

## CORRESPONDENCE

However, big trees in these areas have been observed to be occupied mostly by birds of prey such as *Milvus migrans lineatus* and *Circus aeruginosus*.

The peripheral shallow water areas have been lost forever due to the damming of the lake. Birds such as storks, pelicans and cranes have also disappeared. *Ephippiorhynchus asiaticus*, *Ciconia ciconia*, *Anastomus oscitans*, *Leptoptilos dubius*, *Grus monachus*, *Grus antigone* and *Pelecanus javanicus* were found abundantly in the study site before damming<sup>2</sup>. During our survey of the Loktak subdivision and its adjoining areas of the Loktak lake conducted from January 2000 to December 2002, none of the birds mentioned above were recorded. Only 41 individuals of *Pelecanus philipensis* (which used to occur in thousands at the lake)<sup>2</sup> were recorded in the three years survey. The ecological changes due to damming have resulted in the dis-

appearance of over 16 indigenous species of fish and 20 species of economically important aquatic plants<sup>4</sup>.

Peripheral dyke fish-farming areas are newly developed ones. The most important feature of this habitat patch is its potential to replace the lost shallow water habitat patch. With suitable spots being developed, many of the lost birds are expected to revisit the lake. However, unlike the lost shallow-water habitat areas, these newly developed areas are not natural but are man-managed. Thus new conflicts between man and the birds for possession of resources (i.e. fishes in the ponds in this case) cannot be ruled out.

Thus the Loktak lake has varied habitat patches (habitat heterogeneity) supporting a rich biodiversity. However, much work is to be done on the distribution and taxonomy of flora and fauna of this relatively unexplored geographical area.

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2. Hume, A. O., *Stray Feathers*, 1888, **11**, 1–353.
3. Sanjit, L., Ph D thesis, Gurukula Kangri University, Haridwar, 2004.
4. Manraj, G., *The Sangai Express*, 4 February 2000.

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## NEWS

### Borlaug award for Dr S. Nagarajan

Dr Subrahmaniam Nagarajan, Director, Indian Agricultural Research Institute, New Delhi has been selected for this year's Borlaug award (2004–2005). The award was instituted by Coromandel Fertilizers Ltd in honour of Dr Norman E. Borlaug, a well-known agricultural scientist, responsible for initiating the Green Revolution in India.

Nagarajan (born November 1945) is a distinguished scientist in the field of

wheat pathology and wheat improvement.

He is currently the acting Chairperson of the Agriculture Biotechnology Committee; and Monitoring and Evaluation Committee (MEC) of the Department of Biotechnology on transgenic crops; Co-Chairman of RCGM and Member SAO(O) of the Department of Biotechnology; Member of the Indo-US working group on

Biotechnology and Indo-French working group on Agriculture; Board of Management Member, National Dairy Research Institute and Indian Veterinary Research Institute. As Director of IARI, he developed the vision document and re-set the research agenda making a shift from production-oriented research to quality improvement, value addition and market-oriented research.

## MEETING REPORTS

### Recent advances in mycology\*

Basic and applied aspects of mycological research are the major concerns in many universities and institutes of India. The National Seminar on Recent Advances in Mycology (NSRAM) conducted in collaboration with the 31st annual meeting of the Mycological Society of India (MSI) provided a forum to discuss the rapidly expand-

ing areas of mycology. About 175 delegates belonging to 20 universities and 10 national institutions participated in the seminar.

Topics on eight broad areas covered in the seminar were: Fungal systematics and biodiversity; Fungi as food, fuel and fertilizer; Fungal interactions with plants and animals; Fungal pathogens of plants and animals; Fungal pesticides and biological control; Fungal bioactive metabolites, and biotechnology; Environmental mycology and Novel techniques and ideas in mycology.

The two-day deliberations consisted of three invited talks, 14 lead lectures, 29 oral and 47 poster presentations.

M. Abdul Rahiman (former Vice-Chancellor, Kannur University, Kerala), in his inaugural address, stressed on the importance of basic research in mycology that is paving the way for endless biotechnological applications in future. K. R. Sridhar (Organizing Secretary, NSRAM) and D. J. Bhat (Secretary, MSI) highlighted the origin, necessity and importance of NSRAM at the national and international level.

The president of MSI, B. P. R. Vittal, (Madras University), spoke on the 'progress and status of marine mycology in India'. He mentioned the investigations and contri-

\*A report on the National Seminar on Recent Advances in Mycology, jointly organized by Mangalore University and Mycological Society of India and held at the Department of Biosciences, Mangalore University, Mangalagangothri, during 2–3 December 2004.

butions of Indian mycologists to the field of marine mycology and discussed the nature of future issues and directions to expand this area of research through emphasis on biodiversity, ecological services and applications of mangrove and marine fungi. Prof. V. Agnihothrudu Memorial Lecture was delivered by Ramesh V. Bhat, Centre for Science, Society and Culture, Hyderabad. Speaking on 'Health and economic significance of fungal contamination of foods', he discussed the damages caused by fungal metabolites to human food and health. Bhat emphasized on the types of fungal toxins as high-risk contaminants, which cause considerable economic loss of food which in turn affects the national economy. Dr Shome Memorial Award Lecture was presented by Absar Ahmad (National Chemical Laboratory, Pune) on 'Fungus-mediated synthesis of inorganic nanoparticles – A novel biological approach to nanoparticle synthesis'. He addressed the production of Au, Ag and CdS nanoparticles employing endophytic fungus *Vetricillium* sp. and typical plant pathogen *Fusarium oxysporum*. The fungus, *F. oxysporum* also produces other nanoparticles of high redox potential elements such as Pt, Pd, Cu, quantum dots (PbS, MnS, NiS, ZnS and EuS) and bimetallic Ag/Au alloy. Ahmed also emphasized that nanoparticle synthesis through fungi is environment-friendly and one of the major developments in the field of green chemistry.

The novelty of this seminar was that the invited and lead lectures were blended with oral and poster presentations in five major sessions (Systematics and biodiversity; Environmental mycology; Food, fertilizer, pathogens and biocontrol; Bioactive compounds; Novel techniques and ideas in mycology). Lead lectures during each session introduced several interesting and thought-provoking topics. Ancient fungi from the deep-sea core belonging to > 0.18 to 0.43 million years are the oldest in age for recovery of culturable fungi (Chandralata Raghukumar, NIO, Goa). Such fungi comprised non-sporulating forms and *Aspergillus sydowii*, and germination of spores of *A. sydowii* at 100, 300 and 500 bar hydrostatic pressures at 5°C confirmed its barotolerance and nativity to deep-sea sediments. Seshagiri Raghukumar (NIO, Goa) emphasized the ancient fungal lineage of *Corallochytrium limacisporum*, originally described as a thraustochytrid and subsequently claimed to be closer to choanoflagellates, an enigmatic unicellular organism that reproduces by production of

amoeboid spores. Molecular studies showed that *C. limacisporum* is closer to fungi than was believed so far due to its marine inhabitation, unique morphology and position at the base of the animal–fungus–choanoflagellate chain. It has been concluded that it is an ancient and undiscovered lineage of the kingdom Eumycota. Current studies revealed that endophytic fungi are neither incidental residents nor latent pathogens of plant hosts (T. S. Suryanarayanan, R.M.V. College, Chennai); they possess high metabolic versatility and produce novel secondary metabolites of industrial importance. D. Ananth Padmanaban (IMTECH, Chandigarh) emphasized the need to invent and conserve new and novel fungal resources to meet the requirement of rapidly developing biotechnology. Nandkumar M. Kamat (Goa University) spoke on popular edible mushroom, *Termitomyces* spp. in Goa and the ban on its collection. He stressed on the current concerns of conservation of edible mushroom biodiversity of the Western Ghats. Diversity and importance of arbuscular mycorrhizal (AM) fungi in plantations and degraded ecosystems (e.g. mining areas) were pointed out by C. Mohanan (KFRI, Peechi) and B. F. Rodrigues (Goa University) respectively. N. G. K. Karanth (CFTRI, Mysore) spoke on the role of fungi in pesticide bioremediation and S. B. Sullia (Bangalore University) addressed the production of phytochelatin that sequester and detoxify heavy metals. Sullia also indicated that metal-binding proteins (metallothioneins) produced by fungi are dependent on several enzymes and metabolic pathways. Traditional practices in plantation disease control (D. Chandrashekar Chowta, Environmental Activist, Mangalore) and controversies on *Beveria bassiana* as biocontrol agent of coffee berry borer disease (Anu Appaiah, Mangalore University) were other interesting aspects of the seminar.

In the session on 'Novel techniques and ideas in mycology', interesting techniques and ideas related to fungal enzymes, enhanced enzyme production and strain selection were described by M. C. Srinivasan (NCL, Pune). The importance and relevance of fungal biomolecular profiling based on Matrix-Assisted Laser Desorption/Ionization-Mass Spectrometry as a potential physical method to characterize fungi, was addressed by S. Shishupala (Kuvempu University, Shimoga). Relevance of digital and infrared spectroscopic characterization of mushroom spore prints for improved

systematic commercial mushroom breeding was interpreted by N. M. Kamat. Selvakumar (Madras University) spoke on the techniques relevant to strain improvement of edible oyster mushroom. Rajeev Bhat (Mangalore University) stressed on the techniques and importance of electron beam irradiation to decontaminate and improve the shelf-life of foods. Other topics in this session were: production of novel extracellular polymeric substances (Ruchi Jain, NIO, Goa), production of wines from tropical exotic fruits (Kumud R. Phadte, Goa University) and biogas production through coffee husk after treating with fungus *Mycotypha* (Jayachandra, Mangalore University).

Topics covered during oral presentations included: fungi in deep-sea sediments in Central Indian basin, exploring yeast flora of floral nectars, association of AM fungi with economically important forest plants, taxol production from endophytic and non-endophytic fungi, antibacterial compounds of milky mushrooms, keratin degradation by fungi, fungal heavy metal tolerance and bioremediation of mine tailings. Poster presentations included lichen diversity in East Antarctica, AM fungi in estuarine habitats, wild edible mushrooms, wood rotting fungi in terrestrial and mangrove habitats, saprophytic entomophthorales, mycoparasites of fruit rot of arecanut, screening marine fungi for chitinase and alkaline lipase production, and phytopolysaccharides as antimicrobial substances.

Prof. M. J. Thirumalachar Merit Awards were presented by MSI for two best oral and two poster presentations. Seena M. Sahadevan, Mangalore University (Endophytic fungal diversity of two sand dune wild legumes from the Southwest coast of India; co-authored by K. R. Sridhar) and B. Sampath Kumar, Madras University (Biodiversity of microfungi colonizing leaf litter of some palms in South India; co-authored by B. P. R. Vittal) bagged prizes for the oral presentation. Prathima, Mangalore University (Screening plant polysaccharides for antimicrobial activity; co-authored by Sushma Appaiah) and Nikita Veena D'Silva, Goa University (Rapid detection of sugars in floral nectar aids in high frequency isolation of saccharophilic nectar inhabiting yeasts; co-authored by Nandkumar M. Kamat) bagged prizes for the poster presentation.

For the benefit of researchers, an on-line demonstration of the novelties and usefulness of databases of HW Wilson – Biological and Agricultural Index Plus

(www.igroupnet.com) (balani@vsnl.net) was arranged during the seminar, with help from the Mangalore University library. Various aspects of UGC INFLIBNET consortium were discussed and brochures were distributed for effective use of these

databases. In his valedictory address, B. Hanumaiah (Vice-Chancellor, Mangalore University) pointed out the enthusiastic participation and contribution of young scientists in the deliberations and the need for their intense involvement in further

ing the knowledge in the field of mycology at the national and international level.

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## Recent trends in biotechnology\*

In recent years, revolution in biology has occurred due to the potentials of biotechnology. Techniques have been developed to produce rare and medicinally valuable molecules, to change hereditary traits of plants and animals, to diagnose diseases and cure them either through biotechnologically derived proteins and polypeptides forming a new class of potential drugs, or through immunodiagnostically designed vaccines and also to clean up the environment. In this way, biotechnology has great impacts in the fields of health, food/agriculture and environmental protection. Due to rapid developments, there seems to be no basic difference between the pharmaceutical industry and the biotechnological industry. However, approved products in the pipeline and renewed public confidence make it one of the most promising areas of economic growth in the near future. India offers a huge market for the products as well as cheap manufacturing base for export. Keeping these points in mind, a national seminar on 'Recent Trends in Biotechnology' was organized. About 116 participants attended the seminar.

S. V. Giri (Vice Chancellor, Sri Sathya Sai Institute of Higher Learning (SSHL) Puttaparthi), in his inaugural address, mentioned that biotechnology will be the key subject in the coming years. India, with its tropical ambience, would become a big centre for generation of biotechnological products in the near future. Giri cautioned the audience that while developing and creating innovative scientific products directly related to the welfare of

humanity; ethics, sincerity and commitment in undertaking the task should not be bypassed.

In the guest lecture session, the first speaker was G. Madhava Reddy (G.M. Reddy Research Foundation, Hyderabad). While speaking on 'Recent advances in plant biotechnology for human welfare', Reddy stated that plant molecular biology techniques like isolation of specific genes, synthesis of chimeric genes, etc., have been used for developing transgenics for more than 250 traits in more than 1000 plant varieties. As examples, he cited the case of transgenic tomatoes possessing qualities such as delayed ripening, high lycopene content, and also potatoes modified with high starch content, under commercial cultivation. According to Reddy, another important area in plant molecular biology is the development of plant vaccines against diseases in humans and animals, including domestic pets. Development of hepatitis B vaccine (HBV) in tobacco is one example of this new technology. He inferred that gene manipulation through biotechnology provides an unlimited opportunity to solve problems of hunger, food security, diseases and also environmental pollution amongst the growing population in developing countries like India. The next speaker was V. Mohan (Madras Diabetes Research Foundation, Chennai). While speaking on 'Can genetic factors explain the epidemic of diabetes in Indians?' he informed the audience that India tops the world with the largest number of diabetic subjects. The number is presently estimated to be 32 million and this is projected to increase to 79.4 million by the year 2030. Mohan also presented some interesting data, where he showed that migrant Indians had elevated plasma insulin levels and greater insulin resistance, compared with their European counterparts. These studies, according to him, suggest

that there could be an increased genetic predisposition to insulin resistance and diabetes in Indians.

The last speaker of this session was Indira Krishnan, Hewlett Chief (Centre for Biologics Evaluation and Research, Food and Drug Administration, Bethesda, USA). While talking on 'Application of biotechnology to medical diagnostics and blood donor testing: HIV/AIDS as a model', she said that early and accurate diagnosis of infectious agents is an effective public-health tool for prevention and spread of disease. She gave details of several new diagnostic technologies based on detection of antibodies, antigens and genes that have been developed and implemented in public-health settings, including blood banks and clinical laboratories over the past few decades. Her presentation included illustrations of the successful use of biotechnology in improving HIV/AIDS prevention through early diagnosis.

In the first technical session on Medical Biotechnology, C. B. Sanjeevi (Karolinska Institute, Sweden), spoke on 'KIR haplotypes'. According to him, KIR haplotypes are associated with susceptibility in patients with type-1 diabetes mellitus (T1DM), either by themselves or in association with other markers in the HLA region (HLA-DR and DQ and MICA). Sanjeevi described the methods by which each of the 14 KIR genes were typed using primers specific for each KIR and identification of the amplified fragment in gel electrophoresis. Preliminary results of KIR genotyping were also furnished. Another speaker of this session was H. V. Batra (Defence R&D Establishment, Gwalior). He spoke on 'Molecular approaches for identification and disease diagnosis of leptospirosis and Melioidosis'. He gave a detailed picture of diseases, causative agents, symptoms and how they spread. The recently developed molecular diagnostic

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