CHAPTER 8

CONCLUSION
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Lichen is a micro ecosystem by itself, composed of an autotrophic partner, the alga and a heterotrophic partner, the fungus. Lichens are therefore unique in their physiology among all other organisms. Smaller plants like lichens are by and large always been neglected. Its role from being the pioneer of succession to be commercially used in the spices, dyes, medicines and another uses has been well acclaimed. After the Rio Convention on biodiversity, interest in conservation biology has rapidly increased all over the world, including concern for lower
plants (Negi 1996; Negi & Kreem 1996; Negi & Gadgil 1997; Sonderstorm et al., 1992; Upreti 1995). Several workers are doing research on lichens in different parts of India. This includes floristic, monographic and revisionary studies. There is plenty of scope to conduct monographic work on several genera particularly the crustose forms (Upreti 2001). The North Eastern region of India has been in focus for its high biodiversity and this region has been a priority for leading conservation agencies of the world. While WWF has identified the entire Eastern Himalayas as a priority Global 200 Eco region while Conservation International has up scaled the Eastern Himalaya Hotspot which initially covered the states of Arunachal Pradesh, Sikkim, Darjeeling Hills, Bhutan, and Southern China to the Indo Burma Hotspot (Myers 2000) which now includes all the eight states of North-East India, along with the neighbouring countries of Bhutan, southern China and Myanmar. There are few exhaustive exploration work done in the NE region giving due importance to the possible potentials of the lichens in the region which includes the work on lichen flora of Nagaland by Singh & Sinha (1994) and some other cursory collections by other workers. The present work will definitely throw some light on the lichens of this region of India and also work as baseline information for future studies. Various parts of India are still virgin for lichenological exploration. The present research work provided a complete account of 71 species belonging to 32 genera and 15 families reported from the Cachar district. The present floristic studies carried out on a single host tree (*Areca catechu*) of Cachar district of Assam revealed 5 species (*Graphis striatula, Phaeographis lobata, Phaeographis subtigrina, Lecanactis*
**Conclusion**

*patellarioides* and *Antracothecium globiferum*) belonging to 5 genera and 3 families (Graphidaceae, Roccelaceae and Pyrenulaceae) are reported new for India. *Tetromelos* is the new genera for India reported from the study area. The Eastern Himalayan region is the richest lichen diversity in the country (Singh, 1999). Interestingly, though the study indicated as many as 16 species added to the flora of North east, 30 to the flora of Assam and 31 added to the flora of Southern Assam, which will be helpful in preparation of floristic account of lichens from Assam in future. There are 14 endemic species detected in this study and they are *Arthonia inconspicua*, *Arthothelium confertum*, *Arthothelium chiodectoides*, *Diorygma megasporum*, *Graphis capillacea*, *Hemithecium aphaneomicrosorum*, *Buellia morehensis*, *Pyxine austroindica*, *Pyrenula introducta*, *Anthracotheium cristatellum*, *Trypethelium albopruinosum*, *Trypethelium assimile*, *Trypethelium endosulphureum* and *Trypethelium indicum*. It is interesting to mention that *Areca catechu* having smaller in trunk diameter but higher number of lichen colonization. Extensive study covering *Areca catechu* trees and different host trees from other areas of the district are likely to afford more new species, genera and the family too. Among the three growth forms only two growth forms were detected throughout the study area. The crustose form dominates the area with 58 species, followed by 13 species of foliose lichens. The fruticose form of lichens exhibits their complete absence in the study area. The Graphidaceous genera such as *Graphis*, *Phaeographis* and *Diorygma* together with *Parmotrema* of the family Parmeliaceae and *Pyxine* and *Dirinaria* of the family Caliciaceae were growing luxuriantly in almost all the
localities of the district. The Eastern Himalayan foothills have moist, damp climate suitable for the growth of many Graphidaceous and Pyrenocarpous lichens and a number of foliose and follicolous lichens (Upreti, 2001). As lichens are capable of indicating the microclimatic changes of their habitat the present enumeration of lichens in the area will constitute a baseline record for conducting future environmental biomonitoring studies.

The detailed ecological parameters used for distribution, frequency, density, abundance, important value index, species richness indices, diversity indices, evenness measures and similarity indices of lichens will act as a baseline information for future biomonitoring and other environmental pollution studies in the area as lichens are sensitive to their microclimatic habitat. Industrialization and urbanization are the important reasons for the loss lichen diversity.

The topography and the nature of bark as substratum are important factors in determining the lichen growth on a tree. Environmental conditions such as climate, substrate, light and moisture play important roles in the distribution of lichens (Kershaw 1985). Many of the trees have barks which are somewhat smooth or utmost medium to rough in texture. Aspect of trees, nature of bark substratum, bark pH, water holding capacity are considered important factors to determine the distribution of lichens in host trees. Measurement of bark pH and water holding capacity provide insight into the quality of substrate available for epiphytic lichens. As the *Areca catechu* tree have smooth bark and low pH which preferred Pyrenocarpous and Graphidaceous lichens which grows luxuriantly in the study area. Vertical zonation and diameter breast height (DBH) were the most
significant factors explaining most of epiphytic groups, while tree bark pH affect the lichen species richness.

Metal accumulation with the help of naturally growing or transplanted lichens is a valid and useful technique in countries like India owing to its economic and increase urbanization. This study is the first attempt dealing with metal concentrations in lichens to investigate damage to chlorophyll in the transplanted lichen *Dirinaria aegialita* in relation to different levels of air pollution at selected monitoring sites in the city. Control site has minimum element concentration than other transplanted sites. Chlorophyll content is minimum in transplanted sites and however chlorophyll degradation is maximum in transplanted sites. Such monitoring could provide a useful marker for traffic flow and support the role of lichens as monitors of environmental as well as human health.

The available account of lichens will be utilized in future for preparation of monographs on the Indian lichens. Further investigations on lichens growing on different substrates of the region are needed, and would have important implications for the management of these habitats to ensure the survival of the lichen species occurring in the region. The lichen flora of the cachar district is remarkably rich and diverse. These are distinct species assemblages at different sites, showing restrictive species distribution, and signifying a need for protection of large areas for lichen conservation. However, mires as the habitat deserve more lichenological attention in the future in this region.