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### School of Life Sciences

**T**he School of Life Sciences presently consists of three departments, namely, Biochemistry, Botany and Zoology. This School is an active centre for postgraduate teaching and research in frontier areas of biology. The major thrust areas of research activities include Immunology, Endocrinology, Reproductive Physiology, Limnology, Genetics, Enzymology, Medical Biochemistry, Radiation Biology, Carcinogenesis, Nitrogen Fixation, Ecology of Forest Ecosystem, Biodiversity, Microbial Genetics, Plant Physiology and Biotechnology.

The departments under the School have well-qualified faculty members. They

are actively involved in teaching and research and many of them have international reputation. They also have several collaborative research programmes with international research groups. They have won wide acclaim in their areas of research and have received several awards. The departments of Botany and Zoology are currently being supported by UGC under Special Assistance Programme (SAP) and COSIST. The departments of Biochemistry, Botany and Zoology have all been given support from the DST under FIST (Fund for Infrastructure in Science & Technology) programme. In addition, departments have also attracted substantial research funds from various funding agencies.

#### DEPARTMENT OF BOTANY

The Department of Botany was established in 1974. Since its inception it has been teaching and conducting research in priority areas of regional and national importance. It is fulfilling the regional aspirations through its well-developed teaching programme. The students passing out from the department are occupying important positions in prestigious educational institutions and research organisations, both in the NE region and in the country.

The department is covered under Special Assistance Programme (SAP) of the UGC and has implemented the second phase of the programme at the level of DSA (1995-2000). The UGC review committee recommended continuance of the programme for a further period of five years at the level of DSA. The thrust areas(s) identified by the UGC are: ecology, conservation and management of forests in north-eastern India, projecting the following



tasks: i. Ecology of forest ecosystems (including microbial ecology), ii. Genetic diversity of forest trees and molecular ecology and, iii. Biology, biotechnology and conservation of rare and endangered species and unexplored plants of potential economic value. It has also been extended assistance by the UGC for Strengthening Infrastructure under Science & Technology Infrastructure Development Programme (COSIST). Ecology, Biodiversity and Conservation in NE India are thrust areas

of the COSIST programme. The Department of Science and Technology has provided financial support under the FIST Programme for the development of central instrument facility and the Ministry of Environment and Forests has sanctioned fund for strengthening experimental cum botanical garden of the Department.

The Department has been recognized as a lead centre under the national agricultural technology project of the Indian Council for Agricultural Research.

<b>Head</b>	:	Prof. A K Misra
<b>Faculty</b>	:	
<b>Professors</b>		R. S. Tripathi, M.Sc., Ph.D (BHU) CAS P. Tandon, M.Sc., Ph.D (Jodhpur) H. N. Pandey, M.Sc., Ph.D (BHU) A.K. Misra, M.Sc., Ph.D (Meerut)
<b>Readers</b>		R. C. Laloo, M.Sc., Ph.D (Gauhati) N.K. Chrungoo, M.Sc., Ph.D (Kashmir) (Miss) M. S. Dkhar, M.Sc., Ph.D (NEHU) Y. Kumar, M.Sc., Ph.D (NEHU) S. K. Barik, M.Sc., Ph.D (NEHU)
<b>Lecturers</b>		U. Shankar, M.Sc., Ph.D (NEHU) L. Kharlukhi, M.Sc., Ph.D (IARI) N. Venugopal, M.Sc., Ph.D (Madras) H. Kayang, M.Sc., Ph.D (NEHU) (Mrs) S. Kumaria, M.Sc., Ph.D (NEHU)
<b>Student Intake:</b>		a) Enrolment capacity : 20
		b) Actual admission : SC/ST/Genl. Male/Female Total
		1 18 1 7 13 20

**Degree Awarded:**

Ph.D :

Ms Luckily Ranee. "Studies on the role of fungal and earthworm populations in maize field". Supervisor: Dr.M.S.Dkhar.

Ms Vineeta Chauhan. "Generation of molecular signatures for *Alnus*

*nepalensis* genotypes with nitrogenase activity in symbiotic association with *Frankia*." Supervisor: Prof. A.K.Misra.

Mr. Atanu Bhattacharjee. "Studies on seed mycoflora of *Phaseolus vulgaris* Linn." Supervisor: Dr. M.S.Dkhar.



**Funds received from agencies other than NEHU/UGC:**

	( Rs. In lakhs)
1. DST-NSF	Rs. 1.85
2. DST	Rs. 3.00
3. IIRS-DOS	Rs. 3.69
4. Ministry of Environment & Forests, Govt. of India	Rs. 4.60
5. ICAR	Rs. 7.73
6. ICAR-WORLD BANK	Rs. 2.00
7. DBT (Bioinformatic Centre)	Rs. 11.07
8. DBT	Rs. 3.00
9. DBT	Rs. 4.81
10. DBT	Rs. 8.68
11. DBT	Rs. 8.70
<b>Total :</b>	<b>Rs.59.13</b>

**Courses Conducted:**

*Core papers:* M.Sc.: Algae, Bryophyta & Pteridophyta, Gymnosperms & Plant Anatomy, Mycology & Plant Pathology, Plant Taxonomy & Biostatistics, Plant Biochemistry & Molecular Biology, Microbiology & Biotechnology, Genetics & Plant Breeding, Ecology & Environment, Plant Physiology, Morphology, Embryology & Differentiation, Ecosystem Analysis & Phytogeography.

*Special papers:* Angiosperm Taxonomy, Microbial Ecology, Forest Ecology.

**Seminars/Conferences:**

Organised :

Prof. R. S. Tripathi organized a symposium on "Eastern Himalayan Biodiversity: Distribution, Human Impacts and Conservation Strategies" as a part of the international conference on "Tropical Ecosystems: Structure, Diversity and Human Welfare" sponsored by the Association for Tropical Biology and co-sponsored by the Third World Academy of Sciences and the Ford Foundation, held in

Bangalore during 15<sup>th</sup> -18<sup>th</sup> July 2001. He also chaired the proceedings of the symposium.

Prof. Tripathi organised the workshop-cum-discussion meeting of the Eco-regional Working Group for National Biodiversity Strategy and Action Plan on 29 May, 2001. In his capacity as the Coordinator of the Regional Centre of NAEB, Ministry of Environment and Forests, Government of India he organized the following workshops / training programmes:

i. "Evaluation and Monitoring Methodologies Relevant to Afforestation and Ecodevelopment Programmes" during 10-11 September 2001 at Shillong for senior level forest officers of the north-eastern states and acted as a resource person.

ii. "Strategies for Management of Jhumland" during 11-12 October 2001 at Shillong on behalf of the Ministry of Environment & Forests, Govt. of India.



iii. "Microplanning for Joint Forest Management in Manipur" during 26-29 November 2001 at Imphal.

iv. "Microplanning for Joint Forest Management in Assam" held during 8-11 January 2002 at Guwahati.

v. "Microplanning for Joint Forest Management in Arunachal Pradesh" during 22-24 January 2002 at Deomali.

vi. Microplanning for JFM in Nagaland during 18-20 January, 2002 & 20-23 March, 2002; in Arunachal Pradesh during 22-24 January, 2002; in Tripura during 6-9 August & 4-5 March, 2002; and in Meghalaya (Tura) during 19-22 February, 2002.

Prof. P.Tandon as Co-ordinator, Bioinformatics Centre, organized training courses on "Application of Basic IT Resource", during June 20-23 2001 and "Introduction to Computer Networks and Internet", during 26-29 September 2001, at Shillong.

#### Attended:

Prof. R. S. Tripathi: (i) Presented a paper entitled "Sacred groves: Community biodiversity conservation model in north-east India" at the symposium on "Eastern Himalayan Biodiversity: Distribution, Human Impacts and Conservation Strategies" held in Bangalore during 15<sup>th</sup> - 18<sup>th</sup> July 2001. (ii) Attended the national seminar on Approaches for increasing agricultural productivity in hill and mountain ecosystem organised by the ICAR at Barapani during 18-20 October 2001. He chaired the session on "Shifting cultivation" and delivered a lecture on "Shifting

cultivation in north-east India".

Prof. P.Tandon delivered a lecture on "Biotechnology for Conservation and Sustainable Utilization of Plant Genetic Resources" at Tripura Secretariat, Agartala on 24.09.2001 and gave a talk on Application of Plant Biotechnology at M.B.B. College, Agartala on 25.09.2001.

Prof. H. N. Pandey delivered a lecture on "Ecological Analysis of Forest Vegetation of Meghalaya" at the national seminar on Approaches for increasing agricultural productivity in hill and mountain ecosystem organized by the ICAR during 18-20 October 2001.

Prof. A. K. Misra attended the XI<sup>th</sup> international conference on Actinorhizal Plants and Frankia held at Carry-le Renet, France in June 2001 and delivered the Opening Lecture on "An overview of antinorhizal symbiosis research in India with special reference to molecular characterisation". He also presented, with Vinita Chauhan, a joint paper entitled "Evidence of co-evolution of host and microsymbiont in Alder-Sfrankia symbiosis"

Dr. N.K. Chrungoo attended the VIII<sup>th</sup> International Symposium on Buckwheat held at Onangwon National University Chunchem, Korea from August 30 to September 2, 2001 and presented a paper entitled "Molecular characterisation of Lysine-rich subunit of buckwheat globulin: evolutionary relationship to other legumin-type proteins."

Dr. Y. Kumar attended the national seminar of NISCOM on Traditional Knowledge base of herbal medicines & Plant resources of N.E. India- Protection, utilization and conservation, 13-15 March, 2001 and presented a paper titled



"Importance of systematic investigation for proper utilization and conservation of *Piper* species of North East India."

Dr. S. K. Barik: (i) Attended the workshop on "Evaluation and Monitoring Methodologies Relevant to Afforestation and Ecodevelopment Programmes" organised during 10-11 September, 2001 at Shillong and presented a paper on "Evaluation and Monitoring methods for afforestation programmes in north-east India". (ii) Attended the workshop on "Bamboo - its Potential in the North-East" organized at State Forest Service College, Bynihat during 27-28 September 2001 and presented a paper on "Bamboo diversity of north-east India and its conservation efforts". (iii) Attended the training-workshop on "PRA and Microplanning for implementation of Doyang HEP Catchment Area Treatment (CAT) Plan, Nagaland" held at the Ministry of Environment and Forests Regional Office, Shillong, during 8-9 November, 2001 and delivered a talk on "Microplanning for implementing CAT Plan". (iv) Attended the training-cum-workshop on "Microplanning in Joint Forest Management in Manipur" held at Imphal during 26-29 November 2001 and presented a paper on "Microplanning for implementation of JFM in Manipur". (v) Attended the training-cum-workshop on "Microplanning for Joint Forest Management in Assam" held at Guwahati during 8-11 January 2002 and presented a paper on "Microplanning exercise using GIS principle". (vi) Attended the training-workshop on "Microplanning for Joint Forest Management in Arunachal Pradesh held at Deomali during 22-24 January, 2002 and presented a paper on "Practical Guide to Microplanning". (vii) Attended the national

workshop on "Emerging Issues in Joint Forest Management" organized by Winrock International India at New Delhi on February 22, 2002 and presented a paper on "Emerging Issues of Joint Forest Management in North-East India". (viii) Attended the International Training Session of LEAD (Rockefeller Foundation, USA) on "GIS and Natural Resource Management" held at New Delhi, India and Okinawa, Japan during 25 February - 6 March, 2002 and presented a project on "Coral reef conservation model for Okinawa, Japan".

Dr. Uma Shankar attended the First Review Meeting of the MacArthur Project "People-centered biodiversity conservation in Arunachal Pradesh" held at the G. B. Pant Institute of Himalayan Environment & Development, Itanagar, during February 11-13, 2002.

#### **Visiting Professors/Fellows:**

Dr. (Ms) Jun Wen, Department of Botany, Field Museum of National History, Chicago, USA visited the Department and delivered a lecture on "Evolution of Asian-Eastern North America Biogeographic Disjunction" on 31.8.2001.

#### **Publications:**

Barik, S.K. and V.T.Darlong. 2001. Biodiversity conservation in Northeast India: lessons from people's experience. In. *Sustainable Management of Forests, India*, ed. By A. Arunachalam and M.L.Khan. Dehradun: International Book Distributors, 477-92.

Bhuyan, P., M.L.Khan and R.S. Tripathi. 2001. Tree diversity conservation model in north-east India. In K. N. Ganeshiah, R. Umashanker and K. S. Bawa, ed. *Tropical Ecosystems: Structure, Diversity and*



*Human Welfare (Supplement)*. Proc. of the International Conference on Tropical Ecosystems. Bangalore: ATREE, 104-107.

Chrungoo, N. K., M. K. Rout and S. Bharali. 2001. Molecular characterization of Lysine-rich basic subunit of buckwheat globulin: Evolutionary relationship to other legumin type protein. *Proc. VIIIth International Symposium on Buckwheat: Current Advances in Buckwheat Research*, 189-199.

Das Gupta S., B.K.Tiwari and R.S. Tripathi. 2001. Coal mining in Jaintia hills Meghalaya: An ecological perspective. In P.M.Passah, ed. *Environment Land and People of Jaintia Hills*. Shillong: NEICSSR, 121-28.

Gajurel, P, and P. Rethy and Y. Kumar. 2001. A new species of *Piper* from Arunachal Pradesh. *Bot. J. Linn. Soc.*, 137: 417-419.

John, B., H.N.Pandey and R.S.Tripathi. 2001. Vertical distribution and seasonal changes of fine and coarse root mass in *Pinus kesiya* Royle ex. Gordon forest of three different ages. *Acta Oecologica*, 22: 293-300.

Kayang, H. 2001. Fungal and bacterial enzyme activities in *Alnus nepalensis* D. Don. *European Journal of Soil Biology*, 37(2): 175-180.

Kumaria, S. and P. Tandon. 2001. Orchids: The World's Wondrous Plants. In P. Pathak, R. N. Sehgal, N. Shekhar, M. Sharma, and A. Sood, ed. *Orchids: Science and Commerce*. Dehradun: Bishen Singh Mahendra Pal Singh, 17-28.

Porwal, M.C., Gautam Talukdar, Harnam Singh, O.P.Tripathi, R.S.Tripathi and P.S. Roy. 2001. Biodiversity characterization at landscape level using

Geo-spatial Modeling in Meghalaya (India). In P. S. Roy, Harnam Singh and A. G. Toxopseus, ed. *Biodiversity and Environment: Remote Sensing and Geographic Information System Perspectives*. Dehradun: Indian Institute of Remote Sensing, 206-291.

Singh, S. S., S.C.Tiwari and M.S.Dkhar. 2002. Soil degradation affects microbial biomass carbon and dehydrogenase activity in humid tropical hilly forest soils. *AJMBES*, 49 (1): 143-148.

Tandon, P, ed. 2001. *Brainstorming Session on Biodiversity Conservation*. Report prepared by Department of Biotechnology, Ministry of Science & Technology, Government of India. New Delhi: Regency Publications.

Tripathi, R. S. 2001. Sacred groves: community biodiversity conservation model in north-east India. In K. N. Ganeshiah, R. Uma Shanker and K. S. Bawa, ed. *Tropical Ecosystems: Structure, Diversity and Human Welfare (Supplement)*. Proc. of the International Conference on Tropical Ecosystems. Bangalore: ATREE, 104- 107.

Tripathi, O. P., R.S.Tripathi and H.N.Pandey. 2001. Status of plant biodiversity in Mawiong Syiem sacred groves of Meghalaya, north-east India. In A.P.Das, ed. *Perspectives of Plant Biodiversity*. Dehradun: Bishen Singh Mahendrapal Singh, 663-680.

Uma, Shankar. 2002. Namdapha proposed biosphere reserve: biodiversity characterisation, propagation packages and conservation issues. In J. K. Sharma, P. S. Easa, C. Mohanan, N. Sasidharan and R. K. Rai, ed. *Biosphere Reserves in India and their Management*, New Delhi: Ministry



of Environment & Forests, Government of India, 228-239.

#### **Study Tour:**

Study tour of M.Sc final semester students was taken by Dr. N. K. Chrungoo, Dr. S. K. Barik and Dr. P.B.Gurung (STA) to New Delhi, Chandigarh and Himachal Pradesh.

#### **Thrust Area of Research:**

Forest Biology

#### **Research Programme/Project:**

New :

✓ "Ecological Analysis of selected Agro-forestry systems in Meghalaya was sanctioned to Prof. R. S. Tripathi (Principal Investigator) and Prof. H. N. Pandey (Co-investigator) by the ICAR, New Delhi.

✓ "Mass micropropagation of orchids towards socio-economic upliftment of women folk in Meghalaya" was sanctioned to Dr. S.Kumaria (Principal Investigator) and Prof. Tandon (Co-investigator) by Department of Biotechnology, Ministry of Science & Technology, Government of India.

✓ "Microbial diversity of north-eastern region with special reference to wood rotting fungi" was sanctioned to Dr. M. S. Dkhar (Principal Investigator) and Dr. H. Kayang (Co-investigator) by the DBT, Government of India.

Ongoing :

"Biodiversity characterization at landscape level using remote sensing and GIS" sanctioned to Prof. R. S. Tripathi by the Department of Space, Govt. of India. to

collaborate with Dr. P. S. Roy, Dean, IIRS.

"Improvement of infrastructural facilities in existing Botanical Garden of North-Eastern Hill University, NEHU Campus, Shillong" sanctioned to Prof. R. S. Tripathi by the Ministry of Environment and Forests, Govt. of India.

" Studies on the effects of human activities on the buffer zone ecosystems of Nokrek Biosphere Reserve, Meghalaya" sanctioned to Prof. R. S. Tripathi (Principal Investigator), Prof. H. N. Pandey, and Dr. S. K. Barik (Co- investigators) by Ministry of Environment and Forests, Government of India.

The DST-NSF project on Molecular diversity and ecology of actinorhizal symbionts found in the Sikkim region of the Eastern Himalayas sanctioned to Prof. A. K. Misra and Prof. R. S. Tripathi (Indian collaborators), and Prof. David Myrold, Oregon State University, Corvallis, USA (US collaborator).

The DST project on "Cloning & Characterization of lysine rich seed storage protein of common Buckwheat sanctioned to Dr.N. K. Chrungoo.

The National Agricultural Technology project " Cloning of genes for nutritionally rich seed proteins of common buckwheat" sanctioned to Dr. N. K. Chrungoo, by the ICAR-World Bank under the National Agricultural Technology Project.

The DBT project on "Computer aid in taxonomy and biodiversity conservation and sustainable use in orchid floriculture" sanctioned to Dr Y. Kumar.

The DST project entitled "Moisture oriented feasibility for storage of seeds of timber yielding wild species of Meghalaya" sanctioned to Dr. L. Kharlukhi.



### Other Activities:

Prof. R.S. Tripathi attended the general assembly of SCOPE (Scientific Committee on Problems of Environment) held in Bremen, Germany during September 24-29, 2001. He was designated as leader of Indian delegation with voting rights. He was also nominated as a member of the Task Force on Management of Jhum Cultivation constituted by the Ministry of Environment and Forests, Government of India. He (with Dr. S. K. Barik of the same department) evaluated the integrated afforestation and ecodevelopment projects scheme sanctioned to West Bengal during IX Five Year Plan, the "Non-timber Forest Produce (NTFP) & Medicinal Plants" scheme, "Area-oriented Fuel and Fodder Project

(AOFFP)" scheme and "Integrated Afforestation and Eco-development Projects (IAEP)" scheme sanctioned to Sikkim during the IX Five year Plan period.

Prof. P. Tandon was appointed as a member, Scientific Advisory Committee of the Institute of Bioresources and Sustainable Development, Imphal. He also received the prestigious B. P. Pal National Environment Fellowship Award on Biodiversity by the Ministry of Environment & Forests, Government of India.

Dr. Venugopal attended a refresher course in life sciences organised by Jawaharlal Nehru University during Dec. 31, 2001 to 25<sup>th</sup> January 2002 at New Delhi.

## DEPARTMENT OF BIOCHEMISTRY

The Department has been imparting education in Biochemistry through its M.Sc. and Ph.D. programmes since 1980. It is servicing a wide range of courses based on modern approaches and applied aspects. The M.Sc./Ph.D. students compete successfully in NET and GATE every year. The members of the faculty have made special efforts to attract research grants from India and abroad and have established collaborative research

links with institutions of eminence abroad. Projects obtained by the faculty members from various agencies like the DST, CSIR, UGC and the NEC have made significant contribution to the rapid growth and development of the Department. It provides good facilities and equipment needed for specialized courses. The Department is also covered under the DST-FIST sponsored programme of the Ministry of Science and Technology.

<b>Head</b>	:	Prof. R. Sharma
<b>Faculty</b>	:	
Professors	:	R. Lalthantluanga, M.Sc., Ph.D (Poona) A.N. Rai, M.Sc. (BHU), Ph.D (Dundee) R. Sharma, M.Sc., Ph.D (BHU) R.N. Sharan, M. Sc., Ph.D (JNU)
Reader	:	A. Alam, M.Sc. (AMU), Ph.D (Moscow)
Lecturers	:	D. Syiem, M.Sc., Ph.D (NEHU) A.K. Singh, M.Sc. (Gorakh), Ph.D (Hyd.)