CHAPTER 9

Ethnic Uses of Lichen
ETHNIC USES OF LICHENS

Since ancient times, lichens have been a household item in India. Lichens collected from the temperate regions of the Himalayas are used indigenously and also exported. The Himachal Pradesh and Uttarakhal hills are the main areas of lichen collection in India. Few ethnic groups in the central Indian region of Madhya Pradesh and in certain localities of the Western Ghats also collect these plants.

The Indian subcontinent harbors a rich lichen flora representing about 2,450 species (Awasthi, 2000). During the last 50 years, the lichen flora of India has declined considerably in diversity and abundance. Upreti (1995) assessed the different influences responsible for the loss of lichen diversity in India. Important variables include the
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change in ecological conditions, loss of forest cover and habitat, and growth of urban and industrial areas. In hilly regions of India, the various human activities such as *Jhoom* cultivation, agriculture, mineral extraction, tourism, hydroelectric and road-building projects, are leading to the rapid deterioration of lichen-rich habitats. The overexploitation and selective removal of economically important lichens by local people have now become the major threat to the lichen flora of India.

Kumar and Upreti (2001) compiled records of the early use of lichen in various cultural events in India. *Shipal* in *Atharveda* (1500 B.C.) is the first record of the use of lichen as medicine. The vernacular name *Charila* is widely used in *Ayurveda*, an ancient system of medicine in India. The Sanskrit synonyms for lichens are *Shailaya* and *Shila Pushp* (*Shila*, rock; *Pushp*, flower). At Kannauj, a town of Uttar Pradesh that has been famous for the past 800 years for its perfume production, lichens are today used in the preparation of an indigenous perfume named 'Otto' (*the Hina Attar*). Lichen powder or whole plants are a major ingredient of the common condiments used in food dishes, known as *Gharm Masala*, meat *Masala*, and *Sambar Masala*. Certain *Ayurvedic* and Unani medicines sold in Indian markets under the trade names *Charila* and *Ushna*, respectively, are composed of different species of lichens. Some species of lichens are burned in holy sacrificial fires known as *Hawan* or *Homa* often mixed with other aromatic herbs.

Upreti (1996) reviewed the ethnobotanical utilization of lichens in India which are used. The amount of raw material required in India for the various uses of lichens is quite large. The lichens weigh very little when dry; hence a large volume of these plants is required. There are 320 tons of lichens used annually for various purposes in Nepal and the adjoining regions of India (Moxham, 1986). The lichens are picked by hand, or sometimes scraped, from the lower branches, trunks, and fallen twigs of trees. The lichens
exploited in India grow at rates from 5 mm/year to about 2 cm/year for the most rapidly growing leafy (foliose) or shrubby (fruticose) lichens.

Shah (1997) mentioned four commercial grades of lichens in India. Grade I, which is the best quality lichen for export, for extraction of resinoids, and which is essential for use in high-grade perfumery, consists of Parmotrema nilgherrense (Nyl.) Hale. Grade II consists of a mixture of P. nilgherrense with species of Everniastrum, while grades III and IV generally consist of Usnea longissima Ach., and a mixture of other Usnea, Ramalina, and Heterodermia species. The graded lichens are transported in 10 to 15 kg bags to various cities in India such as Lucknow, Kannauj, Bombay, Delhi, Varanasi, and Kolkota, as well as abroad to Saudi Arabia or London (Richardson 1991). Lichens can be found for sale in grocery shops as Charila in most cities in India. Shah (1997) has documented the need for protection and conservation of lichens in India because of their intense exploitation, but conservation has not received the desired attention.

**Traditional uses of lichens**

Lichens have been used in traditional medicine since the time of the first Chinese and Egyptian civilizations. Their utilization in folklore as medicine has been cited in different pharmacopoeias of the world. During the middle-ages lichens figured prominently among the herbs used by medicinal practitioners (Hale 1983). The use of lichens in medicine can be traced back to antiquity. *Evernia furfuracea* has been found in an Egyptian vase belongs to 18th Dynasty (1700-1600 BC) was used as a drug (Llano 1948).

The literary review and records of medicinal plant lore of India show the word ‘Shipal’ is used for algae in Rigveda (6000-4000 BC), a text where the first authentic record of ‘Oushadhi’ (medicine) has been described. The medicinal properties attributed
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to Shipal as lichen are in Avkolve as mentioned in Athraveda (1500 BC). Subsequently a number of Sanskrit synonyms of lichens, for example, ‘Shailaya’ and ‘Shilapushp’ – have been described in Sushruta Samhita (1000 BC), Charaka Samhita (300-200 BC) and several Nighantu (1100-1800 AD). The Sanskrit names were later identified to several species of Parmelioid lichens, such as P. cirrhata and P. perforata (=Parmotrema perforatum (Jacq.) Mass.) (Kumar and Upreti, 2001). The vernacular name Charila is widely used in Ayurveda, an ancient system of Indian medicine, for different disease and disorders, for example, headache, skin diseases, urinary trouble, boils, vomiting, diarrhoea, dysentery, heart trouble, cough, fever, leprosy and as a blood purifier. Parmelia sulcata, which is described in medicinal plant lore of India, is also reported as medicinally useful by Hale (1983) in cranial maladies.

Doctrine of signature

The fame of many lichens derive from the Doctrine of Signature, which is very old in genesis and was raised to an accepted science by Paracelsus but is now discredited. The Doctrine signature relies on the concept that like affects the like. Hence plants designed by the creator for human beings may be expected to bear a sign pointing to its special use. Lobaria pulmonaria (L.) Hoffm., was used to treat lung disease because of its superficial resemblance to lung tissue. The long filaments of Usnea barbata Wigg., were used for strengthening after confinement. Xanthoria parietina being yellow supposed to cure jaundice, while Peltigera apthosa (L.) Willd., the thallus of which is dotted with small warts like tubercles, was recommended for children who suffer from ‘Thrush’.
Charila, the crude Indian drug

Chandra and Singh (1971) provided a detailed description of crude drug ‘Charila’ sold in Indian markets which comprises three species of Parmelia; *P. perlata* (L.) Ach. (*=Parmotrema chinense* (Osbeck) Hale & Ahti), *P. perforata* (Wulf.) Ach. (*=Parmotrema perforatum* (Ach.) Mass.) and *P. sancti-angelii* Lynge (*=P. sancti-angeli* (Lynge) Hale). The drug has astringent, resolvent, laxative, carminative properties and is also supposed to possess aphrodisiac property. The drug is considered to be useful in dyspepsia, spermatorrhoea, amenorrhoea, calculi, diseases of blood and heart, stomach disorders, enlarged spleen, bronchitis, bleeding piles, scabies, leprosy, excessive salivation, soreness of throat, tooth-ache and general pain. The smoke of ‘Charila’ is believed to relieve headache. The powdered drug is applied to wounds, besides a good cephalic snuff.

Lichen metabolites and their importance

About 800 metabolites produced by lichens are identified (Huneck and Yoshimura 1996) and new ones are being identified every now and then. The secondary metabolites produced by lichens are unique with respect to those of higher plants. Biological activities of a lichen is mostly due to presence of the secondary metabolites present in them. However, their therapeutic potential not yet fully explored and thus remains pharmaceutically unexploited. This is certainly due to difficulties encountered in identification of species and collection in bulk quantity. Müller (2001) provided a list of such pharmaceutically relevant metabolites belonging to group aliphatic acids, pulvinic acid derivatives, depsides and depsidones, dibenzofurans, anthraquinones, naphthoquinones and epidithiopiperazinediones. Similarly, Boustie and Grube (2005) discussed the diversity of secondary metabolites, their evolutionary pattern, genes
involved in their production, bioactive molecules and their potential use. Slow growth of lichen and in axenic culture is the major hurdle for easily obtaining desired metabolite. However, culture conditions of the mycobiont can be optimized to synthesize interesting secondary compounds and researches are underway elsewhere in this direction.

**Ethnomedicinal lichens of India**

During the last five decades of the last century, exhaustive ethnobotanical work has been carried out by several workers in different part of India, with major emphasis on higher plants where as the ethnobotanical aspects of cryptogamic groups such as algae, fungi, lichens and bryophytes have not received adequate attention. Brij Lal (1988, 1990), Brij Lal and Upreti (1995), Saklani and Upreti (1992) have collected ethnomedicinal information on a few species of lichens used by the different tribal and non-tribal communities of India. Upreti *et al.* (2005) listed 15 lichen species used by various tribes in India in their daily life either as medicine or as asthetics. Upreti and Chatterjee (2007) reviewed world wide ethnomedicinal information on more than 50 lichen taxa. Most of the acids present in the lichens used by the tribals have been reported as antibacterial or antiviral by Asahina and Shibata (1954). The lichen acids are mainly phenolic-carboxylic acids (atranorin, lobaric, salazinic acids), fatty acids (protolichersterenic acid) and triterpenes (zeorin) derivatives.

**Indian medicinal lichens**

India has a rich diversity of lichens represented by more than 2050 species. The lichens are abundant in temperate and alpine regions of the Himalayas and hilly regions of Peninsular India. Several lichens are already in use in traditional medicine of the country. Out of the 137 species lichens having medicinal uses, 36 are used in traditional
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medicine in India and elsewhere. Most of them have been studied for their biological activity. The biological screening of lichen for active molecules can be grouped in to three main categories, antimicrobial, antioxidant and anti-cancer. About 55 lichens that also occur in India were screened for antimicrobial activity, about 57 species, including a major proportion of Graphidaceaeous lichens have been studied for antioxidant property while about 37 for anti-cancer, cytotoxicity and other activities. There are few lichens which have shown anti-inflammatory, immunomodulating and hepatoprotective activity.

The medicinal lichens enumerated from India represented by 25 families. Parmeliaceae with 39 species and consisting of both foliose and fruticose genera is most widely utilized. Among the growth forms foliose (64 taxa) and fruticose (36 taxa) lichens were mostly utilized for their medicinal properties, as they can be easily recognizable, pickable and yield good biomass. About 37 crustose lichens were also been utilized for their biological screening, however they mostly belongs to Graphidaceae family and experimented by a single research group of Behera et al. (2003, 2004, 2006). In most of the cases of ethnomedicine or biological screening crude drug or crude extract is used. The polysaccharides or usnic acid is found to be the isolated biologically active molecules in many cases.

*Cetraria islandica*, otherwise known as ‘Iceland moss’ is the most commonly utilized lichen and has been included among the drugs listed in 50 pharmacopoeias or dispensaries of the period 1840s in Europe (Vartia 1973), also been screened for various biological activity. *Cladonia rangiferina, Evernia prunastri, Everniastrum cirrhatum, Hypogymnia physodes, Parmotrema chinense, Peltigera canina* and *Usnea longissima* (Fig. 2-8) are the other lichens mostly utilized for traditional medicine and biological screening.
Lichen used by ethnic people of Along town, West Siang District, Arunachal Pradesh

Information of the ethbotanical utilization of lichens were obtained by the interaction with the local people. As the study area comprises of only few foliose lichens, a single species of *Leptogium* is used by the local people of Along town. *Leptogium denticulatum* Nyl., a cyanobacteria photobiont containing lichens is used by the local people as vegetable.

The species mostly grow in moist, shady places both of trees and on soil in association with mosses. The species is easily recognized by its dark grey brown colour with whitish glabrous (tomentum) under surface. Due to the presence of wide lobes of the lichen thallus the local ethnic group called it ‘Eki Nyaru’ means ‘Dog’s ear’. The lichen species is more prominent in rainy season when the thallus becomes more greenish and waxy in appearance. The local people use this lichen as vegetable.

Mode of usage: The local people collect the lichen both from soil and tree trunk. Wash it properly and boil with water. The soup and boiled thallus which becomes jelly like after boiling is used as vegetable.

Some of the lichen species which are used as vegetables by ethnic groups have bitter taste due to the presence of lichen acids. Interestingly, the *Leptogium denticulatum*, a cyanolichen do not possess secondary metabolites except some polysaccharides.