

records for the region. However, identification of Antarctic lichens is a challenging task. Phenotypic variation due to the harsh climatic conditions is a common factor in Antarctic lichens and underestimation of this leads to incorrect identification. Blizzards, continuous light or darkness, low temperature and humidity are the major abiotic factors responsible for the phenotypic variation seen in Antarctic lichens. The freeze-thaw actions of the lichen thallus, slow growth, abnormal regeneration, animal feeding and fungal parasitism are other factors contributing significantly to the phenotypic variation. Out of 427 lichens that are known from the Antarctica, about 73% are microlichens (crustose-squamulose forms), which are the toughest groups to identify and require mostly detailed microscopic observation. These microlichens develop only a thin, primitively organized thallus, which is either completely affixed to the substratum over the whole lower surface or hidden in the uppermost layer of rock (endolithic). The microlichens are capable of colonizing in extreme habitats better than any other macroscopically visible plants. The lack of floras and monographs, unavailability of important type collections, lack of representative collections adequate to study the variability and distribution further complicate the taxonomy of Antarctic lichens¹¹. The study of Antarctic lichens also demands prior working experience of a researcher with lichens of alpine, polar or cool temperate regions. The difficulties, excitement or inadequate knowledge in taxonomy of Antarctic lichens can be explained with the example of Dodge¹², who reported a total of 429 lichens

from Antarctica, among which nearly half was described by Dodge alone or with collaborators, while the remaining half was by others lichenologists. The work of Dodge had been subjected to severe criticism and reexamination by several lichenologists. Castello and Nimis¹³ re-examined and reduced the number of Antarctic endemics of Dodge from 152 to 31 valid taxa; the types of 94 species were proved to be synonymous to previously described species, while 27 were either poorly developed or non-lichenized parasitic fungi.

Realizing the need in taxonomy of Antarctic lichens, more reliable flora have been recently published by Øvstedal and Smith². However, with the present rate of lichenological activities in the Antarctica by various countries, soon there will be bulk accumulation of new data and certainly the present flora becomes outdated. Lichenological research in a small area like Schirmacher Oasis is an example of continuous source of new data.

1. Torrey, J., *Am. J. Sci. Arts*, 1823, **6**, 104–106.
2. Øvstedal, D. O. and Smith, R. I. L., *Lichens of Antarctica and South Georgia: A Guide to Their Identification and Ecology*, Cambridge University Press, UK, 2001, p. 411.
3. Golubkova, N. S. and Simonov, I. M., *Trudy Sovet Skoy Antarkti Cheskoj Eksfeditzii Leningrad*, 1972, **60**, 317–327.
4. Richter, W., In *The Schirmacher Oasis, Queen Maud Land, East Antarctica and its Surroundings* (eds Bormann, P. and Fritzsche, D.), Jastus Perthes Verlag Gotha, Gotha, 1995, pp. 321–347.

5. Wafar, S. and Untawale, A. G., In *Scientific Report – First Indian Expedition to Antarctica*, DOD, New Delhi, 1983, pp. 182–185.
6. Upreti, D. K., *Willdenowia*, 1996, **25**, 681–686.
7. Upreti, D. K., *Feddes Rept.*, 1997, **108**, 281–286.
8. Upreti, D. K. and Pant, G., In *Scientific Report – Eleventh Indian Expedition to Antarctica*, DOD, New Delhi, 1995, pp. 229–241.
9. Pandey, V. and Upreti, D. K., In *Scientific Report – Seventeenth Indian Expedition to Antarctica*, DOD, New Delhi, 2000, pp. 185–201.
10. Gupta, R. K., Sinha, G. P. and Singh, D. K., *Indian J. For.*, 1999, **22**, 292–294.
11. Hertel, H., *Polarforschung*, 1988, **58**, 65–76.
12. Dodge, C. W., *Lichen Flora of the Antarctic Continent and Adjacent Islands*, Phoenix Publishing, New Hampshire, 1973, p. 399.
13. Castello, M. and Nimis, P. L., *Bibl. Lichenol.*, 1995, **57**, 71–92.

ACKNOWLEDGEMENTS. We thank Dr P. Pushpangadan, Director, NBRI for providing laboratory facilities, and National Centre for Antarctic and Ocean Research, Goa and Department of Ocean Development, New Delhi for their expedition-related assistance.

SANJEEVA NAYAKA
D. K. UPRETI*

*Lichenology Laboratory,
National Botanical Research Institute,
Rana Pratap Marg,
Lucknow 226 001, India
e-mail: upretidk@rediffmail.com

Changes in local intertidal seaweed habitats in the Andaman and Nicobar Islands after 26 December 2004 tsunami

The Andaman and Nicobar islands located in the subduction zone of the Burma Plate was the most affected region of India due to the recent tsunami on 26 December 2004. Here some interesting observations made by the author during 15–30 January 2005 as a part of spot surveys carried out at various coastal locations of the Andaman and Nicobar islands are reported.

Intertidal areas being more hospitable for seaweed growth¹, the survey was conducted at intertidal locations of different islands of Andaman and Nicobar, viz. South Point Port Blair, South Andaman Island; Obugza, South Andaman Island; Mayabandar, Middle Andaman Island and Malakka, Car Nicobar Island. The intertidal areas at South Point Port Blair, Obugza, Mayabandar and Malakka either

showed destruction or edifice of seaweed habitats. The intertidal areas in the tropical region are dynamic and harbour a diverse range of seaweeds having a variety of life forms, which enable them to colonize faster compared to other higher organisms². The inundation of seawater during high tide at South Point Port Blair, Obugza and Malakka allowed fugitive seaweed species like *Enteromorpha compressa*, *E.*



Figure 1. *a*, New seaweed habitat (road) at South Point Port Blair, South Andaman. (Inset) Close-up of *Enteromorpha compressa* community developed on the roadside due to change in water boundary during high tide. *b*, New seaweed habitat (debris of construction) at Malakka, Car Nicobar. (Inset) Growth of *E. flexuosa* on the remains of a house. *c*, Destruction of seaweed habitat (mangrove vegetation) at Mayabandar, Middle Andaman. (Inset) Leftover mangrove trunk with *Bostrychia* plants. *d*, New seaweed habitat (coconut orchard) at Obragza, South Andaman.

flexuosa, *Chaetomorpha spiralis*, *Ulva* sp. and *Padina* sp. to colonize in the new seaweed habitats over the roads, debris and remains of destructed houses and coconut orchards (Figure 1*a, b, d*). As this post-tsunami change in the water boundaries is permanent, it would develop into a new seaweed settlement over available substrate. Prior investigations^{3,4} had revealed that the phenomenon of such successions takes several months to attain equilibrium colonization. However, destruction of seaweed habitats at Mayabandar (Figure 1*c*) is mainly due to damage to mangrove vegetation. It has been evident from the remnants of the population of *Catenella*, *Caloglossa*, *Bostrychia* and *Ceramium* species that the seaweeds should have existed luxuriantly prior to the tsunami in the areas of destructed mangrove vegetation. The restoration of these habitat-specific seaweed

populations would take longer time, since it depends on the establishment of mangrove plants. Though these preliminary observations are made right after the tsunami havoc, continuous monitoring of seaweed populations at these locations is recommended for better understanding of their refurbishment.

1. Mairh, O. P., Reddy, C. R. K. and Raja Krishna Kumar, G., In *Seaweed Resources of World* (eds Critchley, A. T. and Ohno, M.), Japan International Cooperation Agency, Japan, 1998, pp. 110–126.
2. Fritsch, F. E., *The Structure and Reproduction of Algae*, Vol. II, Vikas Publishing House Pvt Ltd, New Delhi, 1979, p. 939.
3. Misra, J. N., In *Proc. Symp. on Algology* (ed. Kachiroo, P.), ICAR, New Delhi, 1960, pp. 187–203.
4. Srinivasan, K. S., In *Indian Botanical Society Silver Jubilee Session* (ed. Sahni, B.), Allahabad, 1947, pp. 267–278.

ACKNOWLEDGEMENTS. I thank Prof. B. Jha, Marine Algae and Marine Environment Discipline for extending the necessary facilities to carry out the work and Dr Pushpito K. Ghosh, Director, Central Salt and Marine Chemicals Research Institute for encouragement. I also thank Dr P. G. Diwakar, Deputy Director and Head, Botanical Survey of India, Port Blair for facilities provided and logistic support, and Dr M. Palanisamy for help during collection work.

VAIBHAV A. MANTRI

*Marine Algae and Marine Environment Discipline,
Central Salt and Marine Chemicals Research Institute,
Gijubhai Badheka Marg,
Bhavnagar 364 002, India
e-mail: vaibhav@csmcri.org*