone well studied. Perhaps the number of undescribed species is actually over a million. In the context of biodiversity prospecting for new drugs and pharmaceuticals, search for efficient agents of biological control, conservation of the germ plasm of wild relatives of cultivated plants and so on, the need to inventory and document our biodiversity can hardly be exaggerated. The practice of sending our plants, animals and microbial specimens to museums outside the country for authentic identifiction is becoming inevitable today and we sometimes pay upto 10 pounds sterling per specimen. In addition to being a waste of money this is something of a national disgrace.

There is no reason why the botanists, zoologists and microbiologists in the 200 universities and thousands of colleges in the country cannot become experts in authentic identification of our own living organisms and also of species found in neighbouring areas and thus perhaps earn those 10 pounds per specimen. The practice of sending our specimens outside for identification has even more serious implications in the context of any national legislation on biodiversity. While we claim (and need to do so) that "all biological resources occurring or naturalised in the territory of the country are the sovereign property of the state", it is ironical that we continue to depend on foreign experts to tell us what we have.

Although the Botanical and Zoological Surveys of India are making some effort at inventorying our biodiversity. their effort alone is most unlikely to meet all the needs of the country. It is therefore imperative for a country of our size and our level of biodiversity, to build significant levels of expertise in taxonomy of animals, plants and microbes in various educational and research institutes. Needless to say, this is not meant to replace the efforts of the BSI and ZSI but to augment them. The presence of an excellent National Museum of Natural History in Washington D.C. does not for example prevent universities at Harvard, Michigan, Kansas, California and so on from having equally excellent research museums and taxonomic experts. *It is therefore proposed that India should set up, state-of-the-art, research museums, in its educational and research institutes.* This will go a long way in speeding up the inventorying of our biodiversity, will bring back the much needed respect and recognition for taxonomy and will do a great deal of good for the cause of creating a suitable research atmosphere, especially in our universities.

It is proposed that 5 to 10 research museums, perhaps specializing to some extent on certain groups, be set up during the next 5 years, the choice of the university/

institution and the choice of the intended specialization if any, should be based at least partly on existing expertise and traditions of taxonomy in different centers in the country. Although many details will have to be worked out, *it is estimated that the annual budget for each such research museum will be of the order of 1 to 2 crore rupees.*

Monitoring our Biodiversity

It is now common knowledge that human activities and the consequent habitat destruction pose a serious threat to biodiversity. Because of high rates of population growth and the need for converting natural habitats into agricultural land and other habitats required for human use, the threat to biodiversity is also more severe in the tropical, poor, developing countries of the world. It has been estimated that many tropical countries may lose as much as 10 to 25% of their biodiversity during the next few decades. Monitoring and conserving our biological wealth is therefore of extreme importance. It is obvious that any successful programme of monitoring cannot hope to pay equal attention to all the 120,000 or so described species, let alone the 500,000 or more undescribed species.

A practical approach would be to identify a subset of some 5000 to10,000 species for systematic and long-term monitoring. Commonness, economic and other importance, endemism and conservation status are some of the obvious criteria that can be used to choose the appropriate subset of species. In spite of choosing a subset of 5000 to 10,000 species, the task of systematic and long-term monitoring of the status of these species is perhaps an even more tedious task compared to the programme of inventorying our biodiversity. Monitoring therefore cannot be expected to be accomplished merely by the agencies such as BSI and ZSI nor even by the proposed 5 to 10 research museums; it would require a much larger network of individuals and institutions throughout the country. However, the level of technical expertise required would be somewhat less because of the focus on 5000 to 10,000 of the better known species.

One possible way in which to organise such a decentralized broad based network for systematic and long-term monitoring of the status of a chosen set of 5000 to 10,000 biological species would be to involve biology teachers and undergraduate and postgraduate students from across the country. With adequate planning and organization this seems an entirely feasible proposition. Much of botany, zoology and organismic biology is unfortunately taught today to our undergraduate and postgraduate students in a rather dry and unimaginative way, depending heavily on the study of preserved specimens. It has been obvious for quite sometime now that more attractive methods of teaching biology, involving first hand observations of living organisms in their natural habitats, is essential if we are to prevent bright young students from turning away from the study of biology. A large number of people trained in classical botany and zoology are fighting a losing battle in trying to engage themselves in research in more sophisticated and expensive biochemical and molecular biological areas. It is clear that with some planning they can be successfully engaged in generating highly relevant new knowledge in the area of biodiversity. The decentralized approach to monitoring India's biodiversity with the involvement of teachers and students can at once tackle both of these problems.

There is no denying that such an approach will require considerable effort in selecting the species to be monitored, the habitats to be looked at and the methodology to be adopted. It will also become necessary to prepare illustrated field guides for the selected species and to appropriately modify the teaching syllabi. A small beginning in this direction has been initiated through the so called Project Lifescape launched by the Indian Academy of Sciences on the occasion of the birth centenary of India's foremost naturalist, Salim Ali.

This initiative of the Indian Academy of Sciences can only serve as a pilot, model programme. To convert it into a wide phenomenon requires a somewhat different approach. *It is therefore proposed that the Ministry of Human Resource Development set up a committee to examine the possibility of organizing a nation wide network of biology teachers and students to help monitor India's biodiversity.* The consequent changes in the methods of teaching biology, preparation of field guides for India's common plants and animals for every ones' use, and the distinct possibility of a large number of botanists and zoologists becoming engaged in highly relevant state-of-the-art research are significant additional benefits that are likely to accrue from such a programme.

National Legislation on Biodiversity

India is now a party to the International Convention on Biological Diversity which came into force on 29th December 1993. This convention has three main objectives – the conservation of biological diversity, the sustainable use of its components and equitable sharing of the benefits arising out of the utilization of biological resources. In order to meet our commitments of conservation and sustainable use of biodiversity and to facilitate access to biological resources there is urgent need for a broad based national legislation on biodiversity. The Ministry of Environment and Forests has set up a committee under the chairmanship of Prof. M.S.Swaminathan and is actively engaged in the process of preparing a suitable draft legislation.

Research Notes

SURVEY OF COLOUR BLINDNESS IN PEOPLE OF RAJAPALAYAM AND SCHOOL CHILDREN OF SIVAKASI, TAMIL NADU

P. UMADEVI, K. PARAMANANDHAM and S. BASKARAN

P.G. and Research Department of Zoology, Ayya Nadar Janaki Ammal College (Autonomous), Sivakasi - 626 124 (Tamil Nadu).

Human colour vision is trichromatic, based on the presence of three kinds of cones, containing three different visual pigments sensitive to short (blue), middle (green), and long (red) wave lengths. Colour blindness is the inability to perceive any part of the visible spectrum. The most common type of colour blindness involves the red or green pigments. Being a genetic disorder, the incidence of colour blindness varies from race to race, and therefore different in the different geographical regions of the world, inhabited by people of different ethnicity.

Surveys on colour blindness in India have been carried out in limited areas in Northern India. Though the incidence of colour blindness has been reported for various populations of several towns and villages, no study has been made for the population at Rajapalayam and school children of Sivakasi in Tamil Nadu. Further, there have been no report on the distribution of blue colour blindness (tritan) in Indian population. It was therefore, felt that a study of tritan in local population would be of interest.

Accordingly a questionnaire on colour vision was prepared following Ishihara type test book of colour blindness and put into use in a population of 1010 persons of 319 families in Malayadipatti area of Rajapalayam town, and 328 school girls in Sivakasi town, belongiong to age groups of 5-17 years, both in Virudhunagar district of Tamil Nadu. The plates were specially prepared to find out the blue colour vision. All precautions recommended by Isihara in 1975 were strictly followed. The percentage and frequencies of different types of colour blindness were calculated.

Out of 1010 individusls living in Malayadipatti area in Rajapalayam, 438 were males and 572 were females. The results revealed that among 438 males, 423 had normal colour vision and 15 had red-green colour blindness. Among 572 females, 565 had normal colour vision and 7 had red-green colour blindness. Out of 328 school girls screened in Sivakasi, 326 had normal colour vision and two had colour blindness. All the people had normal vision for blue colour vision.

The percentage of red-green colour blindness in Malayadipatti area in Rajapalayam among males was 3.42% and females 1.22%. The percentage of red-green colour blindness among school girls of Sivakasi was 0.61%.

The distribution of colour blindness among females had been reported to vary from one geographical area to another geographical area, race to race and also to depend on marriage customs. Being an X-linked disorder, the incidence of red-green colour blindness is gender dependent and race dependent. The high incidence of colour blindness in the present study may be due to the consanguinous marriages which are common in these areas. Blue colour blindness (tritan) is not observed in the present study. The occurrence of tritan is 1 in 500 and it is inherited through the autosome in a dominant way with incomplete penetrance located in the 7th chromosome (Krawczynski, 1995).

Reference

Krawczynski, M.R. 1995. Genetics of congenital colour vision defects-II. Rare types of colour blindness. *Klin-Oczna*, 97 (1-2): 39-43.

Cellulose

Botanists have now ended a 30-year hunt for the gene that makes cellulose in plants. This finding could lead to applications ranging from easier paper manufacturing to better corn. Cellulose is the framework of plant cells and the world's most abundant biopolymer. Its uses are vast: cellulose is an important dietary fibre; it helps cotton clothes withstand wear and tear; it makes the very thin paper of coffee filters strong enough for heavy grounds.

But for all the industrial uses of cellulose, nobody knew how plants make it. Now, Richard Williamson and colleagues at Australian National University report in the journal *Science* that a gene called RSW1 synthesizes the enzyme responsible for cellulose production. Williamson's work in the small plant *Arabidopsis*, a relative of mustard plants, opens the door to inproved fibre technology. Altering the cellulose ratio in trees, for example. could yield stronger timber or trees that are more easily processed into paper. Farmers could breed corn and wheat with more cellulose in the stalks so hail or wind don't knock them over.

PERFORMANCE OF EXOTIC TREE SPECIES IN TEMPERATE AREA OF HIMACHAL PRADESH

K.S. PANT, PANKAJ PANWAR and I.K.THAKUR

Department of Silviculture and Agroforestry, University of Horticulture and Forestry, Nauni, Solan - 173 230 (Himachal Pradesh).

An Arboretum-cum-Pinetum at Manali was established in 1935 by the Britishers. It was established with an objective to see the adaptability and growth performance of exotic tree species in a temperate region. This Arboretum now acts as gene bank of various exotic broad leaved and conifer species. However, no data has been recorded on their growth performance. Therefore, a study was made to record the growth performance of various tree species planted in the Arboretum. This data would help in identifying those exotic species which are adaptive to temperate region of Himachal Pradesh and hence can be recommended for extensive plantation in other areas having similar climatic conditions.

The Arboretum-cum-Pinetum is situated in Manali (Himachal Pradesh) at an elevation of 2200 m above mean sea level. In winters the temperature falls here to sub-freezing and in summers the mean temperature is 20°C. In 1935 the Arboretum had 10 broad leaved species, viz. *Fagus sylvatica Quercus pendunculata, Q. robur, Q. palaustris, Q. cerris, Castaenea sativa, Tilia europea, Plantinus orientalis, Corylus colurena* and *Populus alba;* and 16 conifer species viz *Cupressus glabra, C. arizonica, C. torulosa, C. obtusa, Cryptomeria japonica, Pinus sylvestris, P. petula, P. girardiana, P. laricio, P. taeda, P. ponderosa, Larix leptolepis, Pseudosuga taxifolia, Picea excelsa, Thuja plicata* and *Taxodium distichum.* More than 35 plants of each species were planted in randomised block design. Observations on height, diameter and number of branches were taken for 10 trees of each species, during 2001.

Table 1. Growth performance of broad leaved species.

Name	Mean Height (m)	Mean Diameter (mm)	No. of branches
Fagus sylvatica	21.50	45.77	44.33
Quercus pendunculata	22.67	56.83	38.00
Q. robur	24.00	78.80	17.00
Q. palaustris	24.17	58.53	63.33
Q. cerris	24.33	57.70	36.67
Castaenea sativa	18.33	72.37	61.67
Tilia europea	21.67	94.57	110.00
Platinus orientalis	16.83	41.10	25.67
Corylus colurena	9.50	25.60	9.00
Populus alba	20.00	29.70	11.00
CD 0.05	3.13	16.15	26.50

Table 2. Growth performance of conifer species.

Name	Mean Height (m)	Mean Diameter (mm)	No. of branches
Cupressus glabra	12.33	22.00	27.00
C. arizonica	20.83	41.07	55.33
C. torulosa	23.50	36.10	51.67
C. obtusa	13.50	27.83	42.00
Cryptomeria japonica	16.67	32.60	29.67
Pinus sylvestris	19.50	33.20	31.00
P. petula	20.00	47.30	43.00
P. taeda	20.67	47.27	28.33
P. ponderosa	20.00	28.50	35.67
P. laricio	23.50	43.23	47.33
P. girardiana	19.00	30.20	34.00
Larix leptolepis	18.33	33.70	44.33
Psuedosuga taxifolia	22.83	46.53	72.67
Picea excelsa	15.67	31.07	85.33
Taxodium distichum	7.50	19.97	20.33
Thuja plicata	17.83	36.17	59.00
CD 0.05	3.97	10.98	35.46

Among broadleaved species (Table 1) maximum height of 24.33 m was obtained by *Quercus cerris* followed by *Q. palaustris* (24.17 m), *Q. robur* (24.00 m) and *Q. pendunculata* (22.67 m) showing non-significant differences among themseleves. The maximum average diameter was observed for *Tilia europea* (94.57 mm), which showed significant difference with rest of the plants and was followed by *Quercus robur* (78.80 mm) and *Castanea sativa* (72.37 mm). The highest mean number of branches were observed in *Tilia europea* (110.0) which showed statistical difference with rest of the plants, which was followed by *Quercus palaustris* (63.33) and *Castaenea sativa* (61.67) showing non-significant differences.

The growth performance of conifers are presented in Table 2. It was observed that maximum height of 23.50 m was obtained by *Cupressus torulosa* and *Pinus laricio* which were at par with *Pseudosuga taxifolia* (22.83m), *Cupressus arizonica* (20.83m), *Pinus taeda* (20.67 m) and *P. petula* (20.00 m), but showed difference from rest of the species. *P. petula* showed maximum mean breast height diameter of

47.30 mm which was followed by and at par with *P. taeda* (47.27mm), *Psudosuga taxifolia* (46.53 mm), *Pinus laricio* (43.23 mm) and *Cupressus arizonica* (41.17 mm); rest of the species showed significantly lesser diameter growth. Number of branches in conifers were maximum (85.33) in *Picea excelsa* which was at par with *Psuedosuga taxifolia* (72.67) but showed statistical significant difference with rest of the species, viz, *Thuja plicata* (59.00), *Cupressus arizonica* (55.33) and *Cupressus torulosa* (51.67).

The growth performance of broadleaved and conifer trees observed after 66 years of plantation reveal that among broadleaved species *Quercus cerris, Q. palaustris, Tilia europea, Q. robur* and *Castaenea sativa* and among conifers *Pinus laricio, Pseudosuga taxifolia, Pinus petula, P. taeda* and *Cupressus arizonica,* have excelled compared to other species and hence these can be recommended for plantation in temperate areas of India to increase the forest cover and biomass production.

Acknowledgements: Authors are thankful to all those persons who were connected with the establishment, management and maintenance of the Arboretum-cum-Pinetum at Manali, in pre-and post-independence years.

Ivory Trade

The Indian Government sometime back submitted a proposal to member countries of the Convention on International Trade in Endangered Species, asking for a complete ban on international ivory trade.

When the ban was in place for 10 years, restricted trade was allowed in 1997 at the 10th Conference of Parties held in Harare, Zimbabwe. Trade of a restricted quantity was approved between Botswana, Namibia and Zimbabwe and one-buyer nation, Japan. However, India along with Kenya, decided to oppose this trade, as it affected populations of both the African and Asian elephants in their own countries.

Legal trade invariably acts as a cover for illegal trade and there are no mechanisms to distinguish between the two. Once the finished products found their way to the market, there were no saying if they were made from "legal" or "illegal" ivory. The number of African elephants, placed between 3 to 6 lac is far higher than the remaining number of Asian elephants at 35-50,000. The problem is also worse for Asian elephants as only the males have tusks. Poaching of male tuskers had skewed the male-female ratio. From a healthy ratio of one male to every three female elephants, it is now down to an average ratio of 1:50.

Obituary

Dr. Mrs. Sudha Mathur

With a heavy heart, I mourn sudden demise of my sister, Prof. Dr. Mrs. Sudha Mathur, former Head of the Deptt. of Zoology, Chaudhary Charan Singh Haryana Agricultural University, Hisar.

Sudha Vatsa was borned in 1936 at Quetta (Baluchistan, Pakistan) and moved to India with her parents during the partition. After attempting to do so at Bhopal and Mathura, the family finally settled in Shyam Nagar locality of Aligarh. Sudha had then two elder sisters, two younger sisters and a youngest brother; now only three sisters survive. She was educated at the D.S. Inter. College, Abdulla Women's College and the Aligarh Muslim University, from where she obtained B.Sc. and M.Sc. (Zoology) degrees. Later she conducted her doctoral research in A.M.U. under Prof. Shah Mashhood Alam, on the topic of the morphology of *Parageniaspis indicus* Alam (Hymenoptera : Encyrtidae), an internal parasite of the Indian lac insect, on a fellowship from the Indian Lac Research Institute, Ranchi, around 1970.

For some time after that, she was teaching Zoology in the Tikaram Girls Degree College, Aligarh, and there she married Dr. Radhey Bihari Mathur, her 4-year senior research colleague. The couple moved to Hisar, first Dr. R.B. Mathur as Lecturer in Zoology in the then Haryana Agric. University, later to become Reader and then Professor in the same departement, followed by Sudha step by step in the same department. She retired as Prof. and Head in Zoology a few years back. Due to their habit of moving together, Mathurs were known as unseparable couple in the town.

Teaching was her first priority, even after retirement. But in the University her field of research was the dust mites (Acari). She guided students, published some research papers and was the Fellow of the Entomological Society of India.

In Hisar, Mathurs constructed a beautiful movie set-like house in Sector 15-A. She married out both of her children, Nivedita and Nishant, in the Ist week of December 2001. Within a month her ailments combined and defeated her. She left on 8th Jan. 2002, for her heavenly abode.

Sudha Mathur was my rakhi tying sister for 47 years. She was getting *Bionotes* regularly. By her sudden departure, all those who knew her are shocked and shattered. May her soul rest in peace.

– *R.K. Varshney*

CYTOPALYNOLOGICAL CHARACTERISTICS OF FERN-ALLIES OF SATPURA HILLS, CENTRAL INDIA

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Satpura Hills comprising of Pachmarhi, Tamia and Patal Kot, located in the Madhya Pradesh, Central India, are unique in having a variety of rare members of fern-allies (Vasudeva & Bir, 1994). The cytopalynological investigations carried out on some of these members have brought to light many interesting facts, which are presented here. Earlier an account of chromosome numbers and evolutionary status of ferns and fern-allies of Pachmarhi Hills was provided by Vasudeva & Bir (1983) and some cytological peculiarities by Vasudeva (2000).

1. *Psilotum nudum* (L.) Beauv. Populations from Pachmarhi and Tamia have shown 104 bivalents at metaphase-I, indicating the species to be tetraploid, on a basic number x = 52. Often 1-2 fragments were observed in different populations. Multivalents were found to be absent in the studied populations. Its chromosomes are largest in size. It is interesting to note that this species is considered to be one of the most primitive of Pteridophytes, yet it has monolete (bilateral) type of spores, which is a common feature of advanced pteriodophytic members.

2. Both the species of *Equisetum,* namely, *E. debile* Roxb. and *E. ramosissimum* Desf. var. *altisimum,* show the same haploid number (n=108) (Vasudeva, 2000). This is a case of paleoploidy and the genus is considered to be based on x=9. They exhibit the highest grade (24x) of polyploidy. The peculiar palynological features of this genus are that its spores are alete. Presence of elaters is a unique characteristic of this genus that is found nowhere else in Pteridophytes.

3. Materials of *Palhinhaea cernua* (L.) Franco & Vasc. studied from Pachmarhi have revealed the presence of 104 bivalents at metaphase-I (4 x aneuploid). The chromosome size is very small. High haploid chromosome numbers in different cytotypes indicate their high polyploid nature. Polyploidy and hybridization seem to have played a signigicant role in the evolution and diversification of this species. Its spores are trilete (tetrahedral) and smallest in size (27-30 x 19-30 µm).

4. In the case of *Selagilnella radicata* (Hook. & Grev.) Spring the materials investigated from Pachmarhi, Tamia and Patal Kot have revealed the presence of 36 bivalents at metaphase-I in several spore mother cells. Based on x= 9 the present species shows the highest grade of polyploidy (Octoploid) ever recorded in the genus (Vasudeva, 2000). Heterosporous, microspores and megaspores are trilete (tetrahedral) in structure. On the other hand in *Selaginella exigua* Spring, the materials studied from Pachmarhi and Tamia indicate the presence of 10 bivalents in several SMCs at metaphase-I. It is a diploid sexual species based on x=10 and has been worked out for the first time. It shows the lowest chromosome number (n=10). Heterosporous. microspores small and megaspores large, trilete (tetrahedral) structures. It is interesting to note that the above two species of *Selaginella* are based on x= 9 and x=10 respectively.

5. Several populations of *Isoetes panchananii* Pant & Srivastava worked out from these hills showed the presence of 55 bivalents and a fragment during metaphase-I (Vasudeva, 2000). Both SMCs and chromosomes are smallest sized. These are decaploid (10x) based on x=11 and show the highest grade of polyploidy ever recorded in the genus. Heterosporous, megaspores largest sized (190-304 x 186-285µm), trilete (tetrahedral), perisporiate; microspores small, monolete (bilateral), non-perinate and very rare in occurrence. The presence of spores with two types of symmetry (bilateral and tetrahedral) in the same genus is a unique feature.

References

Vasudeva, S.M. 2000.Cytological peculiarities of Pteridophytic flora of Satpura Hills. *Bionotes,* 2 (4): 77-78.

Vasudeva, S.M. & Bir, S.S. 1983. *Chromosome numbers and Evolutionary status of Ferns and Fern allies of Pachmarhi Hills (Central India).* International Bioscience Monographs, Vol. 14. Today & Tomorrow's Printers and Publishers, New Delhi.

Vasudeva, S.M. & Bir, S.S. 1994. *Pteridophytic Flora of Pachmarhi, Tamia and Patal Kot in Central India.* Indian Fern Society, Western Printers, Patiala.

Know Sex in 16 days

Doctors of Tel Aviv Medical Centre (Israel) have found that the serum HCG is 18.5% more in mothers going to give birth to a daughter. It can be detected in just 16 days after conception. The result was drawn after trial of about 350 would be mothers.

COMMENSAL OBSERVATIONS BETWEEN SPIDERS AND ANTS IN SUNDARBAN, WEST BENGAL

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Some observations on two aspects of commensalism, viz., interspecific relation between different spider species and intraspecific relation between different spiders and ant species, were made recently by the author in the Sundarban area. These are briefly reported as follows:

(i) In January, 1999, it was seen on the leaves of a mango tree (*Mangifera indica*) near a pond in the Canning Hospital ground, that a small spider, *Argyrodes dipali* Tikader, was living within the web built by another spider *Argiope pulchela* Thorell, and feeding on the entrapped small insects, which were neglected by the owner of the web. Similar observation was made by Tikader (1987).

(ii) Further it was seen in February, 1999, on the leaves of a coconut tree (*Cocos nucifera*) near a pond in Gosaba, that a small clubionid spider, *Simalio biswasi* Majumder & Tikader, was living within the web of another araneid spider *Araneus himalayensis* Tikader. In this case also, *Simalio* was feeding on the small insects trapped in the web of *Araneus*. Similar observation in clubionids was reported by Majumder & Tikader (1999).

(iii) On 20th February, 1999, an intraspecific relation was seen between colonial spider, *Stegodyphus sarasinorum* Karsch, and three species of ants, viz. *Pachycondyla luteipes* (Mayr), *Diacamma regosum* (Guillou) and *Diacamma sculptum* (Jerdon) (Hymenoptera: Formicidae), on the babul tree leaves (*Acacia arabica*) near the sea shore of Gangasagar Island. These ants were feeding on the unconsumed insect bodies which have been neglected by the colonial spiders in their webs. Here the ants were acting like a sweeper of the webs and showing symbiotic relationship.

(iv) Similar observations between two species of spiders, *Catianeria zetes* Simon and *Myrmarachne bengalensis* Tikader, with two species of ants *Pachycondyla astuta* Smith and *Diacamma scalpratum* (Smith), were seen in the soil litter of mango leaves (*Mangifera indica*), near Canning Town, in March, 1999.

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References

Majumder, S.C & Tikader, B.K.1999. Studies on some spiders of the family Clubionidae from India. *Rec. Zool. surv. India, Occ. Pap.*, 102: 1-175.

Tikader, B.K. 1987. *Handbook of Indian Spiders*, Zoological Survey of India, Calcutta: 251 pp.

Legendary Monsters

Legendary mythical monsters exist in many cultures. Their origins often lie in fossils.

■ **Dragon:** Giant reptile-like creatures, often with wings and claws, and breathing fire. Origin likely to be the discovery of dinosaur fossils 2,000 years ago in China, imaginatively reconstructed.

■ **Unicorn:** A horse with a single horn in the centre of its forehead, Fossils of the giant extinct rhinoceros *Elasmotherium*, with its single 4-ft horn, are found in Persia (present Iran), where images of the unicorn are also found.

■ **Cyclops:** The one-eyed monster with a human body may have originated from the skulls of ancient dwarf elephants that once lived on the Mediterranean Islands. Their skulls have a single central "eye-socket".

■ **Mermaids:** Sea mammals such as the dugong, manatee, or seal are the most plausible source, Their cries can be unnervingly human, and dugongs suckle their young with their upper body out of the water.

■ **Roc:** Mythical bird of huge size from ancient Persia (Iran), it may have been inspired by the fossil eggs. a foot in length, of an extinct bird, *Aepyornis* (elephant bird).

■ **Yeti:** Also known as the Yeren in China, the Nguoi Rung in Vietnam, and Bigfoot in America, the Yeti is one of the most persistent of mythical monsters. Its inspiration may lie in the extinct great ape, creating a "folk memory" that still survives. Popular in Nepal.

■ **Kraken:** Sea monsters that drag down ships with their many arms were clearly inspired by the octopus or the giant squid.

■ **Sea serpent:** The rare ribbon-fish, with its glittering silver skin, could be the source of rumours of sea serpents.The Japanese believe its appearance presages an earthquake.

EFFECT OF INDUSTRIAL POLLUTION ON THE RATE OF POLLEN TUBE GROWTH OF *MORINGA PTERYGOSPERMA* AT SEWRI, GREATER MUMBAI

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Sewri, a highly industrialized area is situated in the 'F' south ward of Municipal corporation of Greater Mumbai. Major air pollutants of this area are petroleum vapors, since all the four petroleum installations *viz.* Bharat Petroleum Corporation Ltd. Indian Oil Corporation Ltd., Hindustan Petroleum Corporation Ltd., and Indo Burma Petroleum Ltd. are located here. In addition to these installations, notable industries such as Colgate Palmolive and factories producing Vegetable Oils are also located here.

The experiments were conducted as already reported by Salgare & Palathingal (2001) in this journal earlier.

Potentiality of pollen germinability in *Moringa pterygosperma* was noted in open flowers (F) and in buds which required 24 hrs.(F-24) to open. Pollen of both series collected from unpolluted area of Colaba and polluted site of Sewri showed their first sign of germination after one hour of sowing. Industrial pollution at Sewri inhibited the rate of pollen tube grwoth of successive flowers of *Moringa pterygosperma* throughout the experiment. It also inhibited the pollen tube growth of either series (Table 1). Present investigation as well as earlier work of Palathingal (1990) and Salgare & Palathingal (1996, 97, 99 and 2001) made it clear that Sewri is highly polluted, which is confirmed by the pollen physiology of successive flowers of several angiospermic plants.

References

Palathingal, Trisa 1990. Evaluation of industrial pollution of Bombay by pollen-I. M. Phil. Thesis, University of Bombay.

Salgare, S.A. & Palathingal, T. 1996. Effect of ambient air at Sewri on pollen size of some angiospermic plants. *Nature and Biophere,* 1 : 62-64.

Salgare, S.A. & Palathingal, T. 1997. Effect of ambient air at Sewri on pollen production of some angiospermic plants. *J. Ecotoxicol. Environ. Monit.,* 7 : 155 - 156.

Salgare, S.A. & Palathingal T. 1999. Effect of ambient air at Sewri on pollen viability of some angiospermic plants. *Bionotes*, 1 : 10-12.

Salgare, S.A. & Palathingal , T. 2001. Effect of industrial pollution on the rate of pollen germination of *Nerium odorum. Bionotes*, 3 (4) : 85.

Table 1. Effect of industrial pollution on the rate of pollen tube growth of *Moringa pterygosperma.*

	Pollen tube growth in µm			
	F		F-24	
H	C	P	C	P
1	166.30±21.17	163.10±35.55ns	156.90±13.14	150.10±03.60ns
2	173.10±05.88	165.10±39.50ns	160.10±04.80	152.20±35.10ns
3	198.00±46.57	168.10±04.58ns	167.10±06.35	154.10±04.42ns
4	258.20±33.84	191.20±22.56ns	183.50±03.47	160.00±00.31**
5	310.10±02.37	207.10±19.59ns	210.60±06.95	163.90±34.60ns
6	343.20±05.21	215.10±05.43**	214.70±35.23	166.80±28.75ns
7	383.90±35.70	272.50±22.49ns	253.10±30.81	180.00±26.07ns
8	462.10±04.42	280.10±34.79ns	390.00±03.88	192.10±35.48ns
9	480.50±30.02	286.10±33.97ns	410.00±00.47	201.50±04.45**
10	510.20±30.02	390.90±05.37ns	412.10±08.59	215.60±22.56*

C= Pollen tube growth of pollen collected from control site; H= time in hours; ns= non-significant; P = pollen tube growth of pollen collected from polluted site; Values are signigicant at *P<0.1%, **P<0.01%. Mean ±SD of 50.

OCCURRENCE OF A VIRUS DISEASE OF PEA FROM ALIGARH, UTTAR PRADESH

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Pea (*Pisum sativum* L.) belongs to family Leguminosae, sub-family Papilionaceae. The major viral diseases of pea are pea early browning, peaenation mosaic, pea false-leaf roll, pea leaf roll, pea mottle, pea necrosis, pea streak, pea mosaic and pea seed borne mosaic. During the survey of virus diseases in and around Aligarh, a disease of pea characterized by severe yellow mosaic, mottling, reduction in size of leaves and number of flowers and pot was found. In the present study, an attempt has been made to identify the virus causing this disease.

Survey was conducted in the fields in and around Aligarh Distt. and infected leaf samples, showing symptoms of severe mosaic, mottling from pea plants, were collected. From these collected leaves the young healthy plants of pea were inoculated with the diseased sap of pea by preparing standard extract prepared with 0.1 PO_4 buffer (pH 7.0). Bio-physical properities of the PeMV were studied by following method of Noordam (1973).

For the host range studies, about 60 species of plants belonging to 14 families (Amaranthaceae, Apiaceae, Chenopodiaceae, Cucurbitaceae, Papilionaceae, Solanaceae, Astraceae, Brassicaceae, Caricaceae, Caryophyllaceae, Liliaceae, Malvaceae, Polemoniaceae and Verbenaceae) were tested by mechanical sap inoculation under an insect proof glass house.

Table 1. Effect of additives on the infectivity of Pea mosaic virus.

Additives	No. of local lesions/leaf	Relative infectivity (%)
Control	42	100.00
Thioglycollic acid (0.1%)	30	71.43
Ethylene-diamine tetra-acetic acid (EDTA 0.1%)	28	66.66
Sodium sulphite (0.1%)	20	47.62
Thioglycollic acid (0.1%)+ EDTA (0.1M)	48	110.43
EDTA (0.1M)+ sodium sulphite (0.1%)	33	78.57
Thioglycollic acid (0.1%)+ sodium sulphite (0.1%)	21	50.00

Table 2. Effect of some organic solvents on the infectivity of Pea mosaic virus.

Organic solvent	% of organic solvent	Average no. of local lesions/leaf
Control	-	46
Chloroform	20	38
Ethyl alcohol	20	32
Butanol	20	50
Carbon tetrachoride	20	36
Chloroform+ Butanol (1:1)	20	40
Butanol + Ethyl alcohol (1:1)	20	38
CCl_4 + $CHCL_3$ (1:1)	20	32
Butanol + $CHCL_3$ (1:1)	20	33
Ethyl alcohol+$CHCL_3$ (1:1)	20	30

To find out the stability and infectivity of the virus, several additives (sodium sulphite, DIECA, EDTA, sodium thioglycollate, mercapto-ethanol) were used. Organic solvents (butanol, ethyl alcohol, chloroform, carbon tetrachloride and di-ethyl ether) either separately or in combination, such as chloroform-butanol, were used for the removal of the extraneous plant material from the infected tissue. The virus was transmitted readily by mechanical sap inoculation to the indicator plants of *Nicotiana* cultivars.

The virus produced light and dark green areas on new emerging leaves. At advance stage of infection, plants showed shortening of leaves and chlorosis. The virus had a thermal inactivation point (TIP) between 60^0-65^0 C, dilution end point (DEP) 10^{-4}- 10^{-5} and longivity in vitro (LIV) at room temperature (25 ± 5^0C) for 64hr and at 4^0C for 112hr.

Table 1 shows that the combination of thioglycollic acid (0.1%) and ethylene-diamine tetra-acetic acid (EDTA 0.1M) was better to maintain the infectivity of the virus at the time of extraction. In the Table 2 butanol (20%) added to the extract showed increased infectivity. In both tables the average number of local lesions per leaf are based on three experiments with 3 plants of *C. amaranticolor* having 6 leaves each.

The virus was found to have a moderate host range, out of 60 species of plants. Amaranthaceae (*A caudatus* L. cv. Red Leaved), Apiaceae (*D. carota* L. cv. Pusa Kesar), Chenopodiaceae (*C. amaranticolor* Coste & Reyn.), Cucurbitaceae (*L. cylindrica* L. Roem.), Papilionaceae (*P. sativum* L.), Solanaceae (*N. tabacum* L. cv. Bhopali Pakra, *N. tabacum* cv. Anand-2 Biditype, *N. tabacum* cv. CTRI

special, Harrison's Special, Jayarri, *N. plumbaginifolia* Viv. and *N. rustica* Schrank.) showed systemic light and dark green areas on the leaves.

The literature on the Pea mosaic virus revealed only a strain of cucumber virus group, causing mosaic and mottling symptoms on pea (Doolittle & Jones, 1925). However the disease has much resemlance with the virus causing mosaic disease on *Pisum saticam* L. (Chamberlin, 1936).

For want of electron microscopy and serological studies, the present isolate can not be placed in any particular group, or to say that it may either be a strain of already described virus or a new virus.

References

Chamberlin, E.E. 1936. Pea mosaic, host range and method of transmission. *N.Z. J.Sci. Tech.*, 18 (6) : 544-556.

Doolittle, S.P. & Jones, F.R. 1925. The mosaic disease in the garden pea and other legumes. *Phytopath.*, 15 (12) : 763-771.

Noordam, D. 1973. *Identification of Plant Viruses-Methods and Experiments.* Oxford and IBP Publishing Co., New Delhi: 207 pp.

CLONES DIE YOUNG

After following the lives and deaths of a dozen cloned mice for more than two years, researchers in Japan have come to a bleak conclusion: a clone's life is wheezy, liverish and short.

The scientists' work casts a shadow over the realm of cloning, already haunted by high failure rates, grossly overweight foetuses, and the discovery that the first animal to be created from an adult cell, Dolly the sheep, has premature arthritis.

In a report to the online edition of the journal *Nature Genetics,* published in Feb. 2002, the team–centred on Tokyo's National Institute of Infectious Diseases – said pneumonia and liver failure had brought the lives of the cloned mice to an early close.

The mice, all males, began to die less than a year after birth; 10 had died before 800 days were up. Two were still alive when the paper was submitted. However, of seven male mice conceived naturally and born at the same time, only one had died by the 800-day mark. Two out of six other mice born through a form of IVF perished,

"Much controversy has been generated over the ethics of human cloning", the scientists said. "The possible negative long term effects of cloning, as well as the high incidence of spontaneous abortion and abnormal birth of cloned animals, give cause for concern about attempts to clone humans for reproductive purposes."

Earlier it was reported in Janaury 2002 that 'Dolly' is suffering from arthritis. Hence the new science of cloning lurched in two opposite directions. There was news of two rival biotechnology companies having managed to clone pigs without including the specific gene that had always made transplating pig organs into humans impossible. This was indeed a breakthrough in xenotransplantation – substituting damaged human organs with those from animals. Pig cells happen to be very similar to human ones. The major hurdle before reserchers was how to knock off the 'hostile' gene that came in the way of successful xenotransplantations. This success is not an esoteric scientific exercise having only lab-coat value. It will hopefully pave the way for people needing transplants not having to wait indefinitely for human organs–the demand for which far exceeds the supply.

Later, the world of genetics stopped patting itself on the back when Dr Ian Wilmut, the 'father' of the first successfully cloned mammal, Dolly, confirmed that the sheep is suffering from arthritis, possibly because of its unorthodox birth. He also added that the cloning methods used were "inefficient". A sheep having arthritis – a collective term for a range of conditions involving inflammation of joints–is not earth-shattering news. But Dolly, who is five-and-a-half years old, is the equivalent of a human in her mid-20s, not the age to develop arthritis. When in 1999, genetic research suggested that cloning could lead to premature ageing, such fears were muted. Dolly's chromosomes–strings of DNA which carry her genes –were indeed of an older animal than her age would suggest. Although researchers are yet to find a conclusive link between her affliction and her cloned origin, even enthusiasts of cloning have started knitting their brows in concern.

If the two items of news–one good and the other bad-tell a story, it is this : Science, especiallly of the cutting-edge variety can resemble a fumbling walk through a dark mansion. It involves finding new rooms as well as bumping into furniture.

(Compiled).

CORRELATION STUDIES BETWEEN TERMITE INFESTATION AND TEMPERATURE AND RAINFALL

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Mango is the most important fruit corp of India, which constitutes 65% (9.22 million t) of the world production (15.7 million t). However, its productivity is very low, 7.0 t/ha in U.P. Termites are important soil pest on mango crop. They are polyphagous and have the widest range of host plants. Their food consists principally of wood cellulose and so they freely attack all woody matter, both dead and alive. Veerana & Basalingappa (1989) found *Odontotermes obesus* Rambur and *O. wallonensis* Wasmann to cause severe damage in mango orchards. In the present investigation, an attempt has been made to study the correlation between termite infestations and temperature and rainfall.

Termite infestations in mango trees in 6 localities, namely in the orchards of Tarai at Horticultural Research Centre, Patharchatta (Pantnagar, Udham Singh Nagar) and Kiccha (Udham Singh Nagar), in dry areas at Upeda (Ghaziabad), Indian Agricultural Research Institute (New Delhi), Rohenda and Khurja (Bulandshahar), were studied. Only those trees having soil galleries of termites were considered. % infestation was correlated with temp. and rainfall at above mentioned places.

The interactions between maximum, minimum and average temp. and total rainfall with % termite infestation were worked out. Results are shown in Table 1. It indicates decrease in infestation with increase in max. temp. at Upeda, Khurja, and I.A.R.I., while infestations at Rohenda, Kiccha and Patharchatta were positively correlated with max. temp. However, correlation coefficient values with min. temp. showed a negative value at Upeda, Khurja, I.A.R.I., Kiccha and Patharchatta, but not in Rohenda. Mean temp. at Rohenda and Patharchatta were positively correleted with % infestation, whereas it was negatively correlated at Upeda, Khurja, I.A.R.I. and Kiccha. Rainfall was negatively correlated to % termite infestation at all the study places. Highest correlation coefficient value of rainfall was observed at Rohenda.

The results show that a negative relationship exists between the rainfall and % infestation of termites. Max., min. and average temp. were negatively correlated with % infestation in Khurja and I.A.R.I., while at Kiccha and Patharchatta, min. temp. has negative co-relation coefficient value and max. has positive value. It can therefore, be derived that temp. has no clear-cut relationship with termite damage. However, in Tarai areas it seems min. temp. has negative correlation and max. temp. has positive interaction with termite infestation. In dry areas it is just reverse, i.e. increase in max. temp. decreases the damage and increase in min. temp. increases it.

Reference

Veerana, G. & Basalingappa, S. 1989. Nesting pattern of the termites, *Odontotermes obesus* Rambur and *O. wallonensis* Wasmann (Isoptera : Termitidae). *Ins. Sci. and its Applic.*, 10 (2) : 169-180.

Table 1. Correlation coefficient (r value) between % infestation of termites and temperature and rainfall.

Place	% infestation	Mean temperature (°C)						Total rainfall (mm)	r value of total rainfall
		Max.	r value of Max.	Min.	r value of Min.	Average	r value of Average		
Upeda (Ghaziabad)	54.17	31.7	-0.097	18.8	-0.049	25.25	-0.071	714.2	-0.47
Rohenda (Bulandshahar)	85.31	29.49	0.034	19.74	0.026	24.62	0.030	1263.9	-0.336
Khurja (Bulandshahar)	86.2	29.49	-0.015	19.74	-0.025	24.62	-0.032	1263.9	-0.389
I.A.R.I. (New Delhi)	46.5	31.7	-0.109	18.8	-0.110	25.25	-0.110	714.2	-0.651
Kiccha (U.S. Nagar)	13.57	29.11	0.235	19.02	-0.166	24.08	-0.002	1661.2	-0.551
H.R.C. Patharchatta (U.S. Nagar)	2.0	29.11	0.349	19.02	-0.019	24.08	0.134	1661.2	-0.390

SEASONAL CHANGES IN PHYTO-PLANKTON PRODUCTIVITY IN A WATER BODY NEAR MATHURA

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The growth of plant and animal communities of a water body correspond to its productivity. The relationship between physico-chemical characteristics and planktonic fauna have been studied by many researchers (Patil et al.,1985; Yadav & Rana, 2001). The present investigation was carried out to investigate the seasonal changes in phytoplankton productivity in a water body of an Ecological Park at Mathura Refinery.

The investigation was conducted for two years (1999 and 2000), during which temperature was recorded by a mercury thermometer and transparency by Secchi's disc. Five litres of water was filtered and preserved with the help of 10% HCHO. Plankton count was done by Sedgwick Rafter plankton counting cell and expressed as organisms per litre.

In both the years, the summer season was more productive (Table 1) as compared to monsoon and winter seasons. The maximum phytoplankton population during summer season might be due to the high temperature in this season. Kaufman (1980) reported that the phytoplankton density is declined due to the transparency of water. It shows that phytoplanktons were negatively correlated with transparency. Proliferation of phytoplankton from winter to summer can be attributed to the increasing water temperature and photoperiod (Verma & Dattamunshi, 1987). Increased productivity in the summer season reported here is in accordance with findings of Yadav & Rana (2001).

References

Kaufman, H.L. 1980. Stream aufurichs accumulates process: Effects of ecosystem depopulation. *Hydrobiol.,* 70 (1-2) : 75-81.

Patil, S.G., Hcrshcy, D.K. & Singh, D.F. 1985.Limnological studies of a tropical fresh water fish tank of Jabalpur (M.P.). *Geobios,* 4(2) : 143-148.

Table 1. Phytoplankton productivity in different seasons, at Mathura. (in thousands)

	Monsoon	Winter	Summer
Year 1999	103	118	136
Year 2000	94	114	137.5

Verma, P.K. & Dattamunshi, J.S. 1987. Plankton community structure of Badua Reservoir, Bhagalpur (Bihar). *Trop. Ecol.,* 28 : 200-207.

Yadav, G. & Rana, K.S, 2001. Effect of temperature and transparency on seasonal changes of phytoplankton community in a pond at Fatehpur Sikri, Agra. *Bionotes,* 3(2) : 40.

Views

Nature and Nurture

The longstanding debate between whether living being are products of nature or nurture took one step in favour of neither. Everyone is familiar with the argument that genes make the man. Everyone also knows the opposing claim that we are what we eat, breathe and otherwise live amidst. Biologists today argue that the reality is a mix of both. An animal's genetic code manifests itself as a result of complex interaction with its surrounding environment. A recent experiment by the Genetic Institute at Cambridge, Massachusetts, has provided tangible evidence of this theory. Researchers were able to closely monitor the manner in which the genes in a group of roundworms were turned on and off by changes in their environment. The scientists involved claim this is the first time all the genes of a multicellular organism were monitored in this manner over a period of time. The black and white division between gene and environment has now been replaced by a greyish dialectic of the two influences.

The evidence in support of this theory has been building up gradually. For example, it was once argued human intellgence had to be of genetic origin because identical twins tend to have similar intelligence quotients. However, thanks to test tube baby technology, some identical twins were delivered from different wombs. These babies were found to have wildly different IQs. The inference was that while the genes did provide the basic parameters for a human brain, how well the brain was wired was dependent on the genes' interaction with the womb environment.

The roundworm experiment has shown that this process works at all levels in an animal. The ability to manipulate genes precisely will hinge largely on how well scientists can come to grips with this genetic dialectic.What environmental stimuli switch on and off genes? How can this process be controlled? It is said the new technological age will be one of biotechnology. The roundworm experiment helps firm up a theoretical foundation without which this new scientific revolution would be stillborn.

(Hindustan Times)

RECORD OF SOME MOTHS FROM CHERRAPUNJI, MEGHALAYA (LEPIDOPTERA: NOCTUIDAE AND PYRALIDAE)

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Under two different projects of the UGC (1981-1986) and CSIR (1984-1988), surveys were undertaken for the collection of moth fauna from certain Indian localities. It revealed 47 species have been collected from a lone khasi locality, i.e., Cherrapunji (1358 mASL) in the State of Meghalaya in North-Eastern Himalaya. The latter is an important biodiversity hot regions in the country.

Cherrapunji is situated about 51 kms south from Shillong and has the record of heaviest rainfall in a day and is, accordingly, one of the wettest places in the world. The Mawsmai Falls are about 6 kms away from Cherrapunji.

Family NOCTUIDAE, Subfamily ACRONICTINAE

1. *Acronicta bicolor* (Moore): 2 ♂♂ , Sept. 1986.
2. *Appana indica* (Moore): 1♂,1♀, Sept. 1985.
3. *Athetis reclusa* (Walker):3 ♂♂, Sept. 1985.
4. *Callopistria repleta* Walker: 2 ♂♂ , Sept. 1985
5. *Checupa fortissima* Moore: 1 ♂, Sept. 1985.
6. *Eutamsia indistans* (Guenee): 1 ♀,Sept. 1985.
7. *Sasunaga tenebrosa* (Moore): 1♂, Sept.1986.
8. *Spodoptera littoratis* (Boisduval): 1♀, Sept. 1985.
9. *Spodoptera mauritia* (Boisduval): 1♂, August 1985.
10. *Spodoptera pecten* Guenee: 1♂, Sept. 1985.

Subfamily CATOCALINAE

11. *Ercheia cyllaria* (Cramer): 1♀, Sept. 1985.
12. *Lagoptera juno* Dalman: 1♀, Sept. 1985.
13. *Ophiusa tirhaca* (Cramer): 1♂, May 1985.
14. *Parallelia maturata* (Walker): 1♂,1♀, Sept. 1985.
15. *Pericyma* sp. 1♂, May 1985.

Subfamily OPHIDERINAE

16. *Aedia discistriga* (Walker): 2♂ , Sept. 1985.
17. *Calesia dasyptera* (Kollar): 1♀. Sept. 1985.
18. *Oxyodes scrobiculata* (Fabricius): 3♂ , Sept. 1986.
19. *Sypna omicronigera* Guenee: 1♀, Sept. 1986.

Family PYRALIDAE, Subfamily PYRAUSTINAE

20. *Bocchoris inspersalis* (Zeller): 3♂ , April 1983, 2♂♂, 1♀, Sept. 1985, 1♂, 2♀♀, Sept. 1986.
21. *Botyodes patulalis* (Walker): 2♂ , Sept. 1985, 1♂, Sept. 1986.
22. *Diaphania bicolor* (Swainson): 1♂, 1♀, May 1983, 1♂, 1♀, May 1986, 1♀, Sept. 1986.
23. *Eurrhyparodes plumbeimarginalis* Hampson: 1♂, April 1983.
24. *Hemopsis angustalis* (Snellen): 5 ♂ , May 1983, 2♂ , 1♀, Sept. 1985, 1♂, 2♀♀, Sept. 1986.
25. *Filodes fulvidorsalis* (Geyer): 3♂ , 4♀♀, April 1983.
26. *Lygropia amyntusalis* (Walker): 3♂ , Sept. 1985.
27. *Maruca amboinalis* (Folder & Rogenhofer): 1♂, Sept. 1983.
28. *Maruca testulalis* (Geyer): 2♂ , Sept. 1985.
29. *Meroctena tullalis* (Walker): 2♂ , 1♀, Sept. 1985.
30. *Nagiella quadrimaculalis* (Kollar): 1♂, May 1983.
31. *Notarcha derogata* (Fabricius): 1♂, 1♀, Sept. 1986.
32. *Pagyda salvalis* Walker: 2♂ , 1♀, Sept. 1985.
33. *Palpita nigropunctalis* (Bremer): 3♂ , May 1983.
34. *Palpita warrenalis* (Swinhoe): 2♀♀, April 1983.
35. *Patania costalis* (Moore): 2♂ , May 1983.
36. *Patania verecunda* (Warren): 2♂ , April 1983, 2♂ , 1♀, Sept. 1986.
37. *Pionea ablactalis* Walker: 1♂, 2♀♀, Sept. 1985.
38. *Prorodes mimica* Swinhoe: 1♀, May 1983.
39. *Samea castoralis* (Walker): 1♂, 1♀, April 1983, 2♂ , 2♀♀, Sept. 1986.
40. *Satanastra meritalis* (Walker): 1♀, April 1983, 1♀, Sept. 1983.
41. *Synclera* sp.: 1♂, Sept. 1982.
42. *Syngamia falsidicalis* (Walker): 1♀, April 1983.
43. *Tangla itysalis* (Walker): 1♂, 1♀, Sept. 1985.
44. *Tangla zelimalis* (Walker): 1♂, May 1983.
45. *Thliptoceras pallida* (Moore): 2♂ , April 1983.
46. *Toxobotys aureans* Rose & Kirti: 2♀♀, 1♂, Sept. 1993.
47. *Uncobotyodes patulalis* (Walker): 1♂, April 1983.

Out of these, sl. no. 46 proved to be the first ever record of the genus from Oriental region and a new species to the science (Rose & Kirti, 1989).

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Reference

Rose, H. S. & Kirti, J.S. 1989. First record of genus *Toxobotys* Munroe & Mutuura (Pyraustinae: Pyralidae: Lepidoptera) from the Oriental region *J.Ins. Sci.*, 2 (1) : 10-13.

EFFICACY OF AUXINS (IAA & NAA) AND MICRONUTRIENT MIXTURES (MULTIPLEX & HUMAUR) ON YIELD, DRY WEIGHT AND ASH CONTENT OF TOMATO FRUITS

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Tomato, *Lycopercicon esculentum* Mill., is one of the most important vegetable crop. For its nutritive and medicinal properties, it is being cultivated in India commercially. The auxins alongwith micronutrient mixtures have profound effect on the productivity and quality of crop as well as provide resistance against physiologycal disorders.

A trial was conducted in fields of Department of Agricultural Chemistry, Allahabad Agricultural Institute, during two successive years (1997-98 and 1998-99) of *rabi* season. The experiment was laid out in two factor factorial randomized block design with 15 treatment combinations and replicated thrice. Auxins (IAA, NAA) were applied on plant @ 25 and 75 ppm respectively at 25 and 50 DAT. The two micronutrient mixtures, namely Multiplex (Karanatka Agro Chemicals, Bangalore) and Humaur (Hindustan Antibiotics Ltd, Pune), were applied @ 2500 ppm and 2000 ppm respectively. The tomato cultivar *Krishna*, F_1-hybrid (Bisco seeds Tech., Secunderabad) was used (Gupta et al., 2001).

The mature fruit size was measured in diameter, of randomly selected five fruits of each treatment. Dry weight and ash content were calculated by standard methods.

The results are shown in Table 1 and briefly discussed below:

Fruit size: It was significantly (P=5%) increased with 75 ppm NAA alongwith Multiplex (P_4 M_1) over control, during both years. Largest size 6.76cm (35. 20% increase) was recorded in treatment with P_4 M_1. Similar findings have been reported by others including Dellacecca & Mancini (1989).

Dry matter and ash content : Higher values of dry matter of plants and ash content were recorded with 75 ppm NAA with Humaur (P_4M_2). The ash content refers to mineral nutrients which are present in plant tissues. Our results are in conformity with the findings of other workers including Ranganathan & Perumal (1995).

Yield : The yield was significantly (P=5%) enhanced (36%) due to PGR and micronutrient mixture. The maximum of 61.66 tonnes/ha in first year and 63.61 tonnes/ha in second year was registred with 75 ppm NAA with multiplex (P_4M_1). as compared to control yield of 45 tonnes/ha. The higher yield was primarily due to more number of branches.

Shittu & Adeleke (1999) reported that 500 ppm GA_3 promoted fruit set and higher yield. Micronutrients increased the tomato yield was also reported by Maharana et al. (1990) and Bose & Tripathi (1996).

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References

Bose, U.S. & Tripathi, S.K. 1996. Effect fo Micronutrients on growth, yield and quality of tomato, *Crop Res., Hisar,* 12 (1) : 61-64.

Dellacecca, V. & Mancini, L. 1989. Studies on the effect of Plant growth regulators for increasing fruit set and fertilisation on the fruiting of table tomatoes. *Colture Protette*, 18 (3) : 69-77.

Gupta, P.K., Gupta, A.K. & Varshney, M.L. 2001. Effect of auxins (IAA & NAA) and micronutrient mixtures (Multiplex and Humaur) on biochemical parameters of tomato fruits. *Bionotes*, 3(2) : 38.

Maharana, T., Pati, P.N. & Sahu, G.S. 1990. Effect of growth regulators and micronutrients on growth and yield of potato-tomato graft. *Environ. & Ecol.*, 8(4) : 1327-1329.

Ranganathan, D.S. & Rani, Perumal 1995. Effect of micronutrients with / with out organic and biofertilizers on growth and development of tomato in Inceptisol and Alfisol. *S. Indian J.*, 43 (3-4) : 89-92.

Shittu, G.A. & Adeleke, J.A. 1999. Effect of gibberellic acid on growth and development of tomato *(Lycopersicon esculentum,* Mill.). *Global J. Pure & Appl. Sci.,* 5(1) : 27-30.

Table1. Efficacy of Auxins and Micronutrient Mixtures on Size, Weight, Ash Content and Yield of Mature Tomato Fruits.

Treatment	Symbol	Fruit Size(cm)		DryWeight (%)		Ash Content (%)		Yield (tonnes/ha)	
		97-98	98-99	97-98	98-99	97-98	98-99	97-98	98-99
Control	$P_0 M_0$	5.0	5.0	2.0	2.08	0.34	0.30	45.27	45.56
Multiplex	P_0M_1	5.13	5.10	2.2	2.22	0.38	0.36	49.45	50.00
Humaur	P_0M_2	5.48	5.47	2.22	2.26	0.40	0.38	50.83	51.12
25 ppm IAA	P_1M_0	5.70	5.60	2.20	2.29	0.45	0.45	47.49	48.34
25 ppm IAA+Multiplex	P_1M_1	5.58	5.62	2.26	2.30	0.49	0.48	50.83	50.83
25 ppm IAA+Humaur	P_1M_2	5.19	5.17	2.29	2.25	0.56	0.55	55.56	56.12
75 ppm IAA	P_2M_0	5.90	5.87	2.25	2.27	0.57	0.62	50.55	51.67
75 ppm IAA+Multiplex	P_2M_1	6.00	5.95	2.32	2.34	0.66	0.65	55.00	55.56
75 ppm IAA+Humaur	P_2M_2	5.75	5.70	2.36	2.40	0.70	0.68	60.55	62.49
25 ppm NAA	P_3M_0	5.76	5.75	2.38	2.43	0.56	0.58	55.00	56.12
25 ppm NAA+Multiplex	P_3M_1	6.21	6.20	2.46	2.51	0.74	0.72	58.34	60.00
25 ppm NAA+ Humaur	P_3M_2	6.10	6.07	2.50	2.56	0.80	0.75	59.44	61.12
75 ppm NAA	P_4M_0	6.32	6.29	2.43	2.47	0.85	0.85	56.66	57.78
75 ppm NAA+ Multiplex	P_4M_1	6.76	6.36	2.62	2.65	0.95	0.93	61.66	63.61
75 ppm NAA+ Humaur	P_4M_2	6.25	6.22	2.65	2.70	1.00	0.98	57.78	59.45
Micronutrient	SEm	0.023	0.020	0.018	0.012	0.008	0.007	0.192	0.130
Auxins	SEm	0.030	0.026	0.023	0.015	0.011	0.009	0.192	0.168
Intraction	SEm	0.053	0.046	NS	0.027	0.019	0.016	0.333	0.291
Micronutrient	C.D.(P<5%)	0.048	0.042	0.037	0.024	0.017	0.015	0.149	0.267
Auxins	C.D.(P<5%)	0.062	0.054	0.048	0.032	0.023	0.019	0.349	0.344
Intraction	C.D.(P<5%)	0.109	0.942	NS	0.055	0.040	0.034	0.683	0.597

SEm = Standard Error of Mean, C.D. = Critical difference, NS=Non significant. Unit: mg/100g. of fruits.

Oldest Microbe

A bacterium raised from a 250-million-year old spore has laid a strong claim to being the oldest known organism. There have been other such cases. A few years ago, 25-40 million-year-old spores were taken from an insect embedded in amber. But the 2-9-3 bacterium has pushed back the time limit by a factor of six. The remarkable resilience of the bacterium's DNA has interesting implications. The first has to do with ageing. Creatures reproduce in two ways. Some have sex and produce offspring with a mix of genetic material. Some divide into two and create exact copies of themselves. Evolutionary theory argues the first variety should experience ageing because once reproduction occurs, the parent body is redundant. This should not be the case for species that replicate by division.

A lot of asexual animals like amoebae and bacteria do not seem to age. A pre-Jurassic spore that is still alive and kicking is a fillip to this theory. But microscopic immortality should mean that complex animals like humans are genetically programmed to die. If so, the process should be open to reversal with biotechnology. Already scientists say centenarians seem to have common genetic traits. A Britain's director of genetic research said that humans could potentially live 1,200 years.

The ability of 2-9-3's DNA to withstand the rigours of time and the environment of a New Mexico salt pan makes arguments that life on earth was the result of organic molecules from space more plausible. Organisms have been found on meteorites and basic organic compounds have been detected in space. Critics have argued that organic molecules are unlikely to survive millions of years of floating in space, let alone a descent through an atmosphere. But the DNA of 2-3-9 is clearly hardy stuff. Not only is it old, but it also survived in an environment where it had no sources of energy and was surrounded by salt--a natural antiseptic. If genetic material is so hardy, time and space pose far less of a limitation to life than expected.

INCREASE IN BODY WEIGHT AND TESTES WEIGHT IN THE ALBINO RAT AFTER EXPOSURE TO SPIRONOLACTONE

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Spironolactone is an aldosterone antagonist, or potassium sparing diuretic drug, used in the treatment of hypertension and congestive heart failure. The metabolic alteration produced by spironolactone is mainly characterized by increase of organ weight and body weight and rate of metabolization (Afifi *et al.*, 1980). In the present communication the effect of exposure to spironolactone on body weight, organ weight (testes) and their ratio are studied in the albino rat, *Rattus norvegicus.*

Eighteen healthy male albino rats of almost equal weight and size were selected and acclimatized for 7 days in the laboratory. Spironolactone (Trade name Aldactone, by Searle Pharmacueticals Co. Limited, Mumbai) was dissolved in the corn oil and given to the rats @ 100 mg/kg body weight, orally through the cathedral tube. The experimental albino rats were divided into six groups of three rats each. Three groups were given spironolactone with corn oil, while other three groups were treated as control and given only corn oil, for 7,14 and 21 days.

Body weight of rats of each group (control as well as treated) were taken after required days, while testes weight was taken after sacrificing the rat and dissecting out the testes from the body. Subsequently their ratio was calculated. The collected data were analyzed statistically (Fisher & Yates, 1963).

An increase of the body weight of treated groups, enhaneed with days, is significant ($p<0.05$). Similarly, increase of the testes weight of treated groups enhanced with days, is highly significant ($p<0.01$). The organ weight/ body weight ratio also increased with increase in the number of days of spironolactone treatment.

Increase in the body weight of albino rat due to effects of spironolactone is supported by earlier reports of Afifi *et al.* (1980) and Mottino *et al.* (1983) that metabolic situation produced by the spironolactone is mainly characterized by increase in body weight in rats. Similar observations have been made by Jenkins *et al.* (1983) and Guibert *et al.* (1987). An increase in the liver weight was reported by Guibert *el al.* (1987) after spironolactone treatment. The organ weight / body weight ratio increase due to the side effect of spironolactone treatment is correlated.

Table. 1. Effect of spironolactone on the body of albino rat groups.

Parameter	Treatment	Control		Treated	
	days	Mean	± S.Em.	Mean	± S.Em.
Body	7	250	± 2.88	260	± 5.77*
Weight	14	225	± 2.90	232	± 4.61*
	21	205	± 2.88	210	± 4.04*
Testes	7	2.17	± 0.011	2.25	±0.014**
Weight	14	1.86	± 0.010	1.97	±0.011**
	21	1.57	± 0.005	1.65	±0.010**
Testes wt/	7	0.0085	± 0.0002	0.0087	±0.0002*
Bodywt.	14	0.0083	± 0.0001	0.0084	±0.0002*
Ratio	21	0.0076	± 0.0001	0.0078	±0.0002*

± S.Em. = Standard Error of mean; *Significant ($p<0.05$); ** Highly Significant ($p<0.01$).

References

Afifi , F., Peigmoux, M. & Auclair, C. 1980. Modification of bile secretion and liver microsomal enzymes by aldosterone and spironolactone. *Hepato. Gestroenterol.*, 27 : 9-16.

Fisher, R.A. & Yates, F. 1963. *Statistical Tables for Biochemical, Agricultural and Medical research*, 6th ed. Hing Yip Printing Co., Hong Kong : 146 pp.

Guibert, E.E., Rodriguez, J.V., Garcia, G. & Rodriguezgarary, E.A. 1987. Biochemical and morphometric analysis of the effect of spironolactone on the liver from immature and adult rats. *Arch. Int. Pharmaco. dyn . Their. Dec.*, 290 (2) : 302-309.

Jenkins, A.D., Lechene, C.P. & Howards, S.S. 1983. The effect of spironolactone on the elemental composition of the intraluminal fluids of the seminiferous tubules rate testi and epididymis of the rat. *J. Urol.*, 129 : 851-854.

Mottino, A.D., Guibert, E.E., Morisoll, L., Carnoval, C. & Rodriguezgaray, E.A. 1983. The formation of bilirubin monoglucuronide and diglucuronide in isolated rat hepatocytes effect of spironolactone. *Biochem. Pharmacol.*, 32 : 3157-3161.

For Young Readers

INSECTIA

R.K. VARSHNEY

A Biologists Confrerie, Raj Bhawan, Manik Chowk, Aligarh-202 001 (U.P.).

(Contd. from Vol. 3, No. 4, p. 97)

Order DERMAPTERA (earwigs)

Elongate insects of moderate size, 5mm to 4.5cm, and hard chitinized exterior. Generally blackish- brown. Mouth parts biting type; forewings modified into short leathery tegmina, hindwings membranous and semicircular; some forms however, without wings. Legs with 3-segmented tarsi; abdomen with unjointed cerci which are modified into a pair of heavily sclerotized conspicuous forceps, which are pronounced in males.

These are mostly nocturnal insects, some are attracted to light sources. They generally hide in the soil, live under stones or bark and in flowers. Majority are omnivorous, some feed on other insects.

A total of 320 species are known from India, Pakistan, Nepal, Bhutan, Bangladesh and Sri Lanka. *Forficula, Labidura* and *Labia* are common.

Order EMBIOPTERA (web-spinners)

Elongate, soft bodied, fragile, flattened, sombre coloured insects of about one cm size. Mouth parts biting type. Males are winged and females wingless; wings when present, of equal size. Swollen in the forelegs, tarsi 3- segmented. Abdomen with 2-segmented cerci, which are asymmetrical in males. These insects generally avoid day light, live beneath stones or under bark. Males are attracted to light. Most striking feature is their habit of constructing silken tunnels in which they live. When disturbed, they run forwards or backwards with speed; live gregariously in the tunnels.

A total of 33 species have been reported from India. *Embia* and *Oligotoma* are common.

Order ISOPTERA (termites, white ants)

These are small to medium size insects (0.2 to 2.5 cm), which have polymorphic castes and thus, called social insects. Mouth parts are biting type; wings when present, elongate, membranous and similar to each other; legs with 4- segmented tarsi, cerci very short, genitalia rudimentary. A termite community starts by a male and female on wings, which they soon shed after pairing. Winged forms are attracted to light. The pair becomes queen and king of the colony, which is added with sterile castes of soldiers and workers. Soldiers have large mandibles on a bigger and highly sclerotized head. Termites inhabit moist soil, under stones, bark of trees and dead logs. Some species made

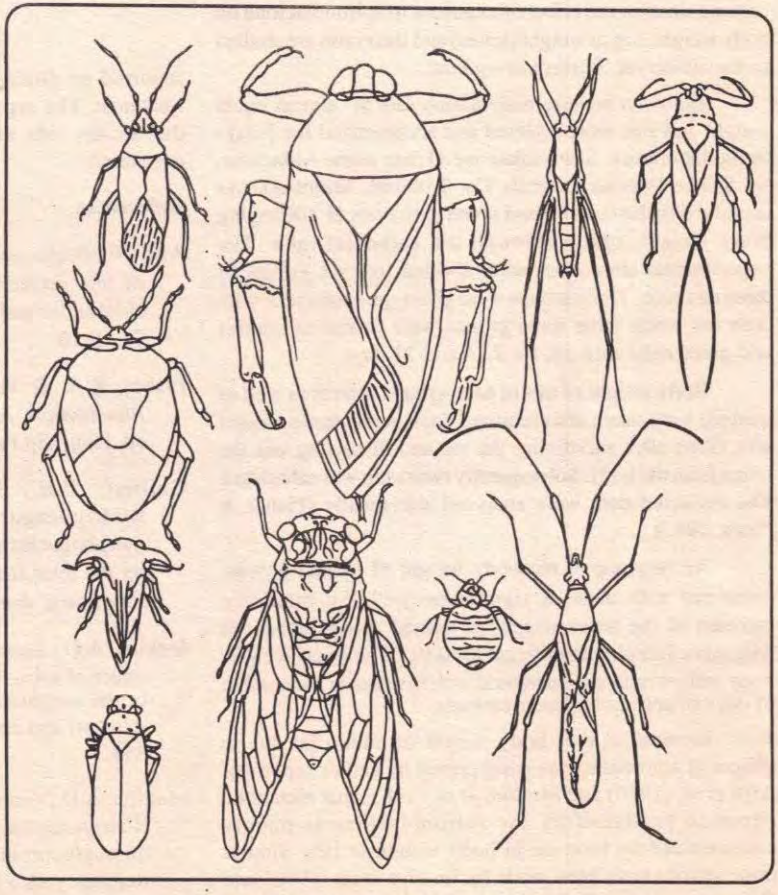

Fig. 6 - Different kind of some Hemiptera.

tunnels, while some other form large mounds. Colonies develop under ground as well as above ground. These insects alone are capable of devouring and digesting wood, hence damage wooden furniture and fittings.

A total of 253 species and subspecies have been recorded from India. Other countries have also listed their termite fauna. *Termes* is common.

Order ZORAPTERA

Minute insects, about 3mm long, winged or apterous, with 9-segmented antennae. Wings, when present, can be shed by basal fractures. Prothorax well developed; tarsi on legs 2-segmented; abdominal cerci very short, ovipositor absent. Commoner forms are apterous, slightly coloured and without eyes.

Among the first species of this group discovered, one was from Ceylon (Sri Lanka). This Order is still not represented in India. *Zorotypus* is comparatively common.

Order PSOCOPTERA (psocids, book lice)

Also called Copeognatha or Corrodentia. Small, soft bodied, white or brown, subglobular, winged or wingless insects of about 2.5mm length. Antennae long, filiform, of 12-50 segments. Prothorax small; wings when present are delicate and membranous, which these insects reluctantly use for flight. Tarsi 2-3 segmented; abdominal cerci absent. These insects are common among books and papers as they feed on the paste of book-binding. They also infest stuffing of mattresses. Outside buildings, they are met on tree trunks, under bark, in birds' nests etc. They feed on animal or vegetable matter, particularly on fungi.

90 species are known from the Indian region. *Psocus* in comparatively common.

Order PHTHIRAPTERA (chewing lice, sucking lice)

Also called Anoplura, Siphunculata and Mallophaga.

This Order includes small, wingless insects of about 5-6 mm length, flat body, which are ectoparasitic on birds and mammals. Eyes reduced, antennae 3-5 segmented, mouth parts modified either as biting type (chewing lice), or piercing type (sucking lice). Meso- and metathorax imperfectly separated or fused; legs with 1-2 segmented tarsi and terminated in single or paired claws; cerci absent.

These are active insects which feed on feathers, hair etc, of the host. Some species feed on blood. Migration from one host to another occurs through body contact.

Known records of species of chewing lice are as follows : Afghanistan - 26, Bangladesh-6, Bhutan-4, China-25, India-389, Myanmar (Burma)- 68, Nepal-83, Pakistan- 178 and Sri Lanka-43. Among sucking lice, *Pediculus* is common.

Order HEMIPTERA (bugs)

Moderate to large size sucking insects, of 2 to 9cm length. They thrive on plants, some even becoming pest. Some carry viruses of plant diseases, transferring them from plant to plant by their piercing and sucking type mouth parts. Two pairs of wings present, of which either forewings of partly harder consistency, the apical portion more membranous than remainder (Heteroptera), or forewings of uniform membranous consistancy (Homoptera).

Bugs are active insects; they fly, move, jump on their host plant; some are water bugs, which swim and live in freshwater ponds and streams, these are also attracted to light.

About 6500 species are known from India. The group is represented in all other countries. Some common pests include cotton stainers (*Dysdercus*), chinch bug (*Blissus*), tea blight (*Helopeltis*). Some well known groups are: cicadas (Cicadidae), frog hoppers or cuckoo-spit insects (Cercopidae), tree hoppers (Membracidae), leaf hoppers or jassids (Cicadellidae), lantern flies (Fulgoridae), jumping plant lice or apple sucker (Psyllidae), white flies (Aleurodidae), plant lice or greenfly (Aphididae), scale insects (Diaspididae), lac insects (Tachardiidae), mealy bugs (Pseudococcidae), pond scaters (Gerrididae), bed bugs (Cimicidae), squash bugs (Coreidae), shield bugs (Pentatomidae), giant water bug (Belostomatidae), water scorpions (Nepidae), back swimmers (Notonectidae), water boatmen (Corixidae) and assassin bugs (Reduviidae).

Select Bibliography (Hemiptera)

Distant, W.L. 1902-1918. *The Fauna of British India including Ceylon and Burma-Rhynchota.* Vol. I-VII. Taylor & Francis Ltd., London.

Ghosh, A.K. 1980-1993. *Fauna of India and adjacent countries–Aphidoidea.* Pts. 1-6. Zoological Survey of India, Calcutta.

Green, E.E. 1896-1922. *The Coccidae of Ceylon.* Pts. I-V. Dulau & Co., London : 472 pp.

Hsiao, T., Ren, S., Zheng, L., Jing H., Zou, H. & Liu, S. 1977. *A Handbook for the determination of the Chinese Hemiptera - Heteroptera.* Vol. I : 330 pp.

Jesudasan, R. W.A. & David, B.V. 1991. Taxonomic studies on Indian Aleyrodidae. *Oriental Ins.*, 25 : 231-434.

Mathur, R.N. 1975. *Psyllidae of the Indian Subcontinent.* I.C.A.R., New Delhi : 429 pp.

Medler, J.T. 1991. Flatidae of Sulawesi, with notes on some related Philippine and Indomalayan species. *Oriental Ins.*, 25 : 1-43.

Medler, J.T. 1996. Flatidae of Borneo, with descriptions of new genera and species. *Oriental Ins.*, 30 : 11-96.

Raychaudhuri, D.N. (Ed.) 1980. *Aphids of Northeast India and Bhutan*. Zoological Society, Calcutta : 521 pp.

Varshney, R.K. 1977. Taxonomic studies on Lac insects of India. *Oriental Ins. Suppl.*, 5 : 97 pp.

Varshney, R.K. 1985. A review of Indian coccids. *Oriental Ins.*, 19 : 1-101.

Order THYSANOPTERA (thrips, fringe-wings)

Minute or small, slender bodied insects of about 0.5 to 10 mm length. Their peculiarities are two pairs of narrow, fringed wings. Mouth parts asymmetrical, right mandible vestigial; a protrusible bladder at the end of tarsi. Antennae 10-segmented, mouth parts piercing type, prothorax well developed, tarsi 1-2 segmented, abdominal cerci absent. Majority of species are phytophagous, some mycophagous and a few predaceous. Several species produce and inhabit plant galls.

A total of 693 species of thrips are recorded from India. These insects are widespread in distribution. Many gall-forming species occur in Indo- Malaysia region. *Thrips* is common.

Division **Holometabola** (complete metamorphosis)

Order NEUROPTERA (lacewing flies, alder flies, ant lions)

Soft bodied, small to rather large insects (2 mm to 6 cm), of which wing expanse reaches up to 10 cm. Antennae usually elongate, mouth parts adapted for biting; two pairs of transparent, almost similar, membranous wings, which at rest are placed in a roof-like manner, venation primitive but with many crisscross veins. Abdomen without cerci. Larvae dissimilar in structure and carnivorous, with suctorial mouth parts.

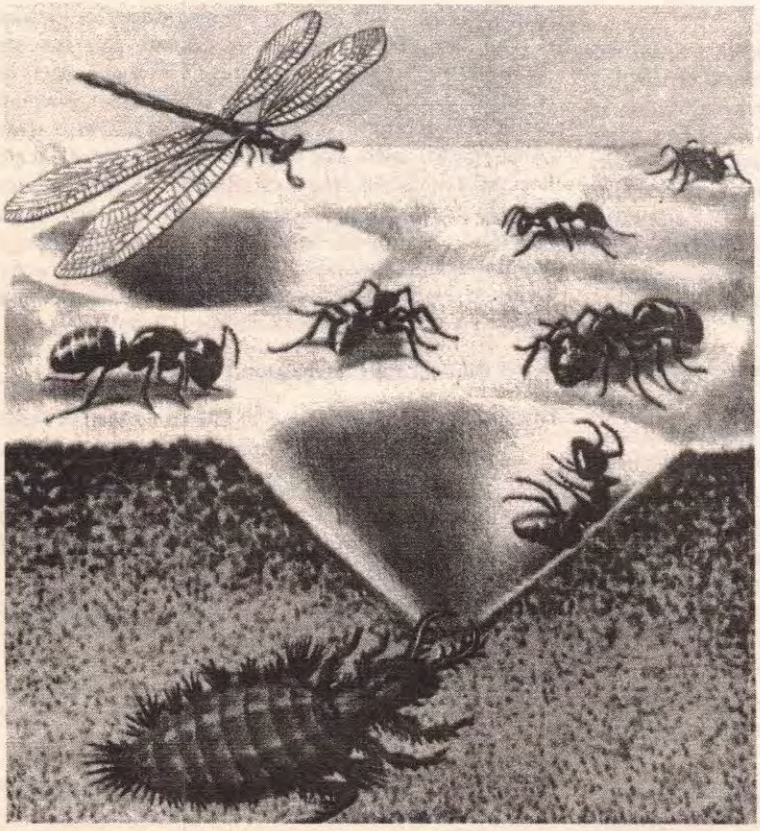

Fig. 7 - Ant lion : flying adult and a larva waiting for prey ants.

Adults are generally found on vegetation, but larvae occupy different habitats from dust, to arboreal, to aquatic. They form pit in the sand and wait for falling ants, hence the name 'ant lion'. Neuropterans are predators on other insects, mites and spiders, both in the larval and adult stages.

Neuropterans are divided into Megaloptera, which has alder flies (Sialoidea) and snake flies (Raphidiodea); and Planipennia, which has lace wings and ant lions, *Croce* has long filiform hindwings with which it hovers in corners of ceiling. Indian snakefly *Inocellia* is restricted to pine vegetation of higher Meghalaya.

India has 335 known species of Neuropterans. Several genera occur in all zoo-geographical regions. *Chrysopa, Mantispa, Hemerobius* are common.

(To be continued.)

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Odum, E. 1971. *Fundamentals of Ecology.* W.B. Saunders Co., New York.

Roonwal, M.L. 1982. Fauna of the Great Indian desert. *In : Desert Resources and Technology* (Ed. A. Singh). Scientific Publishers, Jodhpur : 1-86.

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