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An updated list of lichens from Great Himalayan National Park, Kullu district, Himachal Pradesh

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ABSTRACT

The present communication enumerates a total of 318 lichen species, representing 104 genera and 33 families from Great Himalayan National Park, Himachal Pradesh. The family Parmeliaceae is the most abundant family in the park with 71 species, followed by Physciaceae with 31 species. Among the different growth forms, foliose lichens are the most prevalent with 142 species, while crustose lichens account for 126 species. A doughnut chart illustrates the distribution of lichen taxa across various families while wave graph was created to highlight the number of lichen taxa under different growth forms. The data on lichen diversity in the park provides baseline information for future biomonitoring and bioprospecting studies.

INTRODUCTION

The Great Himalayan National Park (GHNP) is recognized as one of the world's key biodiversity hotspots for unique species. It is situated in the Banjar subdivision of Kullu district in Himachal Pradesh. It lies within the upper catchments of the Tirthan, Sainj, Jiwanal, and Parvati rivers. Geographically, the GHNP spans from 31°38'28'' to 31°54'58'' North and 77°20'11'' to 77°45'00'' East with elevation ranging from 1,700 to 5,800 m. The GHNP is renowned for its diverse ecosystems, *in situ* conservation of numerous endemic and endangered high-altitude species, scenic beauty, and its growing eco-tourism potential (Bandna, 2005). More than half of the GHNP area is located above 4,000 m, which roughly marks the upper limit of subalpine and alpine scrub vegetation in this part of the Himalayas. The forested zones showcase a wide variety of vegetation types typical to the area, with notable stands of dominant tree species such as *Abies pindrow, Cedrus deodara, Pinus wallichiana, P. roxburghii, Picea smithiana* and *Quercus* species. Besides, the GHNP also harbor rich diversity of fungi, lichens, bryophytes and ferns. The rich diversity of plants and animals in the GHNP is largely attributed to its varied and overlapping ecological zones, complex topography, striking high peaks, alpine meadows, riverine forests, and wide range of altitude (Bandna, 2005).

A total of 192 lichen species belonging to 65 genera and 31 families, were recorded by Upreti and Nayaka (2000) and Yadav (2005). Srivastava (2005) added 124 new species to the GHNP lichen flora. Later, Kant et al. (2019) identified two additional lichen species, bringing the total number of lichen species GHNP to 318 species. The present paper aims to compile and present a comprehensive list of all lichen taxa found in the GHNP, accompanied by graphical representations for better illustration.

MATERIAL AND METHODS

This study is based on Ph.D. theses and published literatures, and research papers available online regarding the lichen diversity of the GHNP in Kullu (Srivastava, 2005; Yadav 2005; Kant et al. 2019), Himachal Pradesh. A detailed list of lichen species has been compiled and presented through graphical data (Table 1). The nomenclature of the species and families is based on Wijayawardene et al. (2022).

Graphical Analysis: The data was visually represented using Origin Pro 2023 software, where a wave graph was created to display the number of lichen taxa across different growth forms, and a doughnut chart was used to illustrate the abundance of lichen taxa within various families.

RESULT AND DISCUSSIONS

The current study identified 318 lichen species from the GHNP, representing 104 genera and 34 families (Table 1). The Parmeliaceae is the most dominant family with 71 species, followed by the Physciaceae with 31 species, and Lecanoraceae with 25 species. The genera *Lecanora,*

Cladonia, Parmotrema, *Heterodermia, Usnea* and *Leptogium* are dominant represented by 20, 18, 16, 16, 10, 7 species respectively. The foliose lichens were the most dominant with 142 species, followed by 126 crustose, 25 fruticose, 19 dimorphic, and 6 leprose lichens. The GHNP has rich diversity of phorophytes which are preferred by the bark inhabiting lichens exhibiting their dominance with 208 species which is followed by 128 saxicolous and 45 terricolous. To illustrate the distribution of lichen taxa across different growth forms, a wave graph was created. The higher points of the wave represent the greater number of lichen taxa, indicating higher diversity within a particular growth form. The foliose and crustose forms are positioned at the higher points of the wave, reflecting the highest diversity, while fruticose, dimorphic and leprose forms are at the lower points, showing the least diversity (Fig. 1). A doughnut chart was created to represent the abundance of lichen taxa across different families. The chart features various sectors, each marked with distinct colors, to represent different lichen families. The Parmeliaceae family, depicted in green, occupies the largest sector, accounting for 22.9% of the lichen taxa. Conversely, the smaller sectors correspond to families with fewer lichen taxa (Fig. 2).

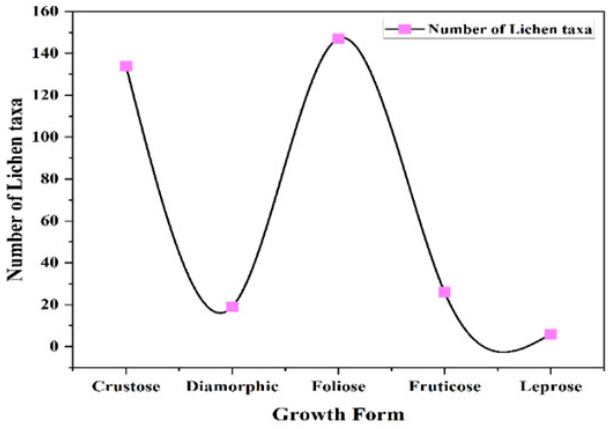

Figure 1: A graph showing number of lichen taxa in different growth forms via a wave.

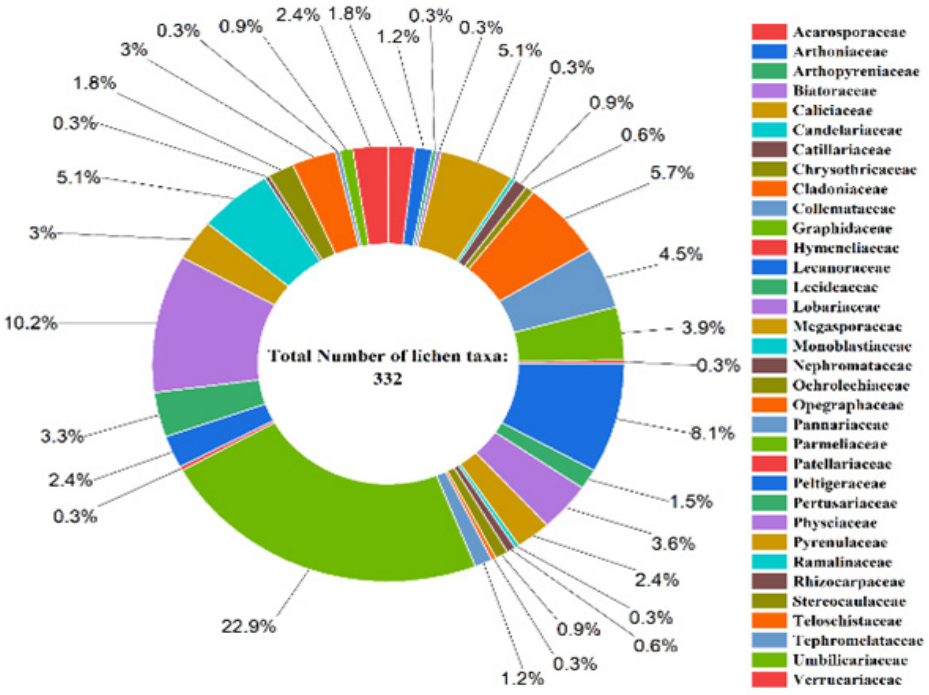

Figure 2: A Doughnut chart showing abundance of lichen taxa in different families.

Table 1: List of lichen taxa from Great Himalayan National Park

S. No.	Lichen taxa	Substratum	Growth Form
ACAROSPORACEAE			
1	*Acarospora bullata* Anzi	S	Cr
2	*A. fusca* B. de Lesd. (=*Silobia rufescens* (Ach.) M. Westb. & Wedin)	S	Cr
3	*A. schleicheri* (Ach.) A. Massal.	S	Cr
4	*A. smaragdula* (Wahlenb. ex Ach.) A. Massal. (=*Myriospora smaragdula* (Wahlenb. ex Ach.) Nägeli ex Uloth)	S	Cr
5	*A. strigata* (Nyl.) Jatta	S	Cr
6	*A. superans* H. Magn.	S	Cr
ARTHONIACEAE			
7	*Arthonia inconspicua* Stirt. (=*Synarthonia inconspicua* (Stirt.) Van den Broeck & Ertz)	C	Cr
8	*A. recedens* Stirt.	C	Cr
9	*A. tumidula* (Ach.) Ach. (=*Coniocarpon cinnabarinum* DC.)	C	Cr
10	*Arthothelium chiodectoides* (Nyl.) Zahlbr.	C	Cr
ARTHOPYRENIACEAE			
11	*Arthopyrenia alboatra* Müll. Arg.	C	Cr
BIATORACEAE			
12	*Bacidiopsora psorina* (Nyl.) Kalb	C	Cr
CALICIACEAE			
13	*Amandinea diorista* (Nyl.) Marbach	C	Cr
14	*A. montana* (H. Magn.) Marbach	C	Cr
15	*Buellia disciformis* (Fr.) Mudd	C	Cr
16	*B. indica* S. Singh et Awasthi	S	Cr
17	*B. megaspora* S.R. Singh & D.D. Awasthi	C, S	Cr
18	*B.palniensis* S.R. Singh & D.D. Awasthi	C	Cr
19	*B. substigmea* S.R. Singh & D.D. Awasthi	S	Cr
20	*Calicium adspersum* Pers.	C	Cr
21	*C. lenticulare* Ach.	C	Cr
22	*C. viride* Pers.	C	Cr
23	*Pyxine berteroana* (Fée) Imshaug	C	Fo
24	*P. cocoes* (Sw.) Nyl.	C, S,	Fo
25	*P. himalayensis* D.D. Awasthi	C	Fo
26	*P. minuta* Vain.	C, S	Fo
27	*P. petricola* Nyl.	C	Fo
28	*Tetramelas papillatus* (Sommerf.) Kalb	C	Cr
CANDELARIACEAE			
29	*Candelaria concolor* (Dicks.) Arnold	C, S,	Fo

CATILLARIACEAE			
30	*Catillaria nilgiriensis* G. Pant & D.D. Awasthi	S	Cr
31	*C. sikkimensis* (Müll. Arg.) Zahlbr.	C	Cr
CHRYSOTHRICACEAE			
32	*Chrysothrix candelaris* (L.) Laundon	C	L
33	*C. chlorina* (Ach.) J.R. Laundon	C	L
CLADONIACEAE			
34	*Cladonia awasthiana* Ahti & Upreti	T	D
35	*C. cartilaginea* Müll. Arg.	T, C	D
36	*C. chlorophaea* (Flörke ex Sommerf.) Spreng.	T, C	D
37	*C. coccifera* (L.) Willd.	T	D
38	*C. coniocraea* (Flörke) Spreng.	T, C	D
39	*C. corniculata* Ahti & Kashiw.	T, C	D
40	*C. corymbescens* (Nyl.) Nyl.	T	D
41	*C. fenestralis* Nuno	T, C	D
42	*C. fruticulosa* Kremp.	C	D
43	*C. furcata* (Huds.) Baumg.	T	D
44	*C. macroptera* Räsänen	T	D
45	*C. mongolica* Ahti	C, T	D
46	*C. ochrochlora* Flörke	C, T	D
47	*C. pocillum* (Ach.) Grognot	T, S	D
48	*C. pyxidata* (L.) Hoffm.	C, T	D
49	*C. ramulosa* (With.) J.R. Laundon	C, S, T	D
50	*C. rangiferina* (L.) Weber	C, T	D
51	*C. squamosa* Hoffm.	C, T,	D
52	*C.subradiata* (Vain.) Sandst.	T	D
COLLEMATACEAE			
53	*Collema auriculiforme* (With.) Coppins & J.R. Laundon (=*Lathagrium auriforme* (With.) Otálora, P.M. Jørg. & Wedin)	C, S	Fo
54	*C. flaccidum* (Ach.) Ach.	C	Fo
55	*C. furfuraceum* (Schaer.) Du Rietz	T	Fo
56	*C. fuscovirens* (With.) J.R. Laundon(=*Lathagrium fuscovirens* (With.) Otálora, P.M. Jørg. & Wedin_	S	Fo
57	*C. polycarpon* Hoffm. (=*Enchylium polycarpon* (Hoffm.) Otálora, P.M. Jørg. & Wedin)	S	Fo
58	*C. subflaccidum* Degel.	S	Fo
59	*C. tenax* (Sw.) Ach. (=*Enchylium tenax* (Sw.) Gray)	C, S	Fo
60	*Leptogium austroamericanum* (Malme) C.W. Dodge	S	Fo
61	*L. burnetiae* C.W. Dodge	C, S	Fo

62	*L. delavayi* Hue	C, S	Fo
63	*L. furfuraceum* (Harm.) Sierk	C, S	Fo
64	*L.* javanicum Mont.	S	Fo
65	*L. papillosum* (B. de Lesd.) C.W. Dodge	C	Fo
66	*L. pedicellatum* P.M. Jørg.	C, S	Fo
67	*L. saturninum* (Dicks.) Nyl.	C	Fo
GRAPHIDACEAE			
68	*Diploschistes actinostomus* (Ach.) Zahlbr.	S	Cr
69	*D. diacapsis* (Ach.) Lumbsch	S	Cr
70	*D. gypsaceus* (Ach.) Zahlbr.	S	Cr
71	*D. scruposus* (Schreb.) Norman	S	Cr
72	*Graphis congesta* (Fée) Müll. Arg. (=*Allographa congesta* (Fée) Lücking & Kalb)	C	Cr
73	*G. duplicata* Ach.	C	Cr
74	*G. glaucescens* Fée	C	Cr
75	*G. hossei* Vain. (=*Allographa hossei* (Vain.) Lücking & Kalb)	C	Cr
76	*Graphis supertecta* Müll. Arg. (=*Allographa supertecta* (Müll. Arg.) Lücking & Kalb)	C	Cr
77	*Opegrapha vulgata* (Ach.) Ach.	C	Cr
78	*Phaeographis inusta* (Ach.) Müll. Arg.	C	Cr
79	*P. subdividens* (Leight.) Müll. Arg.	C	Cr
80	*Platygramme wattiana* (Müll. Arg.) V.P. Tewari & Upreti	C	Cr
LECANORACEAE			
81	*Lecanora alba* Lumbsch	C	Cr
82	*L. albella* (Pers.) Ach.	C	Cr
83	*L. caesiorubella* Ach.	C	Cr
84	*L. campestris* (Schaer.) Hue	S	Cr
85	*L. cenisia* Ach.	S	Cr
86	*L. cinereofusca* H. Magn.	S	Cr
87	*L. concilianda* Vain.	C	Cr
88	*L. fimbriatula* Stirt.	C	Cr
89	*L. flavidofusca* Müll. Arg.	C	Cr
90	*L. formosula* Lumbsch	S	Cr
91	*L. indica* Zahlbr.	S	Cr
92	*L.intumescens* (Rabent.) Rabenh.	C	Cr
93	*L. imshaugii* Brodo	C	Cr
94	*L. japonica* Müll. Arg.	C	Cr
95	*L. leuteomarginata* Nayaka & Upreti	S	Cr
96	*L. muralis* var. *muralis* (Schreb.) Rabenh.	S	Cr
97	*L. phaeocardia* Vain.	C	Cr

98	*L. pseudistera* Nyl. (=*Omphalodina pseudistera* (Nyl.) S.Y. Kondr., Lőkös & Farkas)	S	Cr
99	*L. somervelli* Paulson	S	Cr
100	*L. subimmersa* (Fée) Vain.	S	Cr
101	*L. subpraesistens* Nayaka, Upreti & Lumbsch	C	Cr
102	*Lecidella carpathica* Körb.	S	Cr
103	*L. euphorea* (Flörke) Kremp	C	Cr
104	*L. stigmatea* (Ach.) Hertel & Leuckert	S	Cr
105	*Protoparmeliopsis muralis* (Schreb.) M. Choisy	S	Cr
LECIDIACEAE			
106	*Lecidea confluens* (Weber) Ach.	S	Cr
107	*Porpidia albocaerulescens* (Wulfen) Hertel & Knoph	S	Cr
108	*P. crustulata* (Ach.) Hertel & Knoph	S	Cr
109	*P. hydrophila* (Fr.) Hertel & A.J. Schwab	S	Cr
110	*P. macrocarpa* (DC.) Hertel & A.J. Schwab	S	Cr
LOBARIACEAE			
111	*Lobaria isidiosa* (Müll. Arg.) Vain.	S	Fo
112	*L. kurokawae* Yoshim.	T	Fo
113	*L. meridionalis* Vain.	T	Fo
114	*L. pindarensis* Räsänen	T	Fo
115	*L. pseudopulmonaria* Gyeln.	T	Fo
116	*L. retigera* (Bory) Trevis.	T	Fo
117	*Pseudocyphellaria crocata* (L.) Vain.	S	Fo
118	*Sticta henryana* Müll. Arg.	C	Fo
119	*S. limbata* (Sm.) Ach.	C	Fo
120	*S. nylanderiana* Zahlbr. (=*Dendriscosticta platyphylla* (Trevis.) B. Moncada & Lücking)	C, S	Fo
121	*S. platyphylloides* Nyl. (=*Dendriscosticta platyphylloides* (Nyl.) B. Moncada & Lücking)	C, S	Fo
122	*S. praetextata* (Räsänen) D.D. Awasthi (=*Dendriscosticta praetextata* (Räsänen) B. Moncada & Lücking)	T	Fo
MEGASPORACEAE			
123	*Aspicilia almorensis* Räsänen	S	Cr
124	*A. dwaliensis* Räsänen	S	Cr
125	*A. griseocinerea* Räsänen	S	Cr
126	*Aspicilia caesiocinerea* (Nyl. ex. Malbr.) Arnold (=*Circinaria caesiocinerea* (Nyl. ex Malbr.) A. Nordin, Savić & Tibell)	S	Cr
127	*Aspicilia calcarea* (L.) Sommerf. (=*Circinaria calcarea* (L.) A. Nordin, Savić & Tibell)	S	Cr
128	*Aspicilia maculata* (H. Magn.) Oksner (=*Circinaria maculata* (H. Magn.) Q. Ren)	S	Cr
129	*Lobothallia alphoplaca* (Wahlenb.) Hafellner	S	Cr

130	*L. praeradiosa* (Nyl.) Hafellner	S	Cr
MONOBLASTIACEAE			
131	*Anisomeridium terminatum* (Nyl.) R.C. Harris	C	Cr
NEPHROMATACEAE			
132	*Nephroma helveticum* Ach.	C, S	Fo
OCHROLECHIACEAE			
133	*Ochrolechia harmandii* Verseghy	C	Cr
134	*O. pallescens* (L.) A. Massal.	C	Cr
135	*O. rosella* (Müll. Arg.) Verseghy	C	Cr
OPEGRAPHACEAE			
136	*Opegrapha vulgata* (Ach.) Ach.	C	Cr
PANNARIACEAE			
137	*Fuscopannaria granulifera* P.M. Jørg. & Upreti	C	Fo
138	*F. subgemmascens* Upreti & Divakar	C	Fo
139	*Pannaria emodi* P.M. Jørg.	C	Fo
PARMELIACEAE			
140	*Bryoria bicolor* (Hoffm.) Brodo & D. Hawhsw.	C	Fr
141	*Bulbothrix meizospora* (Nyl.) Hale	C, S	Fo
142	*B. setschwanensis* (Zahlbr.) Hale	C	Fo
143	*Canoparmelia eruptens* (Kurok.) Elix & Hale	C	Fo
144	*C. texana* (Tuck.) Elix & Hale	C	Fo
145	*Cetraria delavayi* (Hue) M. Satô	C	Fo
146	*C. nigricans* Nyl.	T	Fo
147	*Cetrelia braunsiana* (Müll. Arg.) W.L. Culb. & C.F. Culb.	C, S	Fo
148	*C. cetrarioides* (Duby) W.L. Culb. & C.F. Culb.	C	Fo
149	*C. olivetorum* (Nyl.) W.L. Culb. & C.F. Culb.	C	Fo
150	*Everniastrum cirrhatum* (Fr.) Hale (=*Hypotrachyna cirrhata* (Fr.) Divakar, A. Crespo, Sipman, Elix & Lumbsch)	C	Fo
151	*E. nepalense* (Taylor) Hale (=*H. nepalensis* (Taylor) Divakar, A. Crespo, Sipman, Elix & Lumbsch)	S	Fo
152	*Flavocetrariella melaloma* (Nyl.) D.D. Awasthi (=*Nephromopsis melaloma* (Nyl.) A. Thell & Randlane)	C	Fo
153	*Flavoparmelia caperata* (L.) Hale	C	Fo
154	*Flavopunctelia borrerioides* Kurok.	C	Fo
155	*F. flaventior* (Stirt.) Hale	C	Fo
156	*F. soredica* (Nyl.) Hale	C	Fo
157	*Hypogymnia vittata* (Ach.) Parrique	C	Fo
158	*Hypotrachyna crenata* (Kurok.) Hale	C	Fo
159	*H. expallida* (Kurok.) Divakar, A. Crespo, Sipman, Elix & Lumbsch	C	Fo
160	*H. infirma* (Kurok.) Hale	C, S	Fo

161	*H. scytophylla* (Kurok.) Hale	S	Fo
162	*H. pluriformis* (Nyl.) Hale	S	Fo
163	*Hypotrachyna rhabdiformis* (Kurok.) Hale (=*Remototrachyna rhabdiformis* (Kurok.) Divakar & A. Crespo)	C, S	Fo
164	*Melanelia stygia* (L.) Essl.	S	Fo
165	*Menegazzia terebrata* (Hoffm.) A. Massal.	C	Fo
166	*Myelochroa aurulenta* (Tuck.) Elix & Hale	C, S	Fo
167	*M. irrugans* (Nyl.) Elix & Hale	C	Fo
168	*M. upretii* Divakar & Elix	C	Fo
169	*M. xantholepis* (Mont. & Bosch) Elix & Hale	C	Fo
170	*Nephromopsis pallescens* (Schaer.) Y.S. Park (=*Cetrariopsis wallichiana* (Taylor) Kurok.)	C	Fo
171	*Parmelia meiophora* Nyl.	C	Fo
172	*P. saxatilis* (L.) Ach.	C, S	Fo
173	*P. squarrosa* Hale	C	Fo
174	*Parmelinella simplicior* (Hale) Elix & Hale	C, S, T	Fo
175	*P. wallichiana* (Taylor) Elix & Hale	C, S	Fo
176	*Parmotrema andinum* (Müll. Arg.) Hale	C	Fo
177	*P. austrosinense* (Zahlbr.) Hale	C	Fo
178	*P. latissimum* (Fée) Hale	C, S	Fo
179	*P. melanothrix* (Mont.) Hale	C	Fo
180	*P. mesotropum* (Müll. Arg.) Hale	S	Fo
181	*P. nilgherrense* (Nyl.) Hale	C, S, T	Fo
182	*P. praesorediosum* (Nyl.) Hale	C, S	Fo
183	*P. pseudonilgherrense* (Asahina) Hale	C	Fo
184	*P. pseudotinctorum* (Abbayes) Hale	S	Fo
185	*P. reticulatum* (Taylor) M. Choisy	C, S	Fo
186	*P. saccatilobum* (Taylor) Hale	C, S	Fo
187	*P. subsumptum* (Nyl.) Hale	C	Fo
188	*P. subtinctorium* (Zahlbr.) Hale	C, S	Fo
189	*P. tinctorum* (Despr. ex Nyl.) Hale	C, S	Fo
190	*Punctelia borreri* (Sm.) Krog	C, S	Fo
191	*P. neutralis* (Hale) Krog	S	Fo
192	*P. rudecta* (Ach.) Krog	C	Fo
193	*P. subrudecta* (Nyl.) Krog	C, S	Fo
194	*Sulcaria sulcata* (Lév.) Bystrek ex Brodo & D. Hawksw.	C	Fr
195	*S. virens* (Gyeln.) Bystrek ex Brodo & D. Hawksw.	C	Fr
196	*Tuckneraria laureri* (Kremp.) Randlane & A. Thell (=*Nephromopsis laureri* (Kremp.) Kurok.)	C	Fo
197	*Usnea aciculifera* Vain.	C	Fr

198	*U. eumitrioides* Motyka	C	Fr
199	*U. himalayana* C. Bab	C	Fr
200	*U. longissima* Ach. (=*Dolichousnea longissima* (Ach.) Articus)	C	Fr
201	*U. orientalis* Motyka	C, S	Fr
202	*U. pectinata* Taylor (=*Eumitria pectinata* (Taylor) Articus)	C	Fr
203	*U. perplexans* Stirt.	C	Fr
204	*U. splendens* Stirt.	C	Fr
205	*U. subfloridana* Stirt.	C	Fr
206	*U. subsordida* Stirt.	C	Fr
207	*U. thomsonii* Stirt.	C	Fr
208	*Xanthoparmelia australasica* D.J. Galloway	S	Fo
209	*X. coreana* (Gyeln.) Hale	S	Fo
210	*X. tinctina* (Maheu & A. Gillet) Hale	S	Fo
PELTIGERACEAE			
211	*Peltigera dolichorhiza* (Nyl.) Nyl.	T	Fo
212	*P. horizontalis* (Huds.) Baumg	T	Fo
213	*P. leucophlebia* (Nyl.) Gyeln.	T	Fo
214	*P. malacea* (Ach.) Funck	T	Fo
215	*P. microphylla* (Anders) Gyeln.	T	Fo
216	*P. pindarensis* D.D. Awasthi & M. Joshi	S, T	Fo
217	*P. praetextata* (Flörke ex Sommerf.) Zopf	T	Fo
218	*P. rufescens* (Weiss) Humb.	T	Cr
PERTUSARIACEAE			
219	*Peltigera microphylla* (Aanders) Gyelnik	S	Fo
220	*P. pallidula* Stirt.	C	Fo
221	*Pertusaria albescens* var. *albescens* (Huds.) M. Choisy & Werner (=*Lepra albescens* (Huds.) Hafellner)	C	Cr
222	*P. leucosora* Nyl. (=*Lepra leucosora* (Nyl.) Hafellner)	C, S	Cr
223	*P. leucosorodes* Nyl. (=*Lepra leucosorodes* (Nyl.) I. Schmitt, B.G. Hodk. & Lumbsch)	C	Cr
224	*P. melastomella* Nyl.	C	Cr
225	*P. multipuncta* (Turn.) Nyl. (=*Lepra multipuncta* (Turner)Hafellner)	C	Cr
226	*P. quassiae* (Fée) Nyl.	C	Cr
227	*P. rigida* Müll. Arg.	C	Cr
228	*P. subochracea* Stirt.	C	Cr
229	*P. velata* (Turner) Nyl. (=*Varicellaria velata* (Turner) I. Schmitt & Lumbsch)	C	Cr

PHYSCIACEAE			
230	*Heterodermia albidiflava* (Kurok.) D.D. Awasthi	S	Fo
231	*H. angustiloba* (Müll. Arg.) D.D. Awasthi	C	Fo
232	*H. boryi* (Fée) Kr.P. Singh & S.R. Singh (=*Leucodermia boryi* (Fée) Kalb)	C	Fo
233	*H. diademata* (Taylor) D.D. Awasthi	C, T	Fo
234	*H. dissecta* (Kurok.) D.D. Awasthi	C, S	Fo
235	*H. hypocaesia* (Yasuda) D.D. Awasthi (=*Polyblastidium hypocaesium* (Yasuda ex Räsänen) Kalb)	C	Cr
236	*H. incana* (Stirt.) D.D. Awasthi	C	Fo
237	*H. japonica* (M. Satô) Swinscow & Krog (=*Polyblastidium japonicum* (M. Satô) Kalb)	C, S	Fo
238	*H. koyana* (Kurok.) Elix	C, S	Fo
239	*H. leucomelos* (L.) Poelt (=*Leucodermia leucomelos* (L.) Kalb)	C	Fo
240	*H. microphylla* (Kurok.) Skorepa (=*Polyblastidium microphyllum* (Kurok.) Kalb)	C	Fo
241	*H. obscurata* (Nyl.) Trevis.	C	Fo
242	*H. pellucida* (D.D. Awasthi) D.D. Awasthi	C	Fo
243	*H. pseudospeciosa* (Kurok.) W.L. Culb.	C, S	Fo
244	*H. rubescens* (Räsänen) D.D Awasthi	C, S	Fo
245	*H. speciosa* (Wulfen) Trevisan	C, S	Fo
246	*H. togashii* (Kurok.) D.D. Awasthi (=*Polyblastidium togashii* (Kurok.) Kalb)	C	Fo
247	*Hyperphyscia syncolla* (Tuck. ex Nyl.) Kalb	C	Fo
248	*Phaeophyscia constipata* (Nyl.) Moberg	S, T	Fo
249	*P. hispidula* (Ach.) Moberg	C, S	Fo
250	*Physcia aipolia* (Ehrh. ex Humb.) Fürnr.	C	Fo
251	*P. caesia* (Hoffm.) Fürnr.	C	Fo
252	*P. dilatata* Nyl.	C	Fo
253	*P. dimidiata* (Arnold) Nyl.	C, S	Fo
254	*P. tribacia* (Ach.) Nyl.	S	Fo
255	*Physconia detersa* (Nyl.) Poelt	C, T	Fo
256	*P. enteroxantha* (Nyl.) Poelt	C, S	Fo
257	*P. muscigena* (Ach.) Poelt	S, T	Fo
258	*Rinodina conradii* Körb.	C	Cr
259	*R. exigua* (Ach.) Gray	C	Cr
260	*R. megaspora* (D.D. Awasthi & M.R. Agarwal) D.D. Awasthi	C, S	Cr
261	*R. roboris* (Dufour ex Nyl.) Arnold	C	Cr
PYRENULACEAE			

262	*Anthracothecium himalayense* var. *pseudohimalayense* (Ajay Singh) Ajay Singh (=*Pyrenula platystoma* (Müll. Arg.) Aptroot)	C	Cr
263	*A. platystomum* Müll. Arg. (=*Pyrenula platystoma* (Müll. Arg.) Aptroot)	C	Cr
264	*Lithothelium hyalosporum* (Nyl.) Aptroot	C	Cr
265	*Pyrenula albella* Müll. Arg. (=*Pyrenula macrocarpa* Müll. Arg.)	C	Cr
266	*P. immersa* Müll. Arg. (=*Pyrenula subumbilicata* (C. Knight) Aptroot)	C	Cr
267	*P. immissa* (Stirt.) Zahlbr.	C	Cr
268	*P. introducta* (Stirt.) Zahlbr. (=*Pyrenula complanat* (Mont.) Trevis.)	C	Cr
269	*P. subglabriuscula* Vain. (=*Pyrenula mamillana* (Ach.) Trevis.)	C	Cr
270	*P. subnitidella* (Nyl.) Müll. Arg. (=*Pyrenula aggregata* (Fée) Fée)	C	Cr
RAMALINACEAE			
271	*Bacidia alutacea* (Kremp.) Zahlbr.	C	Cr
272	*B. fusconigrescens* (Kremp.) Zahlbr.	C	Cr
273	*B. incongruens* (Stirt.) Zahlbr.	C	Cr
274	*B. millegrana* (Taylor) Zahlbr.	C	Cr
275	*B. personata* Malme	C	Cr
276	*B. rubella* (Hoffm.) A. Massal.	C	Cr
277	*Bacidina arnoldiana* (Körb.) V. Wirth & Vězda	C	Cr
278	*B. medialis* (Tuck ex Nyl.) Kistenich, Timdal, Bendiksby & S. Ekman	C	Cr
279	*Phyllopsora corallina* (Eschw.) Müll. Arg.	C	Fo
280	*P. parvifolia* (Pers.) Müll. Arg.	C	Fo
281	*Ramalina baltica* Lettau	S	Fr
282	*R. celastri* (Spreng.) A. Massal.	C	Fr
283	*R. conduplicans* Vain.	C	Fr
284	*R. inflata* (Hook. f. & Taylor) Hook. f. & Taylor	C	Fr
285	*R. pollinaria* (Westr.) Ach.	C	Fr
286	*R. roesleri* Hochst. ex Schaer.	C	Fr
287	*R. sinensis* Jatta	C	Fr
RHIZOCARPACEAE			
288	*Rhizocarpon geographicum* (L.) DC.	S	Cr
STEREOCAULACEAE			
289	*Lepraria coriensis* (Hue) Sipman (=*Leprocaulon coriense* (Hue) Lendemer & B.P. Hodk.	C	Cr
290	*L. lobificans* Nyl.	C	L
291	*L. nigrocincta* Diederich, Sérus. & Aptroot	S	L
292	*L. vouauxii* (Hue) R.C. Harris	C, T	L
293	*Stereocaulon foliolosum* Nyl.	T	Fr
294	*S. pomiferum* P.A. Duvign	T	Fr
295	*S. sasakii* Zahlbr.	S	Fr

TELOSCHISTACEAE			
296	*Caloplaca cerina* (Hedw.) Th. Fr.	S	Cr
297	*C. cinnabarina* (Ach.) Zahlbr. (=*Neobrownliella holochracea* (Nyl.) S.Y. Kondr., Upreti & A. Thell)	S	Cr
298	*C. diphyodes* (Nyl.) Jatta (=*Kuettlingeria diphyodes* (Nyl.) Frolov & Vondrák)	S	Cr
299	*C. flavorubescens* (Huds.) J.R. Laundon(=*Opeltia flavorubescens* (Huds.) S.Y. Kondr. & Hur)	S	Cr
300	*C. malaensis* (Räsänen) D.D. Awasthi	C	Cr
301	*Ioplaca pindarensis* (Räsänen) Poelt & Hinter.	S	Cr
302	*Xanthoria candelaria* (L.) Th. Fr. (=*Polycauliona candelaria* (L.) Frödén, Arup & Søchting)	C	Fo
303	*X. elegans* (Link) Th. Fr. (=*Rusavskia elegans* (Link) S.Y. Kondr. & Kärnefelt)	S	Fo
304	*X. parietina* (L.) Th. Fr.	S	Fo
305	*X. ulophyllodes* Räsänen	C	Fo
TEPHROMELATACEAE			
306	*Tephromela khatiensis* (Räsänen) Lumbsch	S	Cr
UMBILICARIACEAE			
307	*Umbilicaria indica* Frey	S	Fo
308	*U. indica var. nana* Frey & Poelt	S	Fo
309	*U. vellea* (L.) Michx.	C, S	Fo
USNEACEAE			
310	*Evernia mesomorpha* Nyl.	C	Fr
VERRUCARIACEAE			
311	*Dermatocarpon miniatum* (L.) W. Mann	S	Fo
312	*D. vellereum* Zschacke	S	Fo
313	*Endocarpon pusillum* Hedw.	S	Cr
314	*E. subrosettum* Ajay Singh & Upreti	S	Cr
315	*Placidium lachneum* (Ach.) de Lesd. (=*Catapyrenium lachneum* (Ach.) R. Sant.)	T	Fo
316	*P. squamulosum* (Ach.) Breuss (=*Catapyrenium squamulosum* (Ach.) Breuss)	T	Cr
317	*Verrucaria acrotella* Ach.	S	Cr
318	*V. margacea* (Wahlenb.) Wahlenb	S	Cr

Abbreviations: C-Corticolous, Cr-Crustose, D-Dimorphic, Fo-Foliose, Fr-Fruticose, GF-Growth Form, L-Leprose, S-Saxicolous, Sp-species, Sub-Substratum, T-Terricolous. Names in the parathesis indicate their current name.

CONCLUSION

The flora of the national park has rich ecological diversity and includes many unique temperate and alpine plants including lichens. The forests of deep river valleys in the lower altitudinal zone mostly composed of *Cedrus deodar*, *Pinus roxburghii* and *Pinus walliachiana* while the altitudes between 2000–2500 m has dominance of *Abies, Cedrus, Juglans, Quercus* and *Rhododendron* trees. The

altitudes between 2500-3500 m and above exhibit luxuriant growth of *Abies, Betula utilis, Cedrus deodara, Quercus semecarpifolia, Picea* and *Taxus* trees provide an additional substrate for many lichen taxa to colonize (Yadav, 2005). Different species of lichens together with bryophytes forms the major portion of cryptogamic vegetation of the forest in most of the zones. Therefore, there is a need to again resurvey the world heritage site for proper documentation of lichen biota. The present information will provide valuable baseline data for future research in biomonitoring, pharmacognosy and ethnobotanical studies of potential lichens.

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