

Additional records of macrolichens from Arunachal Pradesh, a biodiversity hotspot in North-East India

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ABSTRACT

Bujarbarua P. & Singh K.P. 2024. Additional records of macrolichens from Arunachal Pradesh, a biodiversity hotspot in North-East India. *Geophytology* 54(2): 259–264.

Fifty-seven species and five varieties of macrolichens are recorded as new additions to the lichen biota of Arunachal Pradesh. These species belong to the following 16 genera: *Bulbothrix*, *Canoparmelia*, *Cladonia*, *Collema*, *Dermatocarpon*, *Dirinaria*, *Heterodermia*, *Lasallia*, *Leptogium*, *Parmotrema*, *Peltigera*, *Phaeophyscia*, *Physcia*, *Punctelia*, *Pyxine* and *Scytinium*. Each species is enumerated by its valid name, author citations and collection details.

Keywords: Lichen biota, new records, biodiversity hotspot, Arunachal Pradesh, North-East India.

INTRODUCTION

Arunachal Pradesh, comprising major portion of Eastern Himalaya botanical region (Jain 1983, Clarke 1898) and a part of the Himalaya biodiversity hotspot (Myers et al. 2000, Mittereier et al. 2005), is endowed with rich and diverse lichen biota due to its varied climatic and topographic conditions. The region had always been a source of floristic wealth, biological curiosity and knowledge for botanical community. The first collection of lichens from this area was made by Rolla S. Rao and G. Panigrahi of Botanical Survey of India (BSI), during 1956–1958. Awasthi (1961) investigated this collection and published 42 species of macrolichens. After

a long gap, BSI again initiated the studies and made planned extensive lichen collections during nineteen eighties and nineties from this region and published interesting results. Singh et al. (2018) compiled all the information and recorded 617 species from Arunachal Pradesh. Subsequently, Bajpai et al. (2022) updated and estimated the lichen diversity in the state and recorded 789 species under 185 genera based on his collections as well as all earlier reports. In continuation of the same studies, further 57 species and 5 varieties of macrolichens are enumerated below by their valid names, author citations and collection details in order to prioritize their publication while details

of these species will be presented separately. The specimens were investigated according to well established lichenological techniques and identified with the help of monographic literature and comparison of our specimens with authenticated specimens available in the herbaria. The studied specimens are deposited in the herbarium at Botanical Survey of India, Eastern Regional Centre, Shillong (ASSAM). The complete lichen biota of the state will be useful for floristic, biomonitoring and bioprospection studies in future.

NEW RECORDS

1. *Bulbothrix* Hale

1.1. *Bulbothrix goebelii* (Zenker) Hale, Smithsonian Contr. Bot. 32: 14. 1976. Corticolous. Upper Subansiri District: Daporijo-Ziro Road, 2 km from Daporijo, in *Terminalia* plantations, alt. c. 300 m, 16.01.1983, K.P. Singh 3072.

2. *Canoparmelia* Elix & Hale

2.1. *Canoparmelia ecaperata* (Müll. Arg.) Elix & Hale, Mycotaxon 27: 278. 1986. Corticolous. West Kameng District: Sessa, On the way of Vajantimala Fall, alt. c. 1250 m, 22.04.1962, K.P. Singh 1246.

2.2. *Canoparmelia texana* (Tuck.) Elix & Hale, Mycotaxon 27: 279. 1986. Corticolous. Anjaw District: Chakwanti-Menzong foot track, alt. 900–950 m, 24.10.1985, K.P. Singh 7281; Menzong-Yasang foot track, alt. 900–1050 m, 25.10.1985, K.P. Singh, 7300, 7311.

3. *Cladonia* P. Browne

3.1. *Cladonia arbuscula* (Wallr.) Flot., in Wendt. Thermen Warmbrunn: 94. 1839. Terricolous. Anjaw District: Simbi-Hotspring foot track, alt. 2700–3200 m, 01.11.1985, K.P. Singh, 7426.

3.2. *Cladonia ochrochlora* Flörke, Clad. Comm.: 75. 1828. On rotten woods, tree bases and humus soils. Anjaw District: Madan Ridge to

Melinja, alt.1500–2250 m, 31.10.1985, K.P. Singh 7769.

4. *Collema* F.H. Wigg.

4.1. *Collema actinoptychum* Nyl., Bull. Soc. Linn. Normandie, sér. 2, 2: 43. 1868. Corticolous. Debang Valley District: Maruli-Brango foot track, alt. 1600–1700 m, 30.01.1987, K.P. Singh 8249.

4.2. *Collema furfuraceum* (Arnold) Du Rietz, Ark. Bot. 22A, 1(3): 3. 1929 em Degelius, Symb. Bot. Upsal. 13(2): 443–445. 1954, Pl. V, fig. e and p. 444, fig. 72 and 20(2): 178. 1974. Corticolous. Debang Valley District: Anini-Alini foot track, alt. 1675 m, 05.02.1987, K.P. Singh 8418.

4.3. *Collema rugosum* Kremp., Fenzl. Reise Novara, Bot. 1: 128. 1870. Corticolous and terricolous. Anjaw District: Wahlong-Krauti foot track, alt. 1300 m, 29.10. 1985, K.P. Singh 7497.

4.4. *Collema rysssoleum* (Tuck.) Schneid., Guide Study Lich.: 181. 1898. Saxicolous on siliceous rocks along with mosses. West Kameng District: Rupa-Bomdila foot track, old route, Drizingpam Forest, alt.1800–2000 m, 25.04.1982, K.P. Singh 1306, 1313.

4.5. *Collema subflaccidum* Degel., Symb. Bot. Upsal. 20(2): 140. 1974. Corticolous. Anjaw District: Hayuliang-Hayugam Road, alt. 600–1100 m, 05.01.1984, K.P. Singh 4368. Debang Valley District: Riyali-Anini foot track, 10 km from Riyali, alt. 900 m, 13.01.1984, K.P. Singh 4821.

5. *Dermatocarpon* Eschw.

5.1. *Dermatocarpon miniatum* var. *miniatum* (L.) W. Mann., Lich. Bahem. Observ. Dispos.: 66. 1825. Saxicolous. Debang Valley District: Gunli-Malinye foot track, alt. 1150–1675 m, 16.01,1987, K.P. Singh 8062.

5.2. *Dermatocarpon miniatum* var. *papillosum* (Anzi) Müll. Arg., Bull. Trav. Soc. Murith 10: 58. 1881. Saxicolous. Debang Valley District: Punli-Mathuli foot track, near Yuron, alt. 1050–1100 m, 23.01.1987, K.P. Singh 8150.

6. *Dirinaria* (Tuck.) Clem.

6.1. *Dirinaria applanata* (Fée) D.D. Awasthi, in D.D. Awasthi & M.R. Agarwal, J. Indian Bot. Soc. 49: 135. 1970. Corticolous or saxicolous. Longding District: Longding-Bimplapur route, alt. 1100–1500 m, 14.01.1988, K.P. Singh 8591.

6.2. *Dirinaria papillulifera* (Nyl.) D.D. Awasthi, The Bryologist, 67: 369. 1964. Saxicolous or corticolous. Tirap District: Deomali, alt. c. 300 m, 25.02.1982, K.P. Singh 861.

7. *Heterodermia* Trevis.

7.1. *Heterodermia awasthii* (Kurok.) D.D. Awasthi, Geophytology 3: 113. 1973 & Comp. Macrolich. India, Nepal & Sri Lanka: 178. 2007. Corticolous and saxicolous. Lower Subansiri District: Tale Valley Road, Sero basti-Pange track, alt. 1700 m, 23.01.1984, K.P. Singh 5370.

7.2. *Heterodermia comosa* (Eschw.) Follmann & Redón, Willdenovia 6: 446. 1972. Corticolous. West Kameng District: On Bomdila-Dirang Road, at 5 km point, alt. 2400–2600 m, 30.04.1982, K.P. Singh 1724.

7.3. *Heterodermia dissecta* (Kurok.) D.D. Awasthi, Geophytology 3: 113. 1973 & Comp. Macrolich. India, Nepal & Sri Lanka: 183. 2007. Saxicolous. Anjaw District: Heyuliang Inspection Bungalow, alt. 600 m, 04.01.1984, K.P. Singh 4250.

7.4. *Heterodermia fragilissima* (Kurok.) J.C. Wei & Y.M. Jiang, Lich. Xiang 111. 1986. Corticolous. West Siang District: Erong-Lungte foot track, alt. 1500 m, 11.12.1984, K.P. Singh 6176.

7.5. *Heterodermia indica* (H. Magn.) D.D. Awasthi, Geophytology 3: 114. 1973 & Comp. Macrolich. India, Nepal & Sri Lanka: 187. 2007. Corticolous. West Kameng District: Kalaktang-Denji Road, alt. 1200–1500 m, 26.11.1984, K.P. Singh 5737.

7.6. *Heterodermia isidiophora* (Nyl.) D.D. Awasthi, Geophytology 3: 114. 1973 & Comp. Macrolich. India, Nepal & Sri Lanka: 187. 2007. Corticolous. West Kameng District: Dirang, Yang Forest, alt. 1625–1800 m, 05.05.1982, K.P. Singh 1948.

7.7. *Heterodermia microphylla* (Kurok.) Skorepa, Bryologist 75: 490. 1972. Corticolous. West Kameng District: Rupa-Thungrai foot track, Bandrima Forest, alt. 1500–1900 m, K.P. Singh 1515.

8. *Lasallia* Mérat

8.1. *Lasallia pustulata* (L.) Mérat. Nouv. Fl. Envir. Paris, ed. 2, 1: 202. 1821. Saxicolous on exposed boulders. Debang Valley District: Etalin basti, alt. 650–750 m, 11.01. 1987, K.P. Singh 7583 A.

9. *Leptogium* (Ach.) Gray

9.1. *Leptogium asiaticum* P. Jørg., Herzogia 2: 466. 1973. Terricolous. West Kameng District: Nafra-Saiden Road, alt. 1200 m, 31.01.1995, K.P. Singh 9204.

9.2. *Leptogium indicum* D.D. Awasthi & Akhatar, Geophytology 8(2): 197. 1979. Terricolous among mosses. West Kameng District: Vajjantimala Fall to Sessa side, c. 5 km, alt. c. 1200 m, 22.04.1982, K.P. Singh 1253.

9.3. *Leptogium milligranum* Sierk, Bryologist 67: 290. 1964. Corticolous. Lower Subansiri District: Yazali, near Yazali Bridge, alt. 750 m, 22.01. 1984, K.P. Singh 5115.

9.4. *Leptogium papillosum* (B. de Lesd.) C.W. Dodge, Ann. Missouri Bot. Gard. 20: 418. 1933. Terricolous among mosses. Anjaw District Yatang-Koibang route, alt. 600–900 m, 06.01.1984, K.P. Singh 4383, 4497.

9.5. *Leptogium phyllocarpum* (Pers.) Mont., Ann. Sci. Nat., Bot., ser. 3, 10: 134. 1848. Corticolous. Lower Subansiri District: Sero basti-Haketari track, alt. 1600 m, K.P. Singh 9801.

9.6. *Leptogium saturninum* (Dicks.) Nyl., Acta Soc. Linn. Bordeaux 21: 272. 1856. Corticolous and muscicolous. Tawang District: Tawang-Womingla route, alt. 3000–3300 m, 25.04.1996, K.P. Singh 9591.

10. *Parmotrema* A. Massal.

10.1. *Parmotrema crinitum* (Ach.) M. Choisy, Bull. Mens. Soc. Linn. Soc. Bot. Lyon 21: 175. 1952. Corticolous. Anjaw District: Sethy-Wahlong foot track, alt. 1150–1300 m, 27.10.1985, K.P. Singh, 7426.

10.2. *Parmotrema grayanum* (Hue) Hale, Phytologia, 28: 336, 1974. Saxicolous. Debang Valley District: Punli-Athuli foot track, alt. 950 m, 14.01.1987, K.P. Singh, 7969.

10.3. *Parmotrema indicum* Hale, Mycotaxon 5: 436. 1977. Corticolous. West Siang District: Erong-Lungte foot track, alt. 1500 m, 11.12.1984, K.P. Singh, 6180.

10.4. *Parmotrema mellissii* (C.W. Dodge) Hale, Phytologia 28: 337: 1974. Corticolous. Anjaw District: Wahlong-Krauti foot track, alt. 1800 m, 29.10.1985, K.P. Singh, 7486.

10.5. *Parmotrema permutatum* (Stirt.) Hale, Phytologia, 28: 338, 1974. Corticolous. Longding District: Longding-Bimlapur Road, alt. 1100–200 m (downwards), 14.01.1988, K.P. Singh 8587.

10.6. *Parmotrema pseudonilgherrense* (Asahina) Hale, Mycotaxon 5: 441. 1977. Corticolous at higher elevations. Tawang District: On the way of Penga Teng Sho, alt. 2970–3800 m, 02.05.1982, K.P. Singh 1773.

10.7. *Parmotrema pseudotinctorum* (Abbayes) Hale, Phytologia 28: 338. 1974. Saxicolous. West Siang District: Tato-Gapo foot track, alt. 1150–1500 m, 19.12.1984, K.P. Singh 6429.

10.8. *Parmotrema rampoddense* (Nyl.) Hale, Phytologia, 28: 338. 1974. Corticolous. Changlang District: Namdapha National Park, alt. c. 1000 m, 20.02.1981, K.P. Singh, 195.

10.9. *Parmotrema stuppeum* (Taylor) Hale, Phytologia, 28: 339. 1974. Corticolous. Tirap District: Namsang, 7 km from Deomali, 25.02.1982, K.P. Singh 857; Khonsa-Lazo Road, Near Kheti Village, alt. 700–900 m, 28.02.1982, K.P. Singh 8521.

10.10. *Parmotrema subarnoldii* (Abbayes) Hale, Phytologia 28: 339; 1974. Corticolous. Namsai District: Jaipur Village Road, alt. 190 m, 28.12.1983, K.P. Singh, 4122.

10.11. *Parmotrema subsumptum* (Nyl.) Hale, Mycotaxon 5: 434. 1977. Corticolous. West Kameng District: Rupa, old Bomdila route, Dukhampani, Drizingpam Forest, alt. 1500–1900 m, 25.04.1982, K.P. Singh 1321.

10.12. *Parmotrema yodae* (Kurok.) Hale, Mycotaxon 5: 436. 1977. Corticolous. Longding District: Longding to Panchou route, 1100–1550 m, 13.01.1988, K.P. Singh 8566.

11. *Peltigera* Willd.

11.1. *Peltigera membranacea* (Ach.) Nyl., Bull. Soc. Linn. Normandie, ser. 4, 1: 74. 1887. Terricolous on mossy ground. West Siang, District: Tatogido-Tato foot track, alt. 1500 m, 08.12.1984, K.P. Singh 6134.

12. *Phaeophyscia* Moberg

12.1. *Phaeophyscia orbicularis* (Neck.) Moberg, Symb. Bot. Upsal. 22(1): 44. 1977. Corticolous and saxicolous. Debang Valley District: Masiya-Bhasam foot track, alt. 1750–1950, 01.02.1987, K.P. Singh 8352.

12.2. *Phaeophyscia pyrrhophora* (Poelt) D.D. Awasthi & M. Joshi Ind. Mycol. Res. (16(2): 278. 1978. Corticolous. Debang Valley District: Athuli-Gunli foot track, alt. 950–1150 m, 15.01.1987, K.P. Singh 8009.

13. *Physcia* (Schreb.) Michx.

13.1. *Physcia aipolia* (Ehrh. ex Humb.) Furnr. Nat. Topogr. Regensburg, 1: 249. 1839. Corticolous. Anjaw District: Hot spring to Jachup

foot track, alt. 3200–3650 m, 02.11.1985, K.P. Singh 7841.

13.2. *Physcia albicans* (Pers.) J.W. Thomson, Nova Hedwigia, 7: 88. 1963. Corticolous and saxicolous. West Kameng District: Kalaktang, Denji Road., alt.1200–1500 m, 26.11.1984, K.P. Singh 5756.

14. *Punctelia* Krog

14.1. *Punctelia borrieri* (Sm.) Krog. Nordic J. Bot. 2: 291. 1982. Corticolous. Anjaw District: Kaho Village-Madan Ridge foot track, alt. 1450–1500 m, 31.10.1985, K.P. Singh, 7591.

14.2. *Punctelia rudecta* (Ach.) Krog, Nord. J. Bot., 2(3): 287–292. 1982. Corticolous or saxicolous or among mosses. Debang Valley District: Punli-Athuli foot track, alt. 950 m, 14.01.1987, K.P. Singh, 7975.

15. *Pyxine* Fr.

15.1. *Pyxine austroindica* D.D. Awasthi, Phycology, 20(2): 364.1980. Corticolous or saxicolous. Upper Subansiri District: Daporijo to Leko Basti Forest, alt. 300–500 m; 14.01.1983, K.P. Singh 3020.

15.2. *Pyxine berteroana* var. *himalaica* D.D. Awasthi, Corticolous or saxicolous. Namsai District: Lathaw coffee plantation, alt. 250 m, 29.12.1983, K.P. Singh 4143.

15.3. *Pyxine coccifera* (Fée.) Nyl., Mem. Soc. Natn. Sci. nat. math. Cherboug 5: 108.1857. Corticolous or saxicolous. West Kameng District: Rupa-Bomdila old foot track, Dukhampani, Drizingpam Forest, alt. 1800–2000 m, 25.04.1982, K.P. Singh 1379.

15.4. *Pyxine cocoes* var. *cocoes* (Sw.) Nyl., Mem. Soc. Imp. Sci. Nat. Chobourgh 5: 108. 1857. Corticolous. Tirap District: Khonsa proper, alt. 900 m, 26.02.1982, K.P. Singh 923.

15.5. *Pyxine cocoes* var. *prominula* (Stirt.) D.D. Awasthi, In Awasthi & Upreti, Indian J. Bot. 3(2): 183. 1980. Saxicolous or corticolous. Lower

Subansiri District: on the way of Yazali to Tago Hydel, 19.08.2000, K.P. Singh 10308, 10380.

15.6. *Pyxine consocians* Vain., Philipp. J. Sci. 8: 109. 1913. Corticolous. Anjaw District: Yasang-Setti foot track, alt.1150–1300 m, 27.10.1985, K.P. Singh 7367.

15.7. *Pyxine coralligera* Malme, Bih. Kongl. Svenska. Vetensk. Acad. Handl. 23(3): 40. 1897. Saxicolous or corticolous. Siang District: Pangin, alt. 500 m; 12.01.1983, K.P. Singh 2922.

15.8. *Pyxine farinosa* Kashiw., Bull. Natl. Sci. Mus. Tokyo, B, 3(2): 67. 1977. Corticolous. Debang Valley District: Athuli-Gunli foot track, alt. 950–1150 m, 15.01.1987, K.P. Singh 8024.

15.9. *Pyxine himalayensis* D.D. Awasthi, Phytomorphology 30: 372. 1980. Corticolous. Anjaw District: Kharang-Hawai foot track, alt. 950–1300 m, 19.10.1985, K.P. Singh 7110.

15.10. *Pyxine meissneriana* Nyl., Bull. Soc. Linn. Normandie, ser. 2, 7: 164. 1973. Corticolous. East Kameng District: Phakui Wild Life Sanctuary, Sejusa, Khelong Reserve Forest, alt. 200 m, 16.04.1999, K.P. Singh 10163.

15.11. *Pyxine minuta* Vain., Acta Soc. Fauna Fl. Fenn. 7(1): 156. 1890. Saxicolous. West Kameng District: Nafra-Bichoom route, alt. 850–1000 m, 03.02.1995, K.P. Singh 9272.

15.12. *Pyxine petricola* Nyl., in Crombie., J. Bot. London 14: 263. 1876. Corticolous. West Kameng District: Rupa-Bomdila old foot track, Dukhampani, Drizingpam Forest, alt. 1800–2000 m, 25.04.1982, K.P. Singh 1405.

15.13. *Pyxine reticulata* (Vain.) Vain., Ann. Acad. Sci. Fenn., ser. A, 6: 70. 1914. Corticolous and Saxicolous. West Kameng District: Rupa-Tenga Valley Road, up to 8 km, alt. 1330–1500 m, 24.04.1982, K.P. Singh 1300.

15.14. *Pyxine subcinerea* Stirt., Trans. & Proc. New Zealand Inst. 30: 397. 1898. Corticolous. West Siang District: Tatogido-Tato foot track, alt. 1500 m, 09.12.1984, K.P. Singh 6137.

16. *Scytinium* (Ach.) Gray

16.1. *Scytinium callopismum* (A. Massal.) Otálora, P.M. Jørg. & Wedin, Fungal Diversity 64(1): 290 2013. (2014). Saxicolous. Anjaw District: Hayuliang-Hayugam route, alt. 600–1100 m, 05.01.1984, K.P. Singh 4367.

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