

## INDIAN CONTRIBUTION TO PHYCOLOGY

The earlier report of Indian work in phycology included occurrence of some members of Lemnaceae in the mountain streams of Himalaya (Doyle, 1839), *Actinotrichia fragilis* (Deaisne and Montagne, 1842, 49) and several species of *Chara* from Bengal (Griffith, 1847) and *Eudorina elegans*, with its fertilisation process (Carter, 1858) followed by a publication of Memoir on "East Indian fresh water" by Turner (1892, 93).

The pioneer work on Indian algae begins with the contribution of Ghosh (1919-32) who studied the blue-algae of Punjab. M.O.P. Iyengar, the so called "The father of Indian algology" joined the field of algal research in 1920 and published a good number of papers on algae of South India. He has published an account of diatoms from Karewa beds of Kashmir in collaboration with Subramanyan which included 10 genera, 13 species and 2 varieties. He and Vimala Bai (1941) while describing desmids from Kodai Kanal in Pulneys at 7-8000 ft above the sea level recorded 35 forms included under 13 genera. Eight forms were new record in India and one form was new. Under his guidance several modern Indian phycologists such as Balkrishnan, Desikachary, Kanthamma, Ramanathan, Subramanyan and other received training. His major contribution includes work on life history of *Cylindrocapsa geminella* and a new genus *Clyndrocapsopsis indica* from India, formation of gametes in *Caulerpa* spp., morphology and cytology of *Polysiphonia platycarpa*, sexual reproduction in *Microdictyon tenuis* and reduction division and auxospore formation in *Cyclotella menegheniana* (diatom). His most outstanding contribution lies in the discovery of terrestrial green alga *Fritschella tuberosa*, a most advanced form of Chaetophorales. Among his other important papers, "Some interesting green algae" is fascinating in which he recorded the occurrence of *Chlamydomonas volvocinae* — a new species inhabiting the coenobium of *Volvox*, and a few new species such as *Physicocytium indicum*, *Chlamydomonas eudorineae*, *C. ulotrichae*, *C. oocysticola*, *C. dictyosphaeriae*, *Paulschulzia indica*, *Gloeococcus pyriformis*, *Characiosiphon rivularis*. Iyengar and Desikachary established a new genera *Mastigocladopsis* which has both lateral and terminal heterocysts.

Bruhl and Biswas (1922, 50) described the algae of Eastern India from Bengal and Assam. Conger, DE-Terra and Patterson have studied the diatom flora of Kashmir. Subramanyan (1946) described 171 forms of marine planktons belonging to 64 genera. Of these nine were new species.

R.N. Singh has carried out exemplary work on varied branches of algae such as Cyanophyceae, Zygnemataceae, Oedogoniaceae and Chaetophorales. He studied the life histories of *Fritschella tuberosa* and *Draparnaldiopsis indica*. He has suggested the cultivation of blue-green algae for the reclamation of Usar land in India and has also written a monograph entitled "Role of the green algae in the economy of Indian agriculture." His wide range studies include mutagenesis in the blue-green algae, electron microscopic structure of cyanophycean cell (*Oscillatoria princeps*) and report on germination of heterocyst in

*Gloeotrichia ghosei* which reveals that heterocysts have a reproductive function leading to the direct propagation of alga. He has contributed quite a lot about nitrogen fixation by blue-green algae and has established that *Aulosira fertilissima* tops the list in India.

Among present Indian phycologists H.D. Kumar is outstanding. He has worked on parasexuality and metabolic behaviour of blue-green algae mainly *Anacystis nidulans*. He has written several books on various topics.

Because of Indian subcontinent fringed with oceanic water, studies on marine algae have fascinated prospects from fundamental and economic point of views. J.N. Misra has worked on marine algae especially on their distribution in India. He has also contributed a book "Phaeophyceae in India". Contributions of Phillipose, Alikhuni and Ganapati are also substantial on planktonic studies of inland waters. Venkataraman (1939) has described 98 forms of diatoms from S. India. Of these 67 are new records in India, 3 new species, 6 new varieties and 6 new forms. Besides he has written many books and is presently working on Nitrogen fixation and Cyanophages.

M.S. Randhawa (1932-60) published a series of papers specially on Zynemaceae, Oedogoniales and Vaucheriaceae from Punjab and Uttar Pradesh. He recorded seventy species in Zygnemaceae which include eleven new species of *Spirogyra*. In 1939, he described *Sirocladium kumaoense*, a new genus and species from Kumaon. He described certain terrestrial green algae including *Zygnema terrestre* and two new species of *Oedogonium*. He has reported a new kind of akinete formation in *Vaucheria geminata* and six species of *Vaucheria* from Punjab. It includes one new species, *V. amphibia*.

T.V. Desikachary (1946) described germination of the heterocyst in *Gloeotrichia raciborskii* and *Rivularia magninii*. He has described three new species of *Camptylonemopsis*—*C. pulneyensis*, *C. minor* and *C. Iyengarii* from S. India. He has worked on various branches of blue green algae, diatoms and red algae of India. His contributed monograph "Cyanophyta" is an authentic Indian record of the subject. His paper entitled "Origin of filamentous condition and phylogeny in blue-green algae" is of outstanding merit. One of his students, Padmja (1965) reported occasional occurrence of dichotomy in *Phormidium* and true branching in *Plectonema* and *Phormidium*.

B.N. Prasad is well known for his contribution on cytology of algae specially of *Schizomeris*, *Zygnema* and *Mougeotia*. His other work of general interest includes the systematic description of algae (some Nostocaceae from U.P., Algae of alkaline usar soil and Thermal algae of Himalayan hot springs), notes on conjugation in *Zygnema*; loop formation in *Heterothrix* and some interesting morphological features in *Tolypothrix*. He has recorded three new species of *Zygnema* and one each in *Calothrix* and *Camptylonema*. He has a credit of first time collection of certain forms in India such as *Uronema gigas*, *Heterothrix trichoides*, *Botrydiopsis arrhiza*, *Coleochaete nitellarum*. He has described nearly 6 genera and several species as new records from India.

A.K. Mitra, D.C. Pandey and his collaborators worked on varied aspects which include the description of new taxa *Chloranomela palmelloides*, *Chlorogloeopsis fritschii*, *Symphaeonemopsis katniensis*, life histories of *Uronema terrestre*, *Sirogonium*, *Microchaete*, *Anabaenopsis*, *Anabaena*, *Nostoc*, *Calothrix*; reinvestigations in *Camptylonema* and ecological studies on the algae of paddy fields of U.P., M.P., Andhra, Karnataka, Tamil Nadu, Bengal and Bihar. Mitra has also worked on N<sub>2</sub> fixation (see Nitrogen Fixation).

A new field for utilisation of algae to boost rice productivity and multiply protein contents has been explored by A.C. Shukla, who carried out intensive work on influence of algal growth promoting substances on growth, yield and protein contents of rice plants. He

suggested, should rice seeds be pretreated with extracts of *Phormidiumfoveolarum*, *P. tenue* and *P. frigidum*, algal growth promoting substances in the extract markedly promote vegetative growth, development and yield of rice crop.

In the form of books, bulletins and journals, the following list would justify the Indian contribution in the subject.

1. The Records of Botanical Survey of India by K. Biswas (1945).
2. Cyanophyta by T.V. Desikachary (1959).
3. Zygnemaceae by M.S. Randhawa (1959).
4. Charophyta by B.P. Pal, V.S. Sundaralingam and G.S. Venkataraman (1962).
5. Proceedings of Symposium on Algology, ICAR (1960).
6. Role of blue-green algae in the nitrogen economy of Indian Agriculture by R.N. Singh (1961)
7. Ulotrichales by K.P. Ramnathan (1964).
8. Vaucheriaceae by G.S. Venkataraman (1964).
9. Cultivation of algae by G.S. Venkataraman (1969).
10. Algae: Forms and function by G.S. Venkataraman, S.K. Goyal, B.D. Kaushik and P. Roychoudhury (1974).
11. Phaeophyceae in India by J.N. Misra (1966).
12. International Symposium: Taxonomy and Biology of blue-green algae, Univ. of Madras (1970).
13. Work done on blue green-algae in relation to agriculture by A. Sankaram (1971).
14. Advances in Applied Phycology. (2. vols.) Eds. A.C. Shukla and S.N. Pandey.
15. Phykos, published periodically from New Delhi.
16. Research Journal of Plant and Environment published periodically from Kanpur, Editor S.N. Pandey.