

## SCHOOL OF LIFE SCIENCE :

### Department of Zoology

From its very inception, the teaching and research programmes of the Department of Zoology were organised with a view to fulfil the aims and objectives envisaged in the Act of the University to develop the academic infrastructure of the hill states under the jurisdiction of the University. The Department of Zoology, thus seized with this problem, has been striving hard to identify the needs of the region and to work on these lines. Being a part of the Indian subdivision of the Oriental Region, these hill states are blessed with a wide variety of fauna both terrestrial and aquatic. With a fairly high rainfall, these areas are endowed with abundant hill streams of all dimensions inhabited by both macro and micro fauna.

The objectives of the Department are two-fold. Firstly, the Department trains Post-Graduate Students much needed in this region to take up teaching in schools and colleges, to work administrative and research personnels in scientific institutions of State and Central Governments. The Second objective is to take up research on various problems related to the animal life in these hill regions with a view to utilise such knowledge for future development.

During the year 1979-80, some of the researchers have completed their doctoral theses. Their particulars are given below :

<b>Name of scholar</b>	<b>Title of thesis</b>	<b>month of submission</b>	<b>Guide</b>
1. Miss D. Roy,	Studies on certain aspects of ecology and develop of Rema limnocharis Wiegmann.	Aug. 1979.	K. K. Khare

2. Mr. A. Majhi Studies of Biology and chromosome analysis of some teleostean fishes of North Eastern India. Jan. '80 K. Chattarjée
3. Mr. V. Reddy Ecosystem structure and function of Pine Forest of Meghalaya March '80 J.R.D. Alfred

**Break up of students' intake :**

Year	Male	Female	Total	of which	
				SC	ST
M. Sc. I ('79-'80)	11	7	18	—	11
M. Sc. III	11	5	16	—	7
M. Phil.	3	—	3	—	1
Ph. D.	29	6	35	—	6

**Honours and Awards :**

Prof. R. G. Michael was elected Fellow of the National Academy of Sciences (F.N.A.Sc.), Allahabad, India (October 1979).

Dr. K. Chattarjée received in Germany the Gregor Mendel Medal from the European Mendel Memorial Committee.

### **Conferences and Seminars**

A paper was read on behalf Prof. R. George Michael and Dr. B.K. Sharma at the 2nd International Rotifer Symposium. (Gent, Belgium, Sept. 1979).

Dr. M.K. Khare presented paper at the 49th Annual Session of the National Academy of Sciences of India at Nagpur (October, 1979).

Dr. J.R.B. Alfred and Dr B.K. Sharma presented papers in the 67th Indian Science Congress at Jodhpur (January 1980).

Dr. B. K. Ratha presented papers at the 4th Cell Biology Conference in 1980 and also at the 48th Annual Meeting of the Society of Biological Chemists (India) at Calcutta (January 1980).

### **Publications**

#### **(a) Paper published**

1. R.G. Michael and B.J. Hann, (1979) On the resurrection of the Cladodera species *Chydorus reticulatus* Dady (Clydoridae, Cladocera) and its relationship to *Clydorus venetricosus* Daday 1898. *Hydrobiologia* 65 : 225-232.
2. (1980) Synopsis of taxonomic studies on Indian ROTATORIA. (Presented at 2nd International Rotifer Symposium. Sept. 1979 Gent, Belgium. *Hydrobiologia*, 73 : 229-236.
3. Sabu A.K. and M.K. Khare 1980. Field key of tadpoles of *Rana Limnocharis*. *The Nat. Acad. Sci. Letters* 3 (5) : 161-164.
4. A. Raghu Varman (1979). Helanins in the pecten of pigeons and their possible roles. *Science & Culture* 45 : 289-290.
5. A. Raghu Varman (1980) Resilin in the cuticle of physogastric queen terminate, *Experientia* 36 (5): 564-565.

6. Reddy, M.V., and J.R.B. Alfred, (1980). Effect of some atnotic factors on *Kusca* population. *Geogios* 7(2): 49-52.
7. (1979). Utilization of Caster(*Ricinus Communis* Linn.) leaves by the last instar larvae of the silk both *Philosmia ricini*. Hutt. (Lipidoptora : Saturniidae). *Indian Biologist* XI, (1 and 2) : 36-40.
8. J.R.B. Alfred and R. George Michael, (1979) Biosystematics and Ecology of fine species of Indian Chironomicae. *Bull. Meghalaya Science*, Sec. 3 : 5-12.
9. Ramanuham, S.N. and Ratha, B.K. (1980). Studies on poscicidal plants of North-Eastern India: Hope for an indegenous plant poison for fish nursery mangement, *Curr. Sci.* 49 : 251-252.
10. (1980). Effect of the alcoholic extract of *Zanthoxylum armatum* fruits of certain haematologic parameters of *Heterophetes familia*, *Curr. Sci.* 49 : 487-489.
11. Nasar, S.A.K. (1979), Effect on certain organs chlor insecticides on primary production in a freshwater pond. *Prog. Tech.* 11(6): 247-751.
12. Nasar, S.A.K. and M. Dasgupta (1979) On the occurence of Ichthyophthiriosis in *Acrossocheilus hexagonolepis* (Mc Cleiland). *Matsya* 5: 73-74.
13. Nasar, S.A.K. and J.D. Nunshi (1979). Studies on the seasonal variations in the fungal population of a freshwater pond of Bhagalpur, India. *Limnological* 12 (1): 137-139.
14. Nasar, S.K.T., and Nasar, S.A.K. (1979) know your pesticides. *Intensive agriculture*, 17(9): 25-26.
15. Sharma, B.K. (1979). Further contributions to the lecanid fauna (Rotifera Lecanidae) of West Bengal. *Acta Hydrobiol.*, 21 (1) : 253-59.
16. (1979) Rotifer from West Bengal. IV. Further contributions to to Eurotatoria. *Hydrobiologia* 65 (1) 39-47.

17. Sharma, B.K. (Contributions to the rotifer fauna of Orrisa, India *Hydrobiologia*. 70 (3): 225-233.
18. (1980) Taxonomic notes on some freshwater *Castrotricha*. From West Bengal, India, *Hydrobiologia* 70(3): 265-267.
19. & Michael R.G. (1980). Synopsis of Taxonomic studies on Indian Rotatoria, *Hydrobiologia* 73: 229-236.

(b) **Papers accepted for Publications**

1. Das, Sumita, Sharma, B.K. and Michael, R.G. 1980. The biology of *Daphnia lumholtzi* Sars I. *In vitro* development of the parthenogenetic egg. *Hydrobiologia*.
2. —do— 1980. Laboratory studies on the longevity instar duration and growth of male *Daphnia lumholtzi* Sars (Cladocera : Daphidae) *Curr. Sci*.
3. —do— (1980.) Field key of tadpoles of *Analeps afgharus*. *Bomb. Nat. Hist. Soc*.
4. Chatterjee, K. Kollinger, G. Schmidt, C.R. Anders, A and Anders, F. 1980. Cytogenetics of *Xiphophorus*. *Cen Genetics and Cytogenetics*.
5. Anders, F., Chatterjee, K. Schwals, M., School, E and Anders, A. 1980. Gene Expression and interphase chromatic appearance in *Xiphophorus*. *Amer. Zool*.
6. A. Raghu Varman, G. Sundara Rajulu and J.B. Acariah (1980). Quinone-tanning in the teeth of *Petrotyzon marionus* Linnaeus. *Experientia*.
7. Ramanujam S.N. & B.K. Ratha (1980). Studies on acetylcholinesterase activity in different tissues of air gill breathing fishes ; *Comp. Physio. Ecol*.
8. —do— (1980). comparative studies on the activities of two glucose metabolising enzymes, Glucose

- 6 phosphate dehydrogenase ( G6 PDH ) and two gill breathing species of fish *Prod. Indian Nat. Sci. Acad. (B)*.
9. Nasar, S.A.K., and M. Sharma (1980). Primary production in relation to the abiotic factors in temporary freshwater pond. *Acta Hydrochemize et Hydrobiol.*
  10. Nasar, S.A.K. (1980). Primary productivity studies on freshwater fish ponds of Bhagalpur. India. *Acta Hydrochem. Hydrobiol.*
  11. Mrinal Dasgupta and Nasar, S.A.K., (1980) Preliminary observations on the biology of the juvenile of *Barilins berdelri* Ham. from river Simsang, Meghalaya (India) *Arguivers do Muzlu Bocage.*
  12. Nasar, S.A.K., Aloka Sarkar and R.V. Bedri (1980). An abnormal record of high oxygen production in the Eol of river Ganga at Bhagalpur, India, *J. Ichthyology.*
  13. Nasar, S.A.K. and S. Kaur (1980) Some limnological observations on a shallow pond in Shillong ( India ) : Physico-Chemical factors and plankto periodicity. *Verb. Internat. Veroin. Limnol.* 21.
  14. Vasht. H.S. and Sharma, B.K. 1980. Diurnal variations in freshwater pond in Ambala city (Haryana) India. *Proc. Zool. Soc, Calcutta.* 31
  15. Sharma B.K. 1980. Contributions to the rotifer fauna of Punjab state, India. I, Family Brachionidae. *Hydrobiologia.*

## **Department of Botany**

The Department of Botany, a constituent of the School of Life Sciences, came into existence in 1974. The setting up of a Post-Graduate Department of Botany in the North Eastern Hill Region under the North-Eastern Hill University has special significance as the entire area is extremely rich in forests and forest resources. Also this area has the unique distinction of being one of the richest geographical regions both from the floristic and faunistic points of view. On the other hand, the North Eastern Region has also the unique problem of rapid depletion of its forest resources, a part from the continuing danger to its environment due to slash and burn agriculture (Jhum) and the felling of trees for timber and fire wood.

In view of the above, forest Biology was identified as the major thrust of the Department. At present, research is being carried out on various aspects of forest ecosystem, weed biology and population ecology, microbial ecology and plant pathology, cytogenetics, experimental morphology and morphogenesis, floristic and ethnobotany, algal ecology and physiology and tree physiology,

Apart from the emphasis on general botanical studies special emphasis is laid on an integrated approach to the study of forest biology and freshwater biology at M. Sc level. The Department offers specialization in forest ecosystem / freshwater ecosystem and second level specialization in the biological areas mentioned above.

### **Research activities :**

The Department has made considerable studies in various areas of research undertaken by the Faculty members.

The current research interests of the faculty members are given below :

Professors P. S. Ramakrishnan and his group ; are engaged with the studies on :

- (i) Productivity, diversity and dominance over successional stages.
- (ii) Energy flow and nutrient cycling in agro-ecosystems.
- (iii) Hydrological cycle.
- (iv) Ecological strategies.
- (v) Growth pattern and tree architecture.
- (vi) Ecological adaptations of tree species.
- (vii) Population studies.

Professor R. R. Mishra and his group are engaged with the studies on :

- (i) Soil microbiology of Jhum land
- (ii) Ecology of rhizosphere fungi
- (iii) Mycorrhizal association and nutrient uptake fungal symbiont in trees, weeds and crop plants.
- (iv) Phyllosphere microbiology.
- (v) Plant litter decomposition
- (vi) Fresh water microbiology
- (vii) Fungal flora of Balphakram forest reserve
- (viii) Seed microbiology

The group is currently engaged in studies on soil microbiology of jhum lands and association of bacteria and fungi with roots of higher plants. The ecological aspects of mycorrhizal association of economically important timber species, local and exotic varieties of crops, various weeds and certain species of orchids of this region are being worked out. The role of fungal and actinomycete symbionts in the nutrient uptake is being studied.

Dr. R. S. Tripathy and his group are engaged with the studies on :

- (i) Regulation and dynamics of population of weedy species
- (ii) Population interaction studies with particular reference to competition between grass and legume species.
- (iii) Allolopatly
- (iv) Reproductive strategies of weeds.
- (v) Weed seeds dynamics in soil

Dr. Avtar Singh and his students are engaged in cytogenetical studies of Weeds growing at different localities with particular reference to their chromosome number and behaviour. The weed populations from different altitudes have been examined to determine the effect of temperature on chromosome associations and chiasmata frequency. Weeds so far studies and *Eupatorium adenephorum*, *E. odoratum*, *E. riparium*, *Hydochaeris radicata*, *Mikania scandaus*, *Galinsoga pawiflora*, *Panicum bravefolium*, *P. astrosanagguineum*, *P. Paludosum*, *P. psilopodium*, *P. mazimum*. Role of B-chromosome with respect of adaptation of *Galinsoga* at different altitudes has been studied. Besides, tannis (*Xanthosoma*) a tuber crop of Meghalaya has been studied and compared with a variety from Kerela with respect to kanyotype, protein content and electrophoretic bands. Similar studies have been made on 13 strains of *Colocasia* from Meghalaya and two strains from the plains. Similar works is being extended to other tuber and cereal crops.

In the field of experimental morphology, effects of gamma rays and ethylene on alkaloid yielding *Solanum* species are being studied by Dr. Y. S. Chauhan and his group. The emphasis is on the study of radiation and plant growth hormone effects on growth, productive biology and differentiation in medicinal and other economically important plants

of the north-eastern region. The group is also engaged with the studies on hormonal regulation of xylogenesis and cytodifferentiation in the cultured juice vesicles of *Citruses* of the north-east with an aim to understand the phenomenon of granulation disorder.

The taxonomic studies pertaining to the monocot and weed flora of Meghalaya, ethnobotanical studies and medicinal plants of Meghalaya, ferns of N. E. region and Pteridophytic flora of Shillong are being pursued by Dr. R. R. Rao and his group.

Dr. P. Tandon is engaged in research activities in the following areas :

- (i) Genetic, biochemical and physiological and mechanism that underline evolution and adaptation of plants,
- (ii) Role of plant tissue organ culture in studies on normal and abnormal growth in plants.
- (iii) Genetic organisation and expression in plants.
- (iv) Role of growth regulators on plants growth, development and metabolism.

Plant pathological studies pertaining to (i) induced resistance to *Fusarium* wilt, (ii) plant pathological survey of agricultural and forested systems with particular reference to chemical and biological control (iii) aero-microbiological survey in relation to plant disease for recasting and allery diseases are being undertaken by Dr. B. K. Datta.

The researches on ecology of edaphic algae and heavy metal pollution were being carried out by Dr. L. C. Rai until he left this Department towards the end of October, With the joining of Dr. V. M. Reddy, the work on the physiology of cellular differentiation and biological nitrogen fixation by the blue-green algae has been initiated.

**Ph.D. thesis submitted/approved :** The following students submitted their their Ph.D. theses to the North Eastern Hill University, Shillong.

<b>Name of the student</b>	<b>Title</b>	<b>Supervisor</b>
Mr. P.K. Das	Micorbial decomposition of pine liter : an ecological approach	Prof. R.R. Mishra
Mr. B. Neogi	Studies on weed flora and agricultural lands and fishery tanks of Meghalaya.	Dr. R.R. Rao

#### **Awards, honours and participations in Symposia Seminars**

Prof. P.S. Ramakrishnan was elected Fellow of the Indian National Science Academy, New Delhi.

He visited Australia during May-September, 1979 on a Visiting Professional assignment of the Australian Vice-Chancellor's Committee (AVCC) sponsored through La Trobe University. He also gave seminars to several institutions in Australia, and completed work on germination ecology of *Tehmeda australis* as a Visiting Scientist of C.S.I.R.O. (Australia).

He was Co-convenor of symposium on "Environmental degradation, Agro-forestry and conservation of Natural Resources" at the 67th Session of the Indian Sciences Congress, Calcutta, 1980. He alongwith his students presented two papers entitled, "Agro-ecosystem and forest fallows under slash and burn agriculture at lower elevations of north-east India an ecological assessment" and "Shifting cultivation and its impact on forested ecosystem at high

elevation of Meghalaya with special emphasis on nitrogen budget''.

Prof. R.R. Mishra was elected Fellow of the National Institute of Ecology.

Prof. R.R. Mishra was invited to attend the Third International Symposium on "Ecology of leaf surface micro-organisms" held at Aberdeen from September 1-5, 1980. Apart from presenting a paper entitled "Fungal succession on needles of coniferous trees" at the said symposium he also attended the Second International Symposium on Microbial Ecology and presented his paper at University of War Wick, Coventry, U.K. during September, 1980.

He has been nominated as a member of the International Union of Forest Research Organisation (IUFRO) and has been invited to attend the IUFRO working party meeting on conifer needle diseases in Sarajevo, Yugoslavia during September 1980. He presented a paper on "Conifer Needle diseases in North Eastern India" in the above mentioned gathering.

A paper jointly by Prof. Mishra and Mr. G.D. Sharma entitle "Impact of Shifting Cultivation on the structure and function of micro-organisms in forested ecosystem" was presented by Mr. Sharma for the focal theme symposium on Environment Degradation, Agro-forestry and conservation of Natural Resources', at the 67th Session of the Indian Science Congress, Calcutta, 1980.

Dr. Y.S. Chauhan attended a Symposium on "Recent trends in the study of plant structure" at Allahabad and presented a paper on "Ethrel and gamma rays induced variation in shoot apex organisation of *Solanum khasianum*" jointly prepared with Miss J.S. Kharbteng.

Dr. Tandon worked on the genetic organisation of chloroplast DNA in the Department of Molecular Biology and Biochemistry at University of California, Irvina, USA under a Govt. of India National Scholarship award.

Dr. B.K. Dutta attended the 67th Session of Indian Science Congress held at Calcutta. 1980 and presented two papers "Trace elements as plant chemotheropentant to control *Verticillium* wilt" and "Studies on the biology and control of *Fusarium monilifer* isolated from pine seedling (*Pinus kesiya* Royle)".

**Publications :**

- Ramakrishnan, P.S. 1980 : Ecological Impact of jhum (slash and burn agriculture) on foresaid ecosystems of North Eastern India, INSA Newsletter No. 60, 3-7.
- Ramakrishnan, P.S. and Teky, O.P. : Preliminary observations on the impact of Jhum ( shifting agriculture ) on the forested ecosystem. In "Resources, Development and Environment in the Himalayan Region", Department of Science and Technology, New Delhi (Published in 1980).
- Mishra, R.R. and Pandey. K.K. 1979 : Phyllosphere Microflore of *Barassica compestris* L. Environment India 2 (1) : 18-22.
- Mishra R.R. and Tiwari, R.P. 1979 : Studies on phyllosphere microflora. Effect. of antibiotics and fungicides on leaf surface fungi and bacteria. Acta Botania Indica 7. 57-63;
- Mishra, R. R. and Sharma, G. D. 1979 : Distribution of Edo-genaceae in a sub-tropical Humid forest of Meghalaya, In Special Vol. on Environment Nat. Acad. Sci. 61-66.
- Mishra, R. R. and Sharma, G. D. 1980 : Report on root nodule formation in *Eupatorium* app. to Cum. Sci. 49 44-47.

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- Mishra, R. R. and Sharma, G. D. 1980 : Mycorrhizae in the ferns of North Eastern India. Proc. Indian, Sci. Acad B. 46 546-551.
- Mishra, R. R. Tiwar, B. K. and Heka, H. K. 1980 : Fungistasis activity of Pine (*Pinus kasiya* Royle) needle extracts. Acta. Botanica Indica Vol. 8 (2) 158-163.
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- Dwivedi, R. P. and Tripathi, R. S. 1980 : The response of *Alysicarpus monilifer* and *Indigofera enneaphylla* to selective removal of association in a grassland vegetation. Proc. Indian Natn. Sci. Acad. B46, 330-336

- Trivedi, S and Tripathi, R. S. 1980 : Bamboo flowering and increase in rodent population in Mizoram ; A preliminary report. In "studies on Redents and their Control" (ed. A. K, Ghosh) p. 66-72 Meghalaya Science Society, Shillong.
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- Singh, A. and Ahmed, R. 1979 : Effect of demethyl sulfoxide on chiasmata in *Trigonella corniculata*. J. Cytel. Genet. 14 : 99-101.
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- Kharbteng, J. S. and Chauhan, Y. S. 1979 : Ethrel-induced inhibition of pistel in *Solanum khasianum*. L. Curr Sci. 48(18) : 819-821.
- Ganguly, D., Singh, K. K., Bhagat, S. D., Upadhyay, D. N. Chauhan, Y. S., Gupta, N. K. and Singh, H. S. 1979 : "RRL Jor-3 1979" an improved strain of Java citronella *Cymbopogon winterianus* Jowitt Indian, Perfumer 23 (2) : 107-111.
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- Rao, R. R. 1979 : *Parthenium hysterophorus* Linn. (asteraceae) in Gauhati—A new record for N. E, India. Jour Indin Bot. Soc. 58 (1) : 44-47.

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- Dutta, B. K. & Isaac I. 1979 : Effect of inorganic amendments (P&K) to soil on the rhizosphere microflora of antirrhinum plants infected with *Verticillium Dahliae* kles. *Plant and Soil* 52 : 561-569,
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