

Endemic lichens of India

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Singh, K.P., Sinha, G.P & Bujarbarua, P. 2004. Endemic lichens of India. *Geophytology* 33 (1&2): 1-16.

Endemicity in Indian lichens has been worked out. There are about 2050 species of lichens known to occur in India, of which 518 species i.e. 25.26% are endemic. It is observed that crustose forms show high degree of endemism as compared to foliose and fruticose forms. In the present state of knowledge the family Graphidaceae contains the maximum number and is represented by 74 species. Other families with high endemism are Arthoniaceae (71 spp.), Pyrenulaceae (62 spp.), Trypetheliaceae (57 spp.), Parmeliaceae (43 spp.), Thelotremataceae (38 spp.), Physciaceae (33 spp.), etc. *Awasthiella* and *Heppsora*, occurring in Eastern Himalayan region and Western Ghats respectively are two monotypic endemic genera in the country. Similarly, some of the major genera showing high degree of endemism in India according to number of species are *Arthothelium* (35 spp.), *Pyrenula* (29 spp.), *Graphina* (24 spp.), *Trypethelium* (23 spp.), *Cryptothecia* (21 spp.), *Graphis*, *Pleurotrema* and *Porina* (20 spp. each), *Pertusaria* (19 spp.), *Laurera* (18 spp.), *Thelotrema* (16 spp.), *Buellia* and *Ocellularia* (15 spp. each), etc. At regional level, the Western Ghats has the highest number and is represented by 219 endemic species, followed by Eastern Himalaya (177 spp.), Andaman & Nicobar Islands (93 spp.) and Western Himalaya (39 spp.) In this paper, an attempt is made to enlist all the Indian endemic species along with their distribution in different lichenogeographical regions. Extensive explorations in unexplored and under explored areas will be helpful to ascertain more accurate data on endemism in Indian lichens and the status of individual species for formulating effective conservation strategies in future.

Key-words - Endemic lichens, Distribution, Frequency, India

ENDEMISM is the phenomenon of confinement of species or taxa in a particular area or habitat. Generally, endemic species are isolated by geographical (spatial), ecological or temporal (genetic, adaptive, etc.) barriers. The significance of flora of any region or country is greatly enhanced by the presence of endemic elements. The concept of endemism in Indian flowering plants has already been discussed earlier by Chatterjee (1962), who studied the Indian flora in great detail with a view to ascertain its endemic status. Balakrishnan (1996) estimated that more than 6100 out of about 17,500 species of flowering plants (more than 36%) are endemic to India. However, for Indian lichens Singh and Sinha (1997) estimated about 23% (466 out of 2021 spp.) of total species as endemic and majority of them belong to micro lichens. With the gearing up of lichen studies in the country, new localities have been explored and subsequently the status, diversity and distributional records of various lichens have also changed. Consequently, accumulated information on the endemism of Indian lichen is being discussed in the present paper.

ENDEMISM IN INDIAN LICHEN FLORA

India is a vast country with interesting and rich flora of all groups. Lichens, one of the important components of flora are universally present almost in all climatic conditions and grow in a wide variety of habitats. Their distribution is largely influenced by altitudinal increase from sea level upwards and prevalent climate. The lichen spores and vegetative propagules have the ability to germinate and colonize even if minimum favourable conditions are available. This may be the probable reason of existence of lichens even at very high altitude, where other plants usually do not grow. The country is known to have 8 lichenogeographical regions (Singh & Sinha 1997), viz. Western Himalayan region, Eastern Himalayan region, Western Dry region, Gangetic Plains, Central India, Western Ghats, Eastern Ghats and Deccan Plateau and Andaman and Nicobar Islands. The diverse climatic and habitat conditions of these regions provide favourable conditions for speciation and endemism.

A list of the endemic lichens of India with their distribution in different lichenogeographical regions is presented in Table 1.

Although the country harbours a rich lichen population, but many parts of the country are still unexplored or underexplored. At regional level, of the 8 lichenogeographic regions, only Western Himalaya, Eastern Himalaya, Western Ghats and Andaman & Nicobar Islands are better explored lichenologically. Therefore to identify a particular area rich in endemism will not be wise as the actual picture will emerge only after thorough explorations in other areas of the country i.e. Western Dry region, Gangetic plains, Central India and Eastern Ghats. At present, in terms of numbers the Western Ghats has the highest number (219) of endemic species, followed by Eastern Himalaya (177 spp.), Andaman & Nicobar Islands (93 spp.) and Western Himalaya (39 spp.) Therefore, these regions may be considered as centres of rich lichen endemism. A large number of endemic species of these regions have restricted distribution, while certain species show extended distribution and grow in more than one lichenogeographical region, thereby increasing the number of endemic species in a particular region. The present status of endemism in different lichenogeographical regions of India is discussed as follows.

STATUS OF ENDEMISM

- i) **Western Himalayan region :** The Western Himalayan region includes Himachal Pradesh, Jammu and Kashmir and Uttaranchal states. The topography of the area is irregular due to valleys and plateaus of various dimensions. Here vegetation is mainly dominated by subtropical, temperate and alpine elements, as altitude extends up to more than 7500m. In the present state of our knowledge out of 550 spp. of lichens occurring in this region, about 39 species are endemic, which constitute 7.09% of the total lichen flora of the region. *Pyrenula*, *Pertusaria* with 4 and 3 species respectively show highest endemism. Some endemic species of this region are *Anaptychia pseudoroemeri*, *Aspicilia almorensis*, *Buellia almorensis*, *Caloplaca pindarensis*, *Hypogymnia alpina*, *Lecanora kumaoensis*, *Parmelina mussooriensis*, *Pertusaria himalayensis*, *P. pallidula*, *Physcia gomukhensis*, *Psora himalayana*, *Pyrenula himalayana*, *P. subochraceoflavens*, *Stereocaulon paradoxum*, *Umbilicaria jingralensis*, etc.
- ii) **Eastern Himalayan region:** The region includes Darjeeling district of West Bengal and states of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura. The region consists of high mountains as well as small to large sized valleys with varied climatic conditions. The altitude extends upto 7500m above the sea level. Eastern Himalayan region is the richest lichenogeographical region of India with ca 850 species. The endemic lichens of this region are also high as 177 species i.e. 20.82% of the total lichen flora is endemic to this region and 8.63% of the Indian lichen flora. Some of the dominant endemic genera of this region are *Graphis* (17 spp.), *Trypethelium* (12 spp.) *Graphina* (11 spp.), *Arthothelium* (10 spp.), *Pyrenula* (7 spp.), *Anthracotheicum* (8 spp.), *Arthonia*, *Buellia*, *Phaeographina* and *Phaeographis* (5 spp. each). Some endemic species of Eastern Himalaya are *Acarospora indica*, *Anthracotheicum cristatellum*, *A. pustuliferum*, *Arthonia collectiva*, *A. recedens*, *Awasthiella indica*, *Baeomyces pachypus*, *Buellia pinicola*, *Coenogonium himalayense*, *Collema hookeri*, *Graphis assamensis*, *Heterodermia indica*, *Hypogymnia thomsoniana*, *Hypotrachyna rigidula*, *Nephroma sikkimensis*, *Parmelina nagalandica*, *Parmelinella manipurensis*, *Phaeographis manipurensis*, *Usnea mekista*, etc.
- iii) **Western Dry region :** The states of Punjab and Rajasthan are included under this region. The climate of this region is entirely different because of irregular rainfall and extreme temperature. Only Mount Abu area of Rajasthan state is known lichenologically, therefore the status and diversity is based on meagre data. A total of about 14 (out of 39) species are found to be endemic to this region. Some of these are *Graphina noralbiata*, *G. salacinilabiata*, *Heppia trichophora*, *Lithothelium indicum*, *Lopadium granulosum*, *Megalospora verruculosa*, *Phylliscum abuense*, *Physcia abuense*, etc.

- iv) **Gangetic Plains :** The region extends from eastern Rajasthan through plains of Uttar Pradesh to Bihar and West Bengal. The region is further divided into upper and lower Gangetic plain. The lichen flora of this region is yet to be worked out thoroughly. Out of total 224 species reported from this region, 24 species e.g. *Diplotomma alboatrior*, *Endocarpon nigro-zonatum*, *E. rosettum*, *Laurera benguelensis*, *L. pseudovaria*, *Mycobilimbia calcuttensis*, etc. are endemic to this region.
- v) **Central India:** This region includes Chhattisgarh, Jharkhand, Madhya Pradesh, parts of Orissa, Andhra Pradesh and Gujarat. Except for some sporadic reports on the lichen flora, no major works have been carried out in this region. About 48 species of lichens occur in this region, of which 13 species are endemic. The endemic species of this region are *Buellia quartziana*, *B. subgalaziouana*, *Diplotomma megasporum*, *Pertusaria nigrescens*, *Pyrenula nanospora*, *Rinodina makenziei*, etc.
- vi) **Western Ghats:** The Western Ghats is a vast region extending from Tapti valley in the north of Gujarat to Kanyakumari in Tamil Nadu. The region consists of hills spreading north-south along the west coast traversing the states of Gujarat, Maharashtra, Goa, Karnataka, Kerala and Tamil Nadu. The region enjoys tropical climate and is one of the richest lichen site of India. Of the total 800 species occur in this region, 219 species *i.e.* 27.37% of total lichen flora of this region and 10.68% of Indian lichen flora are endemic. *Arthothelium* (18 spp.), *Porina* (16 spp.), *Pyrenula* (14 spp.), *Cryptothecia*, *Ocellularia*, *Pertusaria*, and *Pleurotrema* (12 spp. each), *Usnea* (11 spp.), *Graphis* (10 spp.), *Laurera* (9 spp.), *Phaeographis* and *Thelotrema* (8 spp. each), *Parmentaria* and *Phaeographina* (7 spp. each), *Anthracotheceum* and *Buellia* (6 species each), etc. are some of the major genera of this region with high endemic species. *Anthracotheceum awasthii*, *A. goaense*, *Arthonia inconspicua*, *Arthothelium albescens*, *Brigantiaea nigra*, *Catillaria nilgiriensis*, *Heppsonia indica*, *Hypotrachyna coorgiana*, *Leptogium indicum*, *Parmotrema kamatii*, *Thyrea indica*, *Usnea nilgirica*, *U. austroindica*, etc. are known to be endemic to this region.
- vii) **Eastern Ghats and Deccan Plateau:** This region consists of broken isolated hills. Although the lichen flora of this region is not worked out properly, the available data shows that *Buellia hemispherica*, *Caloplaca orissensis*, *Conotrema indicum*, *Rocella belangeriana*, etc. are endemic to this region.
- viii) **Andaman and Nicobar Islands:** Andaman and Nicobar in Bay of Bengal consist of about 300 islands, covering an area of about 8300 sq. km. The lichen flora of this region is unique in terms of diversity and endemism. The region is famous for foliicolous taxa. There are over 307 species of lichens known to occur in this region and 93 species are endemic. Genera with high endemism in the region are *Pyrenula* (12 spp), *Pleurotrema* (9 spp.), *Graphina* and *Trypethelium* (8 spp. each), *Thelotrema* (7 spp.), *Cryptothecia* (5 spp.), etc. *Arthonia catenulata*, *Arthothelium bessale*, *Astrothelium subvariolosum*, *Bottaria awasthii*, *Clathroporina duplicascens*, *Graphina andamanica*, *Laurera alboverruca*, *Minksia alba*, *Ocellularia guptei*, *Pleurotrema andamanicum*, *P. corticola*, *Porina andamanensis*, *Pyrenula andamanica*, *P. mastophorhiza*, *Thelotrema rugatum*, etc. are some of the endemic species occurring in this region.

DISCUSSION AND CONCLUSION

The present analysis of the endemic lichens of India revealed that the country is a 'hotspot' in terms of lichen diversity as 25.26% of the total lichens of the country are endemic. Within the country endemism particularly in the regions like Western Ghats, Eastern Himalaya, and Andaman and Nicobar Islands are very high as compared to the other parts of the country. There is a general perception that lichens do not show high degree of endemism as compared to flowering

	1	2	3	4	5	6	7	8
<i>A. bisporum</i> K. Singh & Sinha		+						
<i>A. chiodectoides</i> (Nyl.) Zahlbr.				+				
<i>A. chlorofuscum</i> Makh. & Patw.						+		
<i>A. coccineonigrum</i> Makh. & Patw.								+
<i>A. confertum</i> (A.L. Smith) Makh. & Patw.		+						
<i>A. consociatum</i> Makh. & Patw.		+						
<i>A. corticatum</i> Makh. & Patw.						+		
<i>A. deplanatum</i> (Mull. Arg.) Makh. & Patw.		+				+		
<i>A. erumpens</i> Mull. Arg.		+						
<i>A. fuscoroseum</i> makh. & Patw.						+		
<i>A. impolitellum</i> (Nyl.) Makh. & Patw.				+				
<i>A. indicum</i> (Müll. Arg) Makh. & Patw.		+						
<i>A. karnatakanse</i> Makh. & Patw.						+		
<i>A. keralense</i> Makh. & Patw.						+		
<i>A. maculatum</i> Makh. & Patw.						+		
<i>A. nigrescens</i> Makh. & Patw.		+				+		
<i>A. nigrodiscum</i> Patw. & Makh.						+		
<i>A. nilamburens</i> Makh. & Patw.								+
<i>A. plicatum</i> Makh. & Patw.						+		
<i>A. pycnocarpoides</i> Mull. Arg.		+						
<i>A. ramosum</i> Makh. & Patw.						+		
<i>A. rimulosum</i> Makh. & Patw.								+
<i>A. subruanum</i> Makh. & Patw.						+		
<i>A. verruculosum</i> Patw. & Makh.						+		
<i>A. violaceoatrum</i> Makh. & Patw.								+
<i>A. zahlbrucknerii</i> Makh. & Patw.						+		
ASPICILIA Massal. (Hymeneliaceae)								
<i>A. almorensis</i> Räsänen	+							
<i>A. dwaliensis</i> Räsänen	+							
ASTROTHELIUM Eschew (Astrotheliaceae)								
<i>A. subvariolosum</i> Makh. & Patw.								+
AULAXINA Fée (Gomphillaceae)								
<i>A. uniseptata</i> R. Sant.		+						
AWASTHIELLA K. Singh (Verrucariaceae)								
<i>A. indica</i> K. Singh		+						
BACIDIA De Not. (Bacidiaceae)		+						
<i>B. chinsurensis</i> (Stirton) Zahlbr.		+						
<i>B. convexula</i> (Mull. Arg.) Zahlbr.		+						
<i>B. fusconigrescense</i> var. <i>oleosa</i> Awasthi						+		
<i>B. incongruens</i> (Stirton) Zahlbr.		+						
BAEOMYCES Pers. (Baeomycetaceae)								
<i>B. pachypus</i> Nyl.		+						
BOTTARIA Massal. (Trypetheliaceae)								
<i>B. awasthii</i> Makh. & Patw.								+
BRIGANTIAEA Trevisan (Brigantiaceae)								
<i>B. nigra</i> Awasthi						+		
<i>B. ionoexcipula</i> (Patw. & Makh.) Awasthi						+		
BUELLIA De Not. (Physciaceae)								
<i>B. almorensis</i> S. Singh & Awasthi	+							
<i>B. confusa</i> Aswasthi		+						
<i>B. hemispherica</i> S. Singh & Awasthi							+	
<i>B. indica</i> S. Singh & Awasthi		+				+		
<i>B. isidiophora</i> Awasthi & Upreti						+		
<i>B. meghalayensis</i> S. Singh & Awasthi		+						
<i>B. montana</i> H. Magn.	+							
<i>B. morehensis</i> K. Singh & S. Singh		+						

	1	2	3	4	5	6	7	8
<i>B. nilgiriensis</i> S. Singh & Awasthi						+		
<i>B. palniensis</i> Awasthi & K. Singh						+		
<i>B. pinicola</i> S. Singh & Awasthi		+						
<i>B. quartziana</i> S. Singh & Awasthi					+			
<i>B. subglaziouana</i> S. Singh & Awasthi					+			
<i>B. subsororioides</i> S. Singh & Awasthi						+		
<i>B. substigmaea</i> S. Singh & Awasthi	+					+		
CALICIUM Pers (Caliciaceae)								
<i>C. adpersum</i> ssp. <i>himalayensis</i> G. Pant & Awasthi		+						
<i>C. subquercinum</i> ssp. <i>nanun</i> G. Pant & Awasthi		+						
CALOPLACA Th Fr. (Teloschistaceae)								
<i>C. holochracea</i> (Nyl.) Zahlbr.	+	+						
<i>C. orissensis</i> (Räsänen) Awasthi							+	
<i>C. pindarensis</i> (Räsänen) Awasthi	+							
CATILLARIA Massal. (Catillariaceae)								
<i>C. cervinofusca</i> (Nyl.) Zahlbr.								+
<i>C. nilgiriensis</i> G. Pant & Awasthi						+		
<i>C. obscura</i> G. Pant & Awasthi						+		
CLATHROPORINA Müll. Arg. (Trichothelia-ceae)								
<i>C. anoptella</i> (Stirton) Zahlbr.		+						
<i>C. duplicascens</i> (Nyl.) Zahlbr.								+
COENOGONIUM Ehrenb. in Nees (Gyalectaceae)								
<i>C. himalayense</i> G. Pant & Awasthi		+						
COLLEMA Weber ex Wigg. (Collemataceae)								
<i>C. hookeri</i> Degel.		+						
CONOTREMA Tuck. (Stictidaceae)								
<i>C. indicum</i> Makh. & Patw.							+	
CROCYNIA (Crocyniaceae)								
<i>C. indica</i> B. de Lesd.	+							
CRYPTOTHECIA Stirton (Arthoniaceae)								
<i>C. albomaculata</i> Makh. & Patw.						+		
<i>C. anamalaiensis</i> Patw. & Makh.						+		
<i>C. assimilis</i> Makh. & Patw.		+				+		
<i>C. awasthii</i> Makh. & Patw.						+		
<i>C. culbersonae</i> Patw. & Makh.						+		
<i>C. dispersa</i> Makh. & Patw.								+
<i>C. dissimilis</i> Makh. & Patw.								+
<i>C. emergens</i> Makh. & Patw.						+		
<i>C. faveolata</i> Makh. & Patw.						+		
<i>C. flaveomaculata</i> Makh. Patw.		+						
<i>C. groenhartii</i> Makh. & Patw.						+		
<i>C. involuta</i> Stirton		+						
<i>C. macrocarpa</i> Makh. & Patw.						+		
<i>C. nilgiriensis</i> Makh. & Patw.						+		
<i>C. oblecta</i> Makh. & Patw.						+		
<i>C. polymorpha</i> Makh. & Patw.								+
<i>C. porosa</i> Makh. & Patw.								+
<i>C. punctulata</i> Makh. & Patw.								+
<i>C. sublecta</i> Stirton		+						
<i>C. verrucominuta</i> Makh. & Patw.						+		
DERMATOCARPON Hedwig (Verrucariaceae)								
<i>D. miniatum</i> var. <i>meuselianum</i> (Schubert & Clem.) Awasthi & Upreti	+							
DIPLOSCHISTES Norman (Thelotremataceae)								
<i>D. awasthii</i> G. Pant & Upreti	+							
<i>D. megalosporus</i> Lumbsch & Mayrhofer						+		

	1	2	3	4	5	6	7	8
<i>O. canara</i> Hale						+		
<i>O. canariana</i> Patw., Sethy & Nag.						+		
<i>O. garoana</i> Patw. & Nag.		+				+		
<i>O. guptei</i> (Nag., Sethy & Patw.) Awasthi								+
<i>O. jamesii</i> (Patw. & Kulk.) Awasthi						+		
<i>O. karnatakensis</i> Hale						+		
<i>O. mahabalei</i> (Patw. & Kulk.) Awasthi						+		
<i>O. neomasonhalei</i> (Patw., Sethy & Nag.) Awasthi						+		
<i>O. patwardhanii</i> Hale						+		
<i>O. submicrosporoides</i> (Nag., Sethy & Patw.) Awasthi								+
<i>O. subperforata</i> Nag., Sethy & Patw.						+		
<i>O. udupiensis</i> Patw., Sethy & Nag.						+		
<i>O. verrucoisidiata</i> Nag., Sethy & Patw.						+		
<i>O. verrucomarginata</i> Patw., Sethy & Nag.						+		
<i>O. wandoorensis</i> Nag., Sethy & Patw.								+
OPEGRAPHA Ach. (Opegraphaceae)								
<i>O. andamanica</i> Upreti & A. Singh								+
<i>O. bengalensis</i> Upreti & A. Singh				+				
<i>O. laeta</i> Stirton				+				
<i>O. longula</i> Nyl.								+
<i>O. subsulcata</i> Mull. Arg.		+						
<i>O. tenuior</i> Stirton		+						
PARMELARIA Awasthi (Parmeliaceae)								
<i>P. subthomsonii</i> Awasthi	+	+						
PARMELINA Hale (Parmeliaceae)								
<i>P. chozoubae</i> K. Singh		+						
<i>P. nagalandica</i> K. Singh & Sinha		+						
<i>P. mussooriensis</i> (Awasthi) Awasthi	+							
PARMELINELLA Elix & Hale (Parmeliaceae)								
<i>P. manipurensis</i> (K. Singh) Elix & Hale		+						
PARMELINOPSIS Elix & Hale (Parmeliaceae)								
<i>P. microlobulata</i> (Awasthi) Elix		+						
<i>P. pindarensis</i> (Awasthi & S. Singh) Elix & Hale	+							
PARMENTARIA Fée (Trypeliaceae)								
<i>P. albidopora</i> Makh. & Patw.								+
<i>P. andamanensis</i> (A. Singh & Upreti) Makh. & Patw.						+		
<i>P. indica</i> Upreti & A. Singh		+						
<i>P. keralensis</i> (Patw. & Makh.) A. Singh						+		
<i>P. maculata</i> Makh. & Patw.						+		
<i>P. nicobarensis</i> Makh. & Patw.								+
<i>P. occulta</i> Makh. & Patw.						+		
<i>P. oligospora</i> Makh. & Patw.						+		
<i>P. operta</i> Makh. & Patw.						+		
<i>P. verrucosareolata</i> Makh. & Patw.						+		
PARMOTREMA Massal. (Parmeliaceae)								
<i>P. erhizinosum</i> (Awasthi) Awasthi						+		
<i>P. kamatii</i> Patw. & Prabhu						+		
PECCANIA Massal. ex Arnold (Lichiniaceae)								
<i>P. hoegii</i> Awasthi	+							
PELTIGERA Willd. (Peltigeraceae)								
<i>P. pindarensis</i> Awasthi & Joshi	+							
PERTUSARIA DC. in Lam. & DC. (Pertusariaceae)								
<i>P. acuta</i> Mull. Arg.						+		
<i>P. amarkantakensis</i> Srivastava & Awasthi	+				+	+		
<i>P. colorata</i> Awasthi & Srivastava						+		
<i>P. dehiscens</i> Mull. Arg. var. <i>depressior</i> Mull. Arg.						+		

	1	2	3	4	5	6	7	8
<i>P. aggregatum</i> (Makh. & Patw.) Awasthi						+		
<i>P. andamanicum</i> (Makh. & Patw.) Awasthi								+
<i>P. bisporum</i> (Makh. & Patw.) Awasthi								+
<i>P. complanatum</i> (Makh. & Patw.) Awasthi								+
<i>P. corticola</i> (Makh. & Patw.) Awasthi								+
<i>P. filisporum</i> Patw., Makh. & Rane						+		
<i>P. flavopallidum</i> (Makh. & Patw.) Awasthi						+		
<i>P. harrisii</i> (Makh. & Patw.) Awasthi						+		
<i>P. immersum</i> (Makh. & Patw.) Awasthi						+		+
<i>P. indicum</i> (Makh. & Patw.) Awasthi						+		
<i>P. karnatakense</i> (Makh. & Patw.) Awasthi						+		
<i>P. macrosporum</i> (Makh. & Patw.) Awasthi						+		
<i>P. megaspermum</i> Makh. & Patw.						+		
<i>P. microcarpum</i> (Makh. & Patw.) Awasthi								+
<i>P. monosporum</i> (Makh. & Patw.) Awasthi						+		
<i>P. muelleri</i> (Makh. & Patw.) Awasthi						+		
<i>P. punctatum</i> (Makh. & Patw.) Awasthi								+
<i>P. straminicolor</i> (Makh. & Patw.) Awasthi								+
<i>P. tarmugliense</i> (Makh. & Patw.) Awasthi						+		
<i>P. verrucosum</i> (Makh. & Patw.) Awasthi								+
PORINA Müll. Arg. (Trichotheliaceae)								
<i>P. andamanensis</i> Upreti & A. Singh								+
<i>P. andamanica</i> Makh., Adaw. & Patw.								+
<i>P. angustata</i> Makh., Adaw. & Zahlbr.			+			+		+
<i>P. atropertiola</i> Makh., Adaw. & Patw.						+		
<i>P. aurantiaca</i> Makh., Adaw. & Patw.						+		
<i>P. elliptica</i> Makh., Adaw. & Patw.						+		
<i>P. glaucoflava</i> Makh., Adaw. & Patw.						+		+
<i>P. halei</i> Makh., Adaw. & Patw.						+		
<i>P. indica</i> Makh., Adaw. & Patw.								+
<i>P. isidiata</i> Makh., Adaw. & Patw.						+		
<i>P. karnatakensis</i> Makh., Adaw. & Patw.						+		
<i>P. microcarpa</i> Makh., Adaw. & Patw.						+		
<i>P. multiloculata</i> Makh., Adaw. & Patw.						+		
<i>P. nilgiriensis</i> Awasthi & K. Singh						+		
<i>P. ochrostoma</i> Makh., Adaw. & Patw.						+		
<i>P. palniensis</i> Awasthi & K. Singh						+		
<i>P. santessonii</i> Makh., Adaw. & Patw.						+		
<i>P. subgigantospora</i> Makh., Adaw. & Patw.			+			+		
<i>P. subinterestes</i> (Nyl.) Müll. Arg.								+
<i>P. subsanctirosae</i> Makh., Adaw. & Patw.						+		
PROTOBLASTENIA (Zahlbr.) Steiner (Psoraceae)								
<i>P. manipurensis</i> (K. Singh) G. Pant & Awasthi			+					
PSORA Hoffm. (Psoraceae)								
<i>P. himalayana</i> (Bab.) Timdal		+						
PSORELLA Müll. Arg. (Biatoraceae)								
<i>P. isidiophora</i> Awasthi & K. Singh						+		
<i>P. isidiza</i> Patw. & Nag.			+					
<i>P. psorina</i> (Nyl.) Zahlbr.						+		
PYRENASTRUM Eschw. (Trypetheliaceae)								
<i>P. oblitescens</i> (Stirton) Makh. & Patw.			+					
PYRENULA Ach. (Pyrenulaceae)								
<i>P. anamalaiensis</i> (Upreti & A. Singh) Upreti						+		
<i>P. andamanica</i> A. Singh & Upreti								+
<i>P. bicarpa</i> Upreti						+		+
<i>P. coactella</i> (Stirton) Upreti			+					

	1	2	3	4	5	6	7	8
<i>P. elegans</i> A. Singh & Upreti						+		+
<i>P. himalayana</i> Upreti	+							
<i>P. immisa</i> (Stirton) Zahlbr.	+	+				+		
<i>P. introducta</i> (Stirton) Zahlbr.	+	+				+		
<i>P. karnatakensis</i> Upreti						+		
<i>P. kurzii</i> A. Singh & Awasthi					+	+		+
<i>P. longislandica</i> A. Singh & Upreti								+
<i>P. mamillata</i> (A. Singh) Upreti								+
<i>P. mastophoriza</i> (Nyl.) Zahlbr.								+
<i>P. microspora</i> (Nag. & Patw.) Upreti		+						
<i>P. nanospora</i> (A. Singh) Upreti					+			
<i>P. nodulata</i> (Stirton) Zahlbr.		+						
<i>P. nuda</i> A. Singh & Upreti								+
<i>P. pluricarpa</i> (A. Singh) Upreti						+		
<i>P. scutata</i> (Stirton) Zahlbr.		+				+		
<i>P. subacutalis</i> Upreti					+	+		
<i>P. subandamanica</i> Upreti						+		
<i>P. subcamptospora</i> Upreti								+
<i>P. subindica</i> Upreti						+		
<i>P. sublaevigata</i> (Patw. & Makh.) Upreti		+		+				
<i>P. submastophora</i> A. Singh & Upreti						+		
<i>P. subnitidella</i> (Nyl.) Mull. Arg.						+		+
<i>P. subochraceoflavens</i> Upreti	+							+
<i>P. suboligocarpa</i> Upreti								
<i>P. subrizalensis</i> A. Singh & Upreti						+		
PYXINE Fr. (Physciaceae)								+
<i>P. austroindica</i> Awasthi						+		
<i>P. berteriana</i> (Fee) Imsh. var. <i>himalaica</i> Awasthi	+	+						
<i>P. himalayensis</i> Awasthi		+						
<i>P. keralensis</i> Awasthi						+		
<i>P. nilgiriensis</i> Awasthi						+		
<i>P. palniensis</i> Awasthi						+		
RAMALINA Ach. (Ramalinaceae)								
<i>R. berteri</i> Bel.								
<i>R. himalayensis</i> Räsänen		+				+		
<i>R. indica</i> Fr.		+				+		
RINODINA (Ach.) Gray (Physciaceae)								
<i>R. mackenziei</i> Räsänen								
<i>R. megaspora</i> (Awasthi & Agarwal) Awasthi		+				+		
ROCCELLA DC. (Roccellaceae)								
<i>R. belangeriana</i> Awasthi							+	
SARCOGRAPHA Fée (Graphidaceae)								
<i>S. maculosa</i> (Stirton) Zahlbr.		+						
SARCOGRAPHINA Müll. Arg. (Graphidaceae)								
<i>S. maculata</i> K. Singh & Sinha		+						
SARCOGYNE Flotow (Acarosporaceae)								
<i>S. sikkimensis</i> Räsänen		+						
SCHISMATOMMA Flotow & Körb. ex Massal. (uncertain in Arthoniales)								
<i>S. atomellum</i> (Stirton) Zahlbr.								
<i>S. cinereum</i> (Mull. Arg.) Zahlbr.		+				+		
<i>S. flavisedellum</i> (Nyl.) Zahlbr.								
<i>S. gregantulum</i> (Mull. Arg.) Zahlbr.		+						+
SPHINCTRINA Fr. (Sphinctrinaceae)								
<i>S. exilis</i> Stirton		+						
<i>S. gomphilloides</i> Nyl.								
<i>S. nitidula</i> Stirton						+		
						+		

	1	2	3	4	5	6	7	8
STEREOCAULON (Schreb.) Hoffm. (Stereocaulaceae)								
<i>S. paradoxum</i> Lamb	+							
STIRTONIA A. L. Smith (Arthoniaceae)								
<i>S. alboverrucosa</i> Makh. & Patw.								
<i>S. dubia</i> A.L. Smith								+
<i>S. macrocarpa</i> Makh. & Patw.		+						
<i>S. monospora</i> Awasthi & K. Singh								+
<i>S. ramosa</i> Makh. & Patw.						+		
<i>S. santessonii</i> Makh. & Patw.								+
THELIDIOPSIS Nyl. (Verrucariaceae)								+
<i>T. mangiferae</i> Räsänen	+							
THELOCARPON Ach. (Acarosporaceae)								
<i>T. palniensis</i> Awasthi & K. Singh								
THELOPSIS Nyl. (Stictidaceae)								
<i>T. inordinate</i> Nyl.								
THELOTREMA Ach. (Thelotremataceae)								
<i>T. albidopallens</i> Nyl.								
<i>T. annuloelevatum</i> Nag., Sethy & Patw.						+		+
<i>T. armellense</i> Patw., Sethy & Nag.						+		+
<i>T. canarense</i> Patw. & Kulk.						+		
<i>T. confertum</i> Nag., Sethy & Patw.						+		
<i>T. crateriforme</i> Bel.						+		
<i>T. dehiscens</i> (Stirton) Zahlbr.						+		
<i>T. exertum</i> (Stirton) Zahlbr.		+						
<i>T. keralense</i> Sethy, Nag. & Patw.						+		
<i>T. khasianum</i> Patw. & Nag.		+						+
<i>T. poeltii</i> Patw. & Kulk.						+		
<i>T. polythecium</i> Sethy, Nag. & Patw.								+
<i>T. rugatulum</i> Nyl.								+
<i>T. subcalvescens</i> Nyl.								+
<i>T. subexpallescens</i> Nag., Sethy & Patw.								+
<i>T. tetrasporum</i> (Stirton) Awasthi		+						+
THYREA Massal. (Lichinaceae)								
<i>T. indica</i> Awasthi & K. Singh						+		
TRYPETHELIUM Sprengel (Trypetheliaceae)								
<i>T. albopruinosum</i> Makh. & Patw.								+
<i>T. andamanicum</i> Makh.								+
<i>T. assimile</i> Stirton		+						
<i>T. dichroum</i> Makh. & Patw.								+
<i>T. dissimilum</i> Makh.		+						
<i>T. endosulphureum</i> Makh. & Patw.		+						
<i>T. flavoalbum</i> Makh. & Patw.								+
<i>T. flavocinereum</i> Makh. & Patw.								
<i>T. hebetum</i> Makh. & Patw.						+		
<i>T. inamoenum</i> Mull. Arg.		+						
<i>T. indicium</i> Makh. & Patw.		+						
<i>T. indutum</i> Stirton		+						
<i>T. luteum</i> Taylor								
<i>T. macrosporum</i> Makh. & Patw.		+				+		
<i>T. meghalayense</i> Makh. & Patw.		+						
<i>T. microsporum</i> Makh. & Patw.								
<i>T. microstomum</i> Makh. & Patw.								+
<i>T. nigrosporum</i> Makh. & Patw.								+
<i>T. nigrorufum</i> Makh. & Patw.		+						
<i>T. parvicarpum</i> Makh. Patw.								+
<i>T. plicatorimosum</i> Makh. & Patw.								+
						+		

	1	2	3	4	5	6	7	8
<i>T. rubrocinctum</i> Makh. & Patw.		+						
<i>T. subnitidiusculum</i> Makh. & Patw.		+				+		
TYLOPHORON Nyl. in Stiz (Cyphellaceae)								
<i>T. nidulans</i> Stirton		+				+		
UMBILICARIA Hoffm. (Umbilicariaceae)								
<i>U. jingralensis</i> Nag. & Patw.	+							
USNEA Dill ex Adans. (Parmeliaceae)								
<i>U. austroindica</i> G. Awasthi						+		
<i>U. corallina</i> Mot.						+		
<i>U. fischeri</i> G. Awasthi						+		
<i>U. ghattensis</i> G. Awasthi						+		
<i>U. indica</i> Mot.	+							
<i>U. mekista</i> (Stirton) G. Awasthi		+						
<i>U. nilgirica</i> G. Awasthi						+		
<i>U. pictoides</i> G. Awasthi						+		
<i>U. spinulosa</i> Stirton						+		
<i>U. stigmatoides</i> G. Awasthi						+		
<i>U. subchalybaea</i> Zahlbr.						+		
<i>U. venosa</i> Mot.						+		
<i>U. vulneraria</i> Mot.						+		
ZAHLBRUCKNERELLA Herre <i>em</i> Henssen (Lichinaceae)								
<i>Z. indica</i> Awasthi & S. Singh								

plants, because the spores and vegetative propagules can withstand extreme conditions for a long period, and are easily blown off to distant places. But the barrier of high mountains in the north, separation of southern region of the country by large water bodies of Arabian Sea, Bay of Bengal and Indian Ocean, extremely arid conditions in the west and humid tropical conditions of Western Ghats and northeast region are some of the important factors that contribute to the endemism in Indian lichen flora.

A large number of endemic species occur in the moist tropical and subtropical forests and have restricted distribution in a particular lichenogeographical region may be due to the inability or poor adaptability of species to wide range of ecological conditions. High endemism in crustose forms may be because of simple nature of the thallus. However, the statistics of endemism as well as distributional records of many species is subjected to change as some of these are known only from single gathering, type locality, etc. Extensive explorations in unexplored and under explored areas will be helpful to ascertain accurate data on endemism in Indian lichens and their regional status in days to come.

Endemic species are most vulnerable to extinction as they occur in narrow geographical area or region. Various kinds of biotic and abiotic threats are responsible for the degradation of lichen habitat and subsequent depletion of their population in the country. According to Jain and Sastry (1980) 'if endemic species are eliminated from our country it will mean they will be annihilated from the whole world, will be lost to science, will be struck off the roles of biological resources of this earth'. Hence in every conservation effort priority should be given to endemics. For Indian lichens, it is required to estimate the population status of endemic as well as rare and threatened lichen taxa in their type localities. Mapping of endemic species with the help of Global Positioning System (GPS) is another measure to mark the exact location of the species. Frequent monitoring of the habitat is also necessary to determine the changes. The taxa, whose habitat is under serious threat of destruction, can be transplanted to other suitable area. Lichens are one of the important components of Indian biodiversity, therefore appropriate strategy is required to conserve lichens of the country in general and endemic, rare, threatened lichen taxa in particular.

ACKNOWLEDGEMENT

The authors are grateful to Director, Botanical Survey of India, Kolkata for encouragement and to Deputy Director, Botanical Survey of India, Shillong for facilities.

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