
Endemism in Liverworts of Western Ghats and their present status

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Abstract. The status of endemic liverworts in the Western Ghats ‘one of the major Hot spots’ of plant biodiversity have been discussed in the present paper. The study is based on the evaluation of type and authentic specimens available in Lucknow University Hepatic Herbarium (LWU) as well as those in several international herbaria including NICH, NY, JE, FH, G and excicatae of the world and published data. An overall assessment and evaluation revealed the presence of a total of 54 liverworts endemic to Western Ghats in India. The paper also discusses those species which were earlier known as endemic to the area but now show an extended range of distribution elsewhere and also the species earlier introduced from Western Ghats but now changed their status.

Key words: India/ Western Ghats/ Endemism/ Bryophytes/ Liverworts

Introduction

India has a very rich heritage of Bryo-diversity with varying degree of generic as well as species differentiation. The Western Ghats of India is one of the 34 hot spots of biodiversity in the world and is included amongst eight of the hottest ‘Hot Spots’ on the globe (Myer, 2005). The region stretches over 1,600 kilometer, started from Sahyadri of Maharashtra and pass through chain of mountains running parallel to western coast of peninsular Indian (including Maharashtra, Goa, Karnataka, Tamil Nadu and Kerala) and culminates at the tip of the Indian peninsula at Kanyakumari. The Western Ghats is the major source of water shade due to the southern monsoon filled with water and soaked by the Ghats’ hill ranges. Due to plenty of water the entire region is floristically rich and blessed with one of the highest rates of endemism in all of India. The forest type in the area includes deciduous, tropical rain forests as well as unique fossil forest ‘Sholas’. These shoals situated in between matrix of grassland eg. Mukuruthy at Tamil Nadu, Eravikulam at Kerala and Kudremukh at Karnataka. The forests of Western Ghats are evergreen not only due to southern monsoon but also due to mossy effect of bryophytes.

The bryophytes being the second largest group of land plants after angiosperms with *ca.* 23,000 described species worldwide include three different lineages the mosses, the liverworts and hornworts (Schuster, 1984; Vitt, 1984, Stotler and Stotler, 2005). They grow on variety of habitats which are subjected to

uninterrupted threat. The ecological importance of bryophytes includes their role in plant succession and production of phytomass. The most important feature of the group is how the embryophytes evolved from these lower plants.

With the unique climate and physiography of the country the hepatic growth in Western Ghats is bulky and diversified. Out of the 7 orders of the hepaticae only the monotypic order Monocleales is not found in India. Yano and Gradstein (1997) listed 370 genera of hepaticae under 70 families across the world, while India is represented by *ca.* 136 (+5) genera and *ca.* 800 species embarrassing 48 families (see also Parihar *et al.*, 1994; Srivastava, 1998; Udar, 1976). The drastically changing landscape due to high population pressure and need of timber for shelter and agriculture land, the forests of Western Ghats have been severely affected eventually causing threat to endemic elements hence are under immediate need for conservation. The region hosts *ca.* 68 genera and *ca.* 314 species falling in 34 families of hepaticae. The tropical and subtropical family Lejeuneaceae show maximum generic as well as species diversity (with 20 genera and 85 species) followed by Plagiochilaceae (with single genus and 24 species) and Jubulaceae (with two genera and 19 species) and Ricciaceae of order Marchantiales (with single genus and 16 species) respectively. Out of 314 taxa, 54 taxa are endemic (see also Stephani, 1898-1924; Chopra, 1938; Udar, 1976; Udar and Srivastava, 1983; Joshi and Biradar, 1984; Srivastava, 1994, 1998; Srivastava and Sharma, 2000; Singh, 2001; Verma, 2005, Alam, 2005). Interestingly the family Lejeuneaceae shows maximum number of endemics (22 species). The cause of endemism may be attributed to isolation, fragmentation and unisexuality among others. The validly recognized endemic taxa as well as those earlier treated as endemic and now show extended range of distribution other than Western Ghats, are also provided.

Enumeration of Taxa

(A.) Taxa endemic to Western Ghats

HEPATICOPSIDA (LIVERWORTS)

Order - Metzgeriales

Family: Pallaviciniaceae

1. *Pallavicinia crispata* (Mont.) Steph. *Spec. Hep.* 1: 316 (1901).

The species instituted from Nilgiri hills, Tamil Nadu as *Diplolaena crispata* Mont. (Montagne, 1842).

* Specimens not examined.

Present status: Very rare.

Family: Aneuraceae

2. *Riccardia perssonii* S. C. Srivast. & Udar, *Lindbergia* 4: 127 (1976).

The species was introduced from Palni hills (Kodaikanal: between Perumalmalai and Shembagnur) (Srivastava and Udar, 1976). It has since been not reported from any other part of the country. However, the species occurring so frequently in the past has now become rare.

Specimens examined: Tamil Nadu: Palni hills (Kodaikanal: between Perumalmalai and Shembagnur); *alt. ca.* 2100 m; Date: January, 1966; Legit.: R. Udar and S. C. Srivastava; 100 R/ 1966 (Holotype – CSIR collection).

Present status: Rare in distribution.

Family: Metzgeriaceae

3. *Metzgeria coorgense* S. Srivast. & S. C. Srivast., *Phytotaxonomy*. 4: 81 (2004).

The species was instituted from Karnataka (Mercara) and subsequently from Nilgiri hills, Tamil Nadu (Srivastava and Srivastava, 2002).

Specimens examined: Karnataka (Mercara); *alt. ca* 1000 m; Date: 30.04.1981; Legit.: A. Kumar and party; 4455/81 (Holotype - LWU).

Present status: Rare in distribution.

4. *Metzgeria lutescens* Steph., *Spec. Hep.* 6: 54 (1917).

The species was instituted from Western Ghats but never recollected from any other locality (Srivastava and Udar, 1975a).

Specimens examined: India Orientalis; Date: 1913; Legit.: Pfliegerer (No. 23); 009907/ 1913, (G - Fondation Stephani).

Present status: Very rare in distribution, never recollected from its original site.

5. *Metzgeria pandei* S. C. Srivastava & Udar, *New Botanist* 2 (1): 16 (1975).

The species was instituted from Palni hills (Kodaikanal: Bryant park) (Srivastava and Udar, 1975a).

Specimens examined: Tamil Nadu: Palni hills (Kodaikanal – Bryant Park); *alt. ca* 2100 m; Date: 18.10.1962; Legit.: R. Udar and V. Chandra; 52/1962 (Holotype - LWU).

Present status: Frequent in distribution.

6. *Metzgeria indica* Udar & S. C. Srivast., *Rev. Bryol. Lichenol.* 37 (2): 361 (1970).

The species was instituted from Palni hills (Kodaikanal: Bryant park) (Udar and Srivastava, 1975a).

Specimens examined: Tamil Nadu: Palni hills (Kodaikanal – Coakers walk – opposite Bartlett house; *alt. ca.* 2100 m; Date: 04.01.1966; Legit.: R. Udar and S.C. Srivastava; C. S. I. R. 53/1966 (Holotype - LWU).

Present status: Frequent in distribution.

7. *Metzgeria nilgiriensis* S. C. Srivast. & Udar, *New Botanist* 2 (1): 24 (1975).

The species was instituted from Nilgiri hills (Ootacamund) (Udar and Srivastava, 1975a).

Specimens examined: Tamil Nadu: Nilgiri hills (Ootacamund – Government Botanical Garden); *alt. ca* 2250 m; Date: 21.09.1962; Legit.: R. Udar and V. Chandra; 182/1962 (Holotype - LWU).

Present status: Frequent in distribution.

8. *Metzgeria raoii* S. Srivast. & S. C. Srivast., *Phytotaxonomy.* 4: 83 (2004).

The species has been recently instituted from Kerala (Lakkidi) (Srivastava and Srivastava, 2002).

Specimens examined: Kerala (Lakkidi); *alt.ca.* 1600 m; Date: 28.04.1981; Legit.: A. Kumar and party; 4499/1981 (Holotype - LWU).

Present status: Rare in distribution (only in small pockets).

Family: Fossombroniaceae

9. *Fossombronia indica* Steph., *Spec. Hepat.* 6: 73 (1917).

The species was instituted from Mangalore, Karnataka (Stephani, 1917).

Specimens examined: India Orientalis: Karnataka (Mangalore); Legit.: Pfliegerer (part of type presented to Prof. S. K. Pande by Pfliegerer).

Present status: Very rare, only once collected after its original discovery.

Order - Jungermanniales

Family: Herbertaceae

10. *Herbertus nilgiriensis* (Steph.) Miller, *Journ. Hattori. Bot. Lab.* 28: 305 (1965).

The species was instituted from Nilgiri hills (Dodabetta) as *Schisma nilgerriense* Steph. (Stephani, 1905).

Specimens examined: Tamil Nadu: Nilgiri hills: Ootacamund (on way to Dodabetta), *alt. ca* 2200-2600m, Date: 08.10.2000, Legit.: S.C. Srivastava and Party, 12420/2000, 12450/2000, 12480/2000, 12490/2000 (LWU).

Present status: Frequent in distribution.

Family: Geocalycaceae

11. *Heteroscyphus palniensis*: Abha Srivast. & S.C. Srivast., *Indian Geocalycaceae*, 130 (2002).

The species has been newly instituted from Palni hills (Kodaikanal) (Srivastava and Srivastava, 2002).

Specimens examined: Tamil Nadu: Palni hills (Kodaikanal); *alt. ca.* 2133 m; Date: 04.01.1966; Legit.: R. Udair and S.C. Srivastava; C. S. I. R. 246/ 1966 (Holotype - LWU).

Present status: Rare in distribution (only in small pockets).

12. *Heteroscyphus perfoliatus* (Mont.) Schiffn. *Oesterr. Bot. Zeitschr.* 60: 171 (1910).

The species was instituted from Nilgiri hills of Tamil Nadu as *Lophocolea perfoliata* (Montagnier, 1842).

Specimens examined: Tamil Nadu: Neel-Gherries; Montagne, Herb. Taylor (type of *Lophocolea perfoliata* Mont.) FH. Coonoor (Laws falls); *alt. ca.* 1700 m; Date: 28.03. 2001; Legit P. K. Verma and A. Alam; 13585/ 2001 (LWU).

Present status: Frequent in distribution.

Family: Plagiochilaceae**13. *Plagiochila palangenensis* S.C. Srivast. & al, *Nat. Acad. News Letter* 29 (7 & 8): 267 (2006).**

The species has been newly instituted from Palni hills (Kodaikanal: Palangi) (Srivastava & al, 2006).

Specimens examined: Tamil Nadu: Palni hills (Kodaikanal – Palangi); *alt. ca.* 2100 m; Date: 14.09.2000; Legit.: S. C. Srivastava; 13103/2000 (Holotype - LWU).

Present status: Rare in distribution.

14. *Plagiochila liebmanniana* Lehm. & Lindenb., in: *Spec. Hepat.* (fasc. 2-4): 97 (1840).

The species was instituted from Nilgiri hills by Lindenberg (1840).

* Specimens not examined, currently known only by the lectotype designated as S – B 3650 (Inoue, 1979).

Present status: Seems to be extremely rare in distribution and never recollected after its original discovery.

Family: Jungermanniaceae**15. *Jungermannia pflidereri* Amak., *Journ. Hattori Bot Lab.* 35: 388 (1972).**

The species was instituted from Palni hills (Kodaikanal ‘Madura’) (Amakawa, 1972).

Specimens examined: Tamil Nadu: Nilgiri hills (Avalanche); *alt. ca.* 2400 m; Date: 02.01.1972; Legit.: R. Udair & A. Kumar; 122 S/1972 (LWU).

Family: Lepidoziaceae**16. *Arachniopsis indica* S.C. Srivast. & Verma, *Nat. Acad. News Letter.* 27 (7 & 8): 269 (2004).**

The species has been newly instituted from dense forest of Nilgiri hills (Governorsholai) of Tamil Nadu (Verma and Srivastava, 2004a).

Specimens examined: Tamil Nadu: Nilgiri hills (Governorsholai); *alt. ca.* 2250 m; Date: 10.04.2002; Legit.: P.K. Verma, A. Alam and N. Sahu; 15496/ 2002 (Holotype - LWU).

Present status: Rare in distribution (only in small pockets).

Family: Arenneliaceae**17. *Gongylanthus indicus* S.C. Srivast. & Verma, *Indian Journ. Forestry.* 28 (2): 200 – 205 (2004).**

The species has been recently instituted from Nilgiri hills (Naduvattam) (Srivastava and Verma (2004b).

Specimens examined: Tamil Nadu: Nilgiri hills (Gudalur: Naduvattam reserve forest – frog hill view to Wilson plantation); *alt. ca.* 1600-1800 m; Date: 30.09.2002; Legit.: P.K. Verma and A. Alam; 16165/ 2002 (Holotype - LWU).

Present status: Rare in distribution (only in small pockets).

Family: Schistochilaceae**18. *Schistochila gaudichaudii* (Gottsche) Schiffn., *Conspectus Hep. Archp. Ind.* 216 (1887).**

The species was described from Nilgiri hills as *Gottschea gaudichaudii* Gottsche (Gottsche, 1887).

* No specimens examined.

Present status: Never been recollected after its original discovery, hence doubtful.

Family: Chonocoleaceae

19. *Chonocolea schusterii* Udar & A. Kumar, *The Bryologist*, 85 (3): 315 (1982).

The species was instituted from Nilgiri hills (Coonoor: Bandishola) (Udar and Kumar, 1982) and never recollected after its original discovery.

Specimens examined: Tamil Nadu: Nilgiri hills (Coonoor – Bandishola, on way to Kotagiri); Date: 01.01.1966m; Legit.: R. Udar and party; 305/1966 (Holotype - LWU).

Present status: Rare and threatened.

Family: Porellaceae

20. *Porella chinensis* var. *irregularis* (Steph.) S. Hatt., *Journ. Hattori Bot. Lab.* 39: 270 (1975).

The species was instituted from Palni hills (Kodaikanal) as *Madotheca irregularis* (Hattori, 1975).

Specimens examined: Tamil Nadu: Palni hills (Kodaikanal); alt. ca. 2100 m; Date: 1908; Legit.: Andre (as *Madotheca irregularis* Steph.); 16788/1908 (Holotype - G).

Present status: Rare in distribution.

21. *Porella kashyapii* R. Chopra & Kachroo, *J. Sci. Univ. Kashmir* 1 (1/2): 159 (1973).

The species was reported from Palni hills (Kodaikanal) by R. Chopra and Kachroo (1973).

* No specimens examined

Present status: Never recollected after its original discovery, hence doubtful.

Family: Jubulaceae

22. *Frullania. alstonii* var. *pfleidereri* Hatt., *Journ. Hattori Bot. Lab.* 36: 119 (1972).

The species was instituted from Western Ghats by Hattori and now recently reported from Nilgiri hills (Dodabetta).

Specimens examined: Tamil Nadu: Nilgiri hills – Ootacamund (Dodabetta); alt. ca 2660 m.; 28.03.2001; Legit.: P.K. Verma and A. Alam; 13454/2001, 13477/2001 (LWU).

Present status: Rare in distribution.

Family: Lejeuneaceae

23. *Archeilejeunea minutilobula* Udar & Awasthi, *Geophytology* 11 (1): 77 (1981).

The species was instituted from lower hills of Nilgiri hills (on way to Mettupallyam) (Udar and Awasthi, 1981).

Specimens examined: Tamil Nadu: Nilgiri hills (Mettupallyam); alt. ca 500 m; Date: 28.12.1965; Legit.: R. Udar and S. C. Srivastava; 200/1965 (Holotype - LWU).

Present status: Very rare in distribution.

24. *Archeilejeunea apiculifolia* Steph., *Sp. Hep.* 6: 558 (1924).

The species was instituted from Karnataka (Kudremukh) (Stephani, 1924).

Specimens examined: Tamil Nadu: Nilgiri hills (Avalanche); alt. ca. 2439 m; Date: 02.01.1972; Legit.: R. Udar and U. S. Awasthi; 73 S A/1972 (Holotype - LWU).

Present status: Udar and Awasthi, (1981) recollected the species from Nilgiri hills. The species is rare in distribution.

25. *Archeilejeunea apiculifolia* var. *dentifolia* Awasthi & S.C. Srivast., *Geophytology* 18 (2): 207 (1988).

The taxon was instituted from Kerala (Achilatti forest) (Awasthi and Srivastava, 1988).

Specimens examined: Kerala (Achilatti forest); *alt. ca.* 2439 m; Date: 22.09.1982; Legit.: R. Udar and U. S. Awasthi; 5641/1982 (Holotype - LWU).

Present status: Very rare, never recollected after its original discovery.

26. *Mastigolejeunea humilis* var. *ciliata* Awasthi & Udar, *Proc. Indian. Acad. Sci.* 93 (4): 487 (1984).

The species was introduced from Kerala (Udar and Awasthi, 1984).

Specimens examined: Kerala (Kumily); *alt. ca.* 2439 m; Date: 02.01.1972; Legit.: R. Udar and U. S. Awasthi; 6226/1982 (Holotype - LWU).

Present status: Very rare, never recollected after its original discovery.

27. *Schiffneriolejeunea indica* Steph., *Geophytology* 11 (1): 73 (1981).

The species was instituted as *Archilejeunea indica* Steph. from Karnataka (Mangalore) (Stephani, 1911).

Specimens examined: Karnataka- Mangalore; at sea level; 22.06.1938; 14999/1938; Pflleiderer; (Type -G as *Archilejeunea indica* Steph.)

Present status: The species was subsequently reported from Nilgiri hills and Kerala, rare in distribution (Udar and Awasthi, 1984b).

28. *Caudalejeunea pluriplicata* Udar & al, *The Bryologist* 85 (3): 329 (1982).

The species was introduced from Karnataka (Agumbe) (Udar & al, 1982).

Specimens examined: Karnataka (Agumbe); *alt. ca.* 791 m; Legit. D. Kumar, A. Kumar and U. S. Awasthi; 4732/1981 (Holotype - LWU).

Present status: Very rare and never recollected after its original discovery.

29. *Lopholejeunea nilgiriensis* Awasthi & al, *Geophytology* 29 (1&2): 51 (2000).

The species has been recently instituted from Nilgiri hills (Gudalur – Naduvattam) (Awasthi & al, 2000).

Specimen examined: Tamil Nadu: Nilgiri hills- Gudalur (Naduvattam); *ca.* 1800m.; Date: 27.09.1983; Legit.: R. Udar, S. C. Srivastava and U. S. Awasthi; 7190/1983 (Holotype –LWU)

Present status: Rare in distribution.

30. *Cheilolejeunea ghatiensis* G. Asthana & al, *Lindbergia* 20: 140 (1995).

The species was instituted from Kerala (Asthana & al, 1995).

Specimen examined: Kerala (Trivandrum - Ponmudi); Date: 02.10.1982; Legit.: R. Udar and Party; 6412/1982 (Holotype - LWU).

Present status: Very rare and never recollected after its original discovery.

31. *Cheilolejeunea udarii* G. Asthana & al, *Lindbergia* 20: 142 (1995).

The species was newly instituted from Nilgiri hills (Dodabetta) (Asthana & al, 1995).

Specimens examined: Tamil Nadu: Nilgiri hills – Ootacamund (Dodabetta); *alt. ca.* 2663 m.; Date: 25.09.1983; Legit.: R. Udar and party; 6863/1983 (Holotype - LWU).

Present status: Frequent in distribution.

32. *Lejeunea perrottetii* Steph., *Hedwegia* 93 (1896).

The species was instituted from Nilgiri hills of Tamil Nadu by Stephani (1915) as *Eulejeunea perrottetii* Steph.

Specimens examined: Tamil Nadu: (Nilgherries); 1836; Legit.: Perrottet; (as *Eulejeunea perrottetii* Steph.) 14271/1836 (Holotype - G).

Nilgiri hills – Ootacamund (Dodabetta); *alt ca.* 2660 m; Date: 08.10.2000; Legit.: S.C. Srivastava and party; 12512/2000 (LWU).

Present status: Frequent in distribution.

33. *Lejeunea tenerima* (Steph.) A. Agarwal, *Ph. D. thesis, Department of Botany, Lucknow University*, 141 (1986).

This species was earlier introduced as *Taxilejeunea tenerrima* Steph. from Karnataka (Agumbe) (Stephani, 1923).

Specimens examined: India Orientalis; Legit.: Pfliederer; *Taxilejeunea tenerrima* Steph.; Herb (G) ?. Tamil Nadu: Nilgiri hills – Ootacamund (Dodabetta); *alt. ca* 2660 m.; Date: 05.10.1972; Legit.: R. Udar and S.C. Srivastava; 1388/1972 (LWU).

Present status: Rare in distribution.

34. *Lejeunea lowriana* Steph., *Sp. Hep.* 5: 779 (1915).

The species was instituted from Karnataka (Coorg) by Stephani (1915) as *Eulejeunea lowriana* Steph.

Specimens examined: Karnataka (Coorg); January, 1896; Legit.: Lowrie; (as *Eulejeunea lowriana* Steph); 008152/ 1896 (Holotype - G).

Present status: Rare in distribution.

35. *Taxilejeunea ghatensis* Verma & S.C. Srivast., *Proc. Nat. Acad. Sci., India* 77 (B): 211 (2007).

The species has been newly instituted from Maharashtra (Mahabaleshwar) by Verma and Srivastava (2007). The species is restricted only in some patches in moist forests.

Specimens examined: Maharashtra: Mahabaleshwar (on way to Chinaman water falls); *alt. ca* 1370 m; Date: 13.09.2001; Legit.: S. C. Srivastava and Party; 14012/ 2001 (Holotype - LWU).

Present status: Frequent in distribution.

36. *Taxilejeunea nilghiriensis* Verma & S.C. Srivast., *Proc. Nat. Acad. Sci., India* 77 (B): 207 (2007).

The species has been newly instituted from Nilgiri hills by Verma and Srivastava (2007).

Specimens examined: Tamil Nadu: Nilgiri hills – Kilkotagiri (Kengarai); *alt. ca* 1850-1900 m.; Date: 01.04.2003; Legit.: P.K. Verma and A. Alam; 16916/2003 (Holotype - LWU).

Present status: Rare and reported only from type locality.

37. *Taxilejeunea parvistipula* Steph., *Sp. Hep.* 6: 403 (1923).

The species was introduced from Nilgiri hills by Stephani (1923).

Present status: Never recollected after its original discovery, hence doubtful.

* Specimens not available.

38. *Cololejeunea nilgiriensis* G. Asthana & S.C. Srivast., *Indian Cololejeunea, Bryophyto. Biblio.* 60: 27 (2003).

The species has been instituted from Nilgiri hills (Avalanche) by Asthana and Srivastava (2003).

Specimens examined: Tamil Nadu: Nilgiri hills (Avalanche); *alt. ca* 2439 m; Date: 02.01.1972; Legit.: R. Udar and Party; 75 S/1972 (Holotype - LWU).

Present status: Rare in distribution and restricted only in some pockets of Nilgiri hills

39. *Cololejeunea karnatakensis* G. Asthana & S.C. Srivast., *Indian Cololejeunea, Bryophyto. Biblio.* 60: 26 (2003).

The species has been instituted from Karnataka (Jog falls) by Asthana and Srivastava (2003).

Specimens examined: Karnataka (Jog falls); *alt. ca* 600 m; Date: 27.09.1982; Legit.: R. Udar and Party 6516/1982 (Holotype - LWU).

Present status: Rare in distribution.

40. *Cololejeunea hyalina* G. Asthana & S.C. Srivast. *Indian Cololejeunea, Bryophyto. Biblio.* 60: 25 (2003).

The species has been instituted from Karnataka (Jog falls) (Asthana and Srivastava, 2003).

Specimens examined: Karnataka (Jog falls); *alt. ca* 600 m; Date: 27.09.1982; Legit.: R. Udar and Party; 6516/1982 (Holotype - LWU).

Present status: Rare and has never been recollected after its original collection in 1982.

41. *Cololejeunea kashyapii* G. Asthana & S.C. Srivast. *Indian Cololejeunea, Bryophyto. Biblio.* 60: 39 (2003).

The species has been instituted from Karnataka (Jog falls) (Udar and Srivastava, 1985).

Specimens examined: Karnataka (Jog falls); *alt. ca* 600 m; Date: 05.01.1940; Legit.: S. K. Pande; 3775/1940 (Holotype - LWU).

Present status: Rare, never recollected after its original collection in 1982.

42. *Cololejeunea mizutaniana* Udar & G. Srivast., *Misc. Bryol. Lichenol.* 9 (7): 137 (1983).

The species was instituted from Karnataka (Jog falls) (Asthana and Srivastava, 2003).

Specimens examined: Karnataka (Jog falls); *alt. ca* 600 m; Date: 05.01.1940; Legit.: S. K. Pande; 3794/1940 (Holotype - LWU).

Present status: Frequent in distribution.

43. *Cololejeunea foliicola* G. Asthana & S.C. Srivast., *Indian Cololejeunea, Bryophyto. Biblio.* 60: 45 (2003).

The species was instituted from Karnataka (Jog falls) by Asthana and Srivastava (2003).

Specimens examined: Karnataka (Jog falls); *alt. ca* 600 m; Date: 27.09.1982; Legit.: R. Udar and party; 6515/82 (Holotype - LWU).

Present status: Rare in distribution.

Family: Radulaceae

44. *Radula nilgiriensis* Udar & Dh. Kumar, *J. Indian bot. Soc.* 61: 177 (1982).

The species was instituted from Nilgiri hills, Tamil Nadu by Udar and D. Kumar (1982).

Specimens examined: Tamil Nadu: Nilgiri hills – (Avalanche); *alt. ca* 2500 m.; Date: 02.01.1972; Legit.: R. Udar and S.C. Srivastava; 71S/1972 (Holotype - LWU).

Present status: Frequent.

45. *Radula pandei* Udar & Dh. Kumar, *Lindbergia* 9: 133 (1983)

The species was instituted from Karnataka (Mercara) by Udar and D. Kumar (1983).

Specimens examined: Karnataka (Mercara); *alt. ca* 700 m; Date: 01.05.1981; Legit.: D. Kumar, A. Kumar and U. S. Awasthi; 4630/1981 (Holotype - LWU).

Present status: Rare, never recollected after its original discovery.

46. *Radula perrottatii* Gottsche Ex. Steph., *Hedwigia* 23: 154 (1884).

The species was introduced by Stephani (1884) from Nilgiri hills.

Specimens examined: Tamil Nadu: Nilgiri hills – (Avalanche); *alt. ca* 2200 m.; Date: 02.01.1972; Legit.: R. Udar and party; 64S/1972, 73S/1972 (LWU).

Present status: Frequent in distribution.

Order - Marchantiales

Family: Marchantiaceae

47. *Marchantia kashyapii* Udar & Shaheen, *Indian J. Bot.* 5 (1): 1-6 (1982).

The species was instituted from Palni hills (Kodaikanal) by Udar and Shaheen (1983) as well as from Nilgiri hills.

Specimens examined: Tamil Nadu: Nilgiri hills – (Ootacamund); *alt. ca* 2200 m.; Date: 1962; Legit.: R. Udar and party; 334/1962 (LWU).

Present status: Rare, only some small pockets.

Family: Aytoniaceae

52. *Mannia foreaui* Udar & Chandra, *Can. J. bot.* 43 (1): 148 (1965).

The species was instituted from Palni hills (Kodaikanal - Beruliar) by Udar and Chandra (1965).

Specimens examined: Tamil Nadu: Palni hills (Kodaikanal); *alt. ca* 2100 m.; Date: September, 1962; Legit.: V. Chandra and S. Chandra B5745/1962.

Present status: Rare in distribution.

53. *Riccia poihaiana* A.E.D. Daniel & P. Daniel, *Bull. Bot. Sur. India*, 135 (2002).

The species has been newly instituted from Kanyakumari, Tamil Nadu (Daniel and Daniel, 2002).

* Specimens not seen

Present status: Only known from type locality.

Family: Ricciaceae

54. *Riccia velimalaiana* A.E.D. Daniel & P. Daniel, *Bull. Bot. Sur. India*, 139 (2002).

The species has been newly instituted from Kanyakumari, Tamil Nadu (Daniel and Daniel, 2002).

* Specimens not seen.

Present status: Only known from type locality.

(B.) Taxa instituted from Western Ghats with an extended range of distribution elsewhere:

1. *Heteroscyphus orbiculatus* Abha Srivast. & S.C. Srivast., *Indian Geocalycaceae*, 140 (2002).

The species has been newly instituted from Palni hills (Kodaikanal) by Srivastava and Srivastava, 2002 and now has an extended range of distribution in western Himalaya (Himachal Pradesh) (Singh and Singh, 2003).

Specimens examined: Tamil Nadu: Palni hills (Kodaikanal); *alt. ca* 2133 m; Date: 29.09.1983; Legit.: R. Udar Srivastava and Srivastava, 2002 & al; 7403/1983 (Holotype - LWU).

Present status: Rare, only some small pockets.

2. *Plagiochila beddomei* Steph., *Bull. Herb. Boissier*, ser. 2,3: 876 (1903).

Earlier this species was reported from Nilgiri hills (Dodabetta) by Stephani (1903) and now shows an extended range of distribution in eastern Himalaya (Rawat and Srivastava, 2007) and China (So, 2001).

Specimens examined: Tamil Nadu: Nilgiri hills – Ootacamund (Dodabetta); *alt. ca* 2660 m.; Date: 08.10.2000; Legit.: S.C. Srivastava and Party; 12517/2000, 12514/2001 (LWU).

Present status: Frequent in distribution.

3. *Plagiochila ghatiensis* Steph., *Sp. Hep.* 6: 158 (1918).

The species was introduced from Palni hills (Kodaikanal) by Stephani (1918). Now the species has been newly reported from China (So, 2001).

Specimen examined: India Orientalis - Kodaikanal (Ghat Merid.); 1908; Legit.: G. Andre; 011001/ 1908 (Holotype - G). Tamil Nadu: Nilgiri hills – Ootacamund (Dodabetta); *alt. ca* 2660 m.; Date: 08.10.2000; Legit.: S.C. Srivastava and party; 12507/2000 (LWU).

Present status: Rare.

4. *Plagiochila indica* Mitt. Ex. Steph., *Bull. Herb. Boissier*, (ser. 2) 3: 532; *Sp. Hep.* 2: 336 (1903).

Earlier this species was reported from Nilgiri hills (Dodabetta) by Stephani (1903) and now shows an extended range of distribution in eastern Himalayas and Thailand (So and Grolle, 2001).

Specimen examined: Nilgiri Mts.; Gardner 40 (NY). Ootacamund (Dodabetta); *alt. ca* 2660 m.; Date: 08.10.2000; Legit.: S.C. Srivastava & party; 12413/2000, 12415/2000, 12423/2000 (LWU).

Present status: Frequent in distribution.

5. *Plagiochila sisparensis* Steph., *Sp. Hep.* 6: 207 (1921).

Earlier this species was reported from Nilgiri hills (Sispara pass) by Stephani (1921) and now reported from Sri Lanka (So and Grolle, 2000).

Specimen examined: Tamil Nadu: Nilgiri hills – Sispara; collector unknown; 010961 (Holotype - G). Nilgiri hills (Avalanche); *alt. ca* 2200 m.; Date: 9.10.2000; Legit.: S.C. Srivastava and Party; 12572/2000 (LWU).

Present status: Rare, only some small pockets.

6. *Plagiochila wightii* Nees Ex. Lindenb., *Syn. Hep.* 43 (1845).

Earlier this species was reported from Nilgiri hills but now it shows an extended range of distribution in China (So, 2001).

Specimen examined: India Orientalis; Date: ?; Herb. Nees No. 47; Legit.: Wight; Universite Louis Pasteur Institute Botanique de Strasbourg Conservation der Herbiers (STR).

Present status: Rare, only some small pockets.

7. *Porella acutifolia* (Lehm. & Lindenb.) Trevis., *Mem. Real. Instit. Lombardo ser. 3, 4: 408* (1977).

The species was instituted from Kerala (Anamalai hills) (Lehmahan and Lindenbergh, 1877) and now the species reported from several other South-east Asian countries (Hattori, 1970).

Present status: Frequent in distribution.

8. *Porella perrottetiana* (Mont.) Trevis., *Mem. Real. Istit. Lombardo ser. 3, 4: 408* (1877).

This species was introduced from Tamil Nadu (Nilgiri hills) as *Madotheca perrottetiana* Mont. and now it has been reported from several other southeast Asian countries (Hattori, 1967).

Specimen examined: Tamil Nadu: Monts. Nilgiris; *alt. ca* 1400; Legit.: Perrottet; 21530 (Type - G).

Present status: Frequent in distribution.

9. *Frullania acutiloba* Mitt., *Proc. Linn. Soc.* 5: 120 (1861).

This species introduced from Tamil Nadu (Nilgiri hills) by Mitten (1861) and now the species reported from several other South-east Asian countries (Hattori, 1979).

Specimens examined: Tamil Nadu: Nilgiri hills – Ootacamund (Government Botanical Garden); *alt. ca* 2250 m.; Date: 10.10.2000; Legit.: S.C. Srivastava and party; 12808/2000 (LWU).

Present status: Frequent in distribution.

10. *Frullania serrata* Gottsche, in: Gottsche & al, *Syn. Hep.* 453 (1845).

Earlier this species was reported from Palni hills (Kodaikanal – Shembagnur) (Gottsche, (1845) and now reported from several other countries of southern hemisphere (Hattori, 1973b).

Specimen examined: India Merid (Kodaikanal); Date: 1933; Legit.: R. P. Foreaur; *Hepaticae Selectae et Criticae* edited by Fr. Verdoorn. 15967/ 1933 (G).

Present status: Frequent in distribution.

11. *Lejeunea neelgherriana* Gottsche, In Gottsche & al, *Syn. Hep.* 354 (1845).

Earlier this species was reported from Nilgiri hills by Gottsche (see Gott. & al, 1854) and now reported from several Asiatic countries (Zhu and So, 2001).

Specimens examined: Tamil Nadu: Nilgiri hills – Ootacamund (Dodabetta); *alt. ca.* 2630 m.; Date: 08.10.2000; Legit.: S.C. Srivastava and party; 12558/2000 (LWU).

Present status: Frequent in distribution.

12. *Asterella leptophylla* (Mont.) Grolle, *Feddes Repert.* 87: 246 (1976).

The species was instituted from Karnataka (Mysore) as *Fimbriaria leptophylla* by Montagne (1842). The species is now reported from several other Asiatic countries.

* Specimens not seen.

Present status: Frequent in distribution.

***Riccia grollei* Udar**

The species was instituted from Nilgiri hills (Udar, 1965) and now the species is reported from several other part of India.

* Specimens not seen.

(C.) Change status of the taxa, earlier instituted from Western Ghats**1. *Aneura foreauna* Steph. *Sp. Hep.* 6: 26 (1917).**

The species was introduced from Palni hills (Kodaikanal: Shembagnur) by Stephani (1917) and now synonymized under *Riccardia multifida* (L.) Gray (Srivastava and Udar, 1976).

Specimens examined: British India: Madura- Shembagnur; H. Herbar, No. 13, Hri Vandenbroeck, Anverse; R.J.G. Foreau 008146 (G - Fondation Stephani).

2. *Plagiochila luethiana* Steph., *Sp. Hep.* 6: 180 (1921).

The species was reported from Nilgiri hills (Dodabetta) by Stephani (1921) and now synonymized under *Plagiochila nepalensis* Lindenb. by So (2001).

Specimen examined: Tamil Nadu: Monts. Nilgiris; *alt. ca* 2640; Legit.: Leiver; 23266 (Type - G).

3. *Plagiochila cornuta* Steph., *Bull. Herb. Boissier, ser, 2,3: 874* (1903).

This species was introduced from Nilgiri hills (Dodabetta) by Stephani (1921) and now synonymized under *Plagiochila nepalensis* Lindenb by So (2001).

Specimen examined: India Orientalis: Nilgherry Mountains; Legit.: Beddome; 319 (Type - G).

4. *Plagiochila flavovirens* Steph., *Sp. Hep.* 6: 156 (1918).

The species was introduced from Palni hills (Kodaikanal 'Madura') by Stephani (1921) and now synonymized under *Plagiochila sciophila* Nees *ex* Lindenb. by So (2001).

Specimen examined: India Orientalis: Madura; Legit.: Valle; 011000/ 1910; (Type - Fondation Stephani).

5. *Plagiochila kudremuktii* Steph., *Sp. Hep.* 6: 173 (1918).

The species was reported from Karnataka (Kudremukh) by Stephani (1918) and now synonymized under *Plagiochila himalayana* Schiffn. by So (2001).

Specimens examined: India Orientalis (Kudremukh); Date: 1911; Legit.: Pfeiderer; 011005/ 1911 (Type - G).

6. *Plagiochila richteri* Steph *ex* S.C. Srivast. & R. Dixit., *Geophytology*, 25: 101 (1996).

The species was reported from Kerala (Vagavurrai) by Stephani (1921) and now synonymized under *Plagiochila nepalensis* Lindenb. by So (2001).

Specimen examined: Kerala: Vagavurrai; Date: 01.06.1981; Legit.: U.S. Awasthi and A. Kumar; 6046/1981 (LWU).

7. *Plagiochila madurensis* Steph., *Sp. Hep.* 6: 183 (1921).

The species was introduced from Palni hills (Kodaikanal 'Madura') by Stephani (1921) and now synonymized under *Plagiochila elegans* Mitt. by So (2001).

Specimen examined: British India: Madura (Shembagnur); Legit.: R.P.G; 010963/ 191123266 (Type - Fondation Stephani - Herbar H. Vandenbroeck, Anvers).

8. *Plagiochila nilgherriensis* Steph., *Sp. Hep.* 6: 789 (1921).

This species was reported from Nilgiri hills (Dodabetta) by Stephani (1921) and now synonymized under *Plagiochila semidecurrence* (Lehm. and Lindenb.) Lindenb. by So (2001).

Specimens examined: Tamil Nadu: Nilgiri Mts. (Dodabetta); *alt. ca* 2600 m; 1909; Legit.: M. Fleisher; 023268/1909 (Holotype - G).

9. *Plagiochila remotistipula* Steph., *Sp. Hep.* 6: 201 (1921).

This species was reported from Nilgiri hills (Dodabetta) by Stephani (1921) and now synonymized under *Plagiochila nepalensis* Lindenb. by So (2001).

Specimens examined: Monts. Nilgiris (Dodabetta); *alt. ca* 2640; Date: 15.12.1909; Legit.: Fleisher 12586/ 1909 (Type - G).

10. *Plagiochila vygensis* Steph., *Sp. Hep.* 6: 237 (1921).

This species was reported from Palni (Kodaikanal 'Madura') by Stephani (1921) and now synonymized under *Plagiochila sciophila* Nees *ex* Lindenb. by So (2001).

Specimens examined: British India: Madura (Shembagnur); Date: 1917; Legit.: R.P.G. Foreau 010958/ 1917 (Type - Fondation Stephani - Herbar H. Vandenbroeck, Anvers).

11. *Tylimanthus indicus* Steph., *Sp. Hep.* 6: 248 (1922).

The species was reported from Palni hills (Kodaikanal 'Madura') by Stephani (1921) and now synonymized under *Plagiochila ghatiensis* Steph. by Inoue, 1984

* Specimens not seen.

12. *Mastigobryum trifidum* Steph., Sp. Hep. 3: 506 (1908).

This species was reported from Nilgiri hills by Stephani (1908) and now synonymized under *Bazzania oshimensis* (Steph.) Horik. by Kitgawa, 1967.

Specimens examined: India Orantalis: Nilgherry Mountains; Date: ? Legit.: Perrottet; 011196 (G-Herbier Stephani, Herb. J. Cardot No. 50 - Type).

13. *Mastigobryum perrottetii* Steph. Sp. Hep.3: 434 (1908).

This species was reported from Nilgiri hills by Stephani (1908) and now synonymies under *Bazzania tricrenata* (Wahlenb.) Lindenb. by Kitgawa, 1967.

Specimens examined: Hindustan: Mt. Nilgherries; Madura (Shembagnur); Date: 1836 Legit.: Perrottet; 012569/ 1836 (Type - G - Fondation Stephani, Herb, J. Cardot).

14. *Mastigobryum cardotii* Steph. Sp. Hep.3: 515 (1908).

This species was reported from Nilgiri hills by Stephani (1908) and now synonymies under *Bazzania tridens* (Reinw. Bl. et Nees) Trev. (see Sharma and Srivastava, 1993).

Specimens examined: India Orantalis: Nilgherry Mountains; Date: 1836 Legit.: Perrottet; 012567/ 1836 (G - Herbier Stephani, Herb. J. Cardot No. 50, Type).

15. *Madotheca nilgherriensis* Mont., Ann. Sci. Nat. ser. 2, 17: 15 (1842).

The species was reported from Nilgiri hills (Dodabetta) by Montgne (1842) and synonymized under *Porella madagascariensis* (Nees et Mont.) Trev. by Hattori, 1970.

16. *Madotheca madurensis* Steph., Sp. Hep.6: 525 (1924).

The species instituted from Palni hills (Kodaikanal - Shembagnur) by Stephani (1924) and synonymized under *Porella campylophylla* by Hattori, 1978).

Specimens examined: British India: Madura (Shembagnur); Date: 1917; Legit.: R.P.G. Farean No. 20 H (Fondation Stephani - Type).

17. *Madotheca indica* Steph; Sp. Hep.6: 524 (1924).

The species instituted from Karnataka (Kudremukh) by Stephani (1924) and synonymized under *Porella campylophylla* (Hattori, 1978).

Specimens examined: India Orientalis; Legit.: Pflleiderer No. (37) 31.

18. *Madotheca calcarata* Steph., Sp. Hep. 6: 518 (1924).

The species was earlier reported from Nilgiri hills (Dodabetta) by Stephani (1924) and synonymized under *Porella caespitans* (St.) Hatt. var. *setigera* (St.) Hatt. (Hattori, 1970).

Specimens examined: Monts. Nilgiris (Dodabetta); alt. ca. 2600; Date: 12.02.1909; Legit.: Fleisher 135; 21504/ 1909 (G - Type).

19. *Frullania pyriflora* Steph., Sp. Hep.4: 443 (1910).

The species was earlier reported from Tamil Nadu (Nilgiri hills - Nilgiri hills, St. Kathrine water falls) by Stephani (1910) and now synonymized under *Frullania polyptera* by Hattori, 1974.

20. *Frullania wallichiana* Mitt., J. Proc. Linn. Soc. 5: 118 (1861).

The species was earlier reported from Nilgiri hills (Tamil Nadu) by Mitten (1861) and synonymized under *Frullania arecae* (Spreng.) Gotteshe (Yuzawa, 1991).

Specimens examined: Tamil Nadu: Nilgiri hills – Ootacamund (on way to Pykara lake); alt. ca. 2100 m.; Date: 10.10.2000; Legit.: S.C. Srivastava and party; 12266/2000, 12761/2000 (LWU).

21. *Ptychanthus pyriformis* Steph., Hedwigia. 35: 122 (1889).

The species was earlier reported from Palni hills (Kodaikanal 'Madura') by Stephani (1924) and synonymized under *P. striatus* (Lehm. & Lindenb.) Nees by Mizutani, 1961)

22. *Ptychanthus perrottetii* Steph. The species was instituted from Nilgiri hills by Stephani (1924) and now synonymies under *Ptychnthus striatus* by Mizutani, 1961.

23. *Cheilolejeunea viridis* Steph., Sp. Hep. 5: 673 (1914).

This species is doubtful as no authentic specimens were available for investigation. However, Asthana & al (1995) suggested that the type of this species shows very close affinity with genus *Lejeunea* (G 12039).

24. *Harpalejeunea indica* Steph., *Sp. Hep.* 6: 392 (1923).

This species introduced from Karnataka (Kudremukh) by Stephani (1923) and now synonymized under *Lejeunea neelgherriana* Gottsche by Grolle and Reiner-Drehwald, 1999

Specimens examined: Karnataka: Kudremukh; Date: April, 1911; Legit.: Pfliegerer; 14857/ 1911 (G - Type).

25. *Eulejeunea stahlia* Steph., *Sp. Hep.* 5: 791 (1915).

This species introduced from Palni hills (Kodaikanal) by Stephani (1915) and now synonymized under *Lejeunea discreta* Lindenb. by Mizutani, 1971

Specimens examined: Tamil Nadu: Palni hills – Kodaikanal; 1909; Legit.: G. Andre; 14272 (G - Type).

26. *Lejeunea olivacea* Steph., *Hedwigia* 29: 137 (1890).

This species introduced from Nilgiri hills Stephani (1890) and now synonymized under *Rectolejeunea olivacea* (Steph.) S. C. Srivast. & A. Agarwal (Srivastava and Agarwal, 1986).

Specimens examined: India Orientalis: Nilgiri hills; Legit.: Wight; 008153 (Type - G).

27. *Cololejeunea dentifolia* Udar & G. Srivast., *J. Bryol.* 12: 229 (1982).

The species instituted from Karnataka (Agumbe) by Udar and Srivastava (1982) and now synonymized under *Cololejeunea gottschei* (Steph.) Mizut. by *Cololejeunea*

Specimens examined: Karnataka (Agumbe); *alt. ca.*: 791 m; Date: 04.05.1981; Legit.: D. Kumar, A. Kumar and U.S. Awasthi; 4789/1981 (Holotype - LWU).

28. *Cololejeunea pandei* Udar & G. Srivast., *J. Bryol.* 12: 227 (1982).

The species instituted from Karnataka (Agumbe) by Udar and Srivastava (1982) and now synonymized under *Cololejeunea trichomanis* (Gottsche) Steph. (see Asthana and Srivastava, 2003).

Specimens examined: Karnataka (Agumbe); *alt. ca.*: 791 m; Date: 04.05.1981; Legit.: D. Kumar, A. Kumar and U.S. Awasthi; 4786/1981 (Holotype - LWU).

29. *Radula andreana* Steph., *Sp. Hep.* 4: 182 (1910).

The species was introduced from Palni hills (Kodaikanal) by Stephani (1910) and now synonymized under *Radula kurzii* Steph by Yamada, 1979.

Specimens examined: India Orientalis: Ghat mired: Kodaikanal; Date: 1908 Legit.: G. Andre; 8222/ 1908 (Type - G).

30. *Radula foreauana* Bvrd. Ex Steph., *Hedwigia* 27: 62 (1888).

The species was introduced from Palni hills (Kodaikanal – Shembagnur) and now synonymized by Yamada (1979) under *Radula meyeri* Steph.

Specimens examined: British India: Madura (Shembagnur); Date: April, 1877; Legit.: R. F. G. Foreau 16359/ 1877 (Type – G, Fondation Stephani).

31. *Radula heterophylla* Steph., *Sp. Hep.* 6: 508 (1924).

The species was introduced from Nilgiri hills (Stephani, 1924) and synonymized by Yamada (1979) under *Radula auriculata* Steph.

* British India: Nilgiri hills 8226 (Type - G)

32. *Radula indica* Steph., *Sp. Hep.* 6: 511 (1924).

The species was introduced from Western Ghats by Stephani (1924) and now synonymized by Yamada (1979) under *Radula tabularis* Steph.

* India Orientalis: Ghat mired: Kodaikanal; Date: 1908 Legit.: Pfliegerer 8227/ 1908 (Type - G).

33. *Radula rara* Steph., *Sp. Hep.* 6: 514 (1924).

The species was introduced from Western Ghats by Stephani (1924) and synonymized by Yamada (1979) under *Radula tabularis* Steph.

*India Orientalis: Ghat mired: Kodaikanal; Date: 1908; Legit.: Pfliegerer 82311/ 1908 (Type - G).

34. *Asterella mysorensis* (Kashyap) Kachroo & Bapna, *J. Indian bot. Soc.* 56: 75 (1977).

The species was instituted from Mysore (Karnataka). It was Kashyap's Manuscript species from Mysore and published by Chopra (1938) under the name of *Fimbriaria mysorensis* and was never recollected. Chandra (1965) placed the species under *Asterella wallichiana* (Lehm. et Lindenb.) Grolle

*Specimen number not available.

35. *Asterella mercarana* (Steph.) Kachroo & Bapna, *J. Indian bot. Soc.* 56: 74 (1977).

The species was instituted from Karnataka (Mysore) as *Fimbriaria mercarana* Steph. by Stephani (1917). Chandra (1965) placed the species under *Asterella wallichiana*. (Lehm. et Lindenb.) Grolle

*Part of original material presented by Pfeleiderer to late Prof. S. K. Pande, Karnataka – Mercara (Coorg); Legit.: Pfeleiderer (Holotype G- 010495).

36. *Asterella indica* (Steph.) Kachroo & Bapna, *J. Indian bot. Soc.* 56: 74 (1977).

The species was instituted from Karnataka (Mysore) as *Fimbriaria indica* Stephani (1917). Chandra (1965) placed the species under synonymized under *Asterella wallichiana* (Lehm. et Lindenb.) Grolle.

* Bryophyte E. Levier Hepaticae Indiae Orientalis: Mysore; Date: 05.09.1903; Legit.: Inayat Khan (Type G - 10474).

(D) Doubtful Taxa reported from Western Ghats:

Some of the species presented in National and International conferences but not published elsewhere. However the validity of the species are still doubtful.

1. *Plagiochasma purandharensis* Biradar & Joshi, *J. Hattori Bot. Lab.* 56: 50 (1984).

The species was instituted from Maharashtra (Purandhar – Military camp area) by Biradar & Joshi (see in Joshi & Biradar, 1984). But the status of the species is still doubtful as it was never validly published.

*Specimens not seen.

Present status: The status has been doubtful due to absence of valid publication, the species was presented only in checklist (see Joshi & Biradar, 1984)

2. *Plagiochasma appendiculatum* Lehm. & Lindenb. var. *mahabaleshwarensis* Joshi & Biradar, *Journ. Hattori Bot. Lab.* 56:49 (1984).

The taxa instituted from Maharashtra (Mahabaleshwar) by (Joshi and Biradar, 1984), but the status of the species is still doubtful as it was never validly published.

*Specimens not seen.

Present status: The status has been doubtful due to absence of valid publication, the taxon was presented only in a checklist (see Joshi & Biradar, 1984).

3. *Riccia inderagandhii* Dabhade, Pp. 82 (2002); (Abstract in world conference of bryology held at Lucknow, 2002)

The species has been introduced from Maharashtra (Poona) by Dhabade, 2002.

*Specimens not seen.

Present status: The status has been doubtful due to absence of valid publication, the species was presented only in a checklist (Dhabade, 2002)

Discussions

The Western Ghats is ecologically very significant and the area spreads over variety of ecosystem but remains inadequately surveyed and documented especially for hepaticae (liverworts). The report is based on sporadic information. Till date now 314 taxa of embracing 68 genera of Hepaticae are known from the Western Ghats. Out of these 55 are clearly endemic, while 12 taxa earlier known as endemic from the Western Ghats are showing an extended range of distribution in other bryo-geographical regions of the country as well as abroad. However, the statuses of 31 taxa earlier reported only from the Western Ghats have been changed, and now they belong to different and correctly assigned genera, while 3 taxa which were presented in conferences remain doubtful as their type specimens and descriptions not available.

It is intriguing to note that there is loss of liverwort diversity including the endemic elements from the Western Ghats and there is great concern to all botanists.

In order to stop check the loss of endemic liverworts of the Western Ghats is an immediate need to firstly spot all such areas where they growing with luxuriance and identify them then conserve. It is needed protected entire Western Ghats to protect the Ghats unique ecosystem because it is clearly evident the bryophytes served as sponge to soaked rain water. The number of endemic species already vanishes because of the large areas of tropical forest were cleared for commercially significant cash crop like tea, coffee, cinchona, and spice gardens as well as was replaced on a huge scale with the introduction of exotic tree species while hydroelectric came after independence destroying entire Western Ghats ecosystem.

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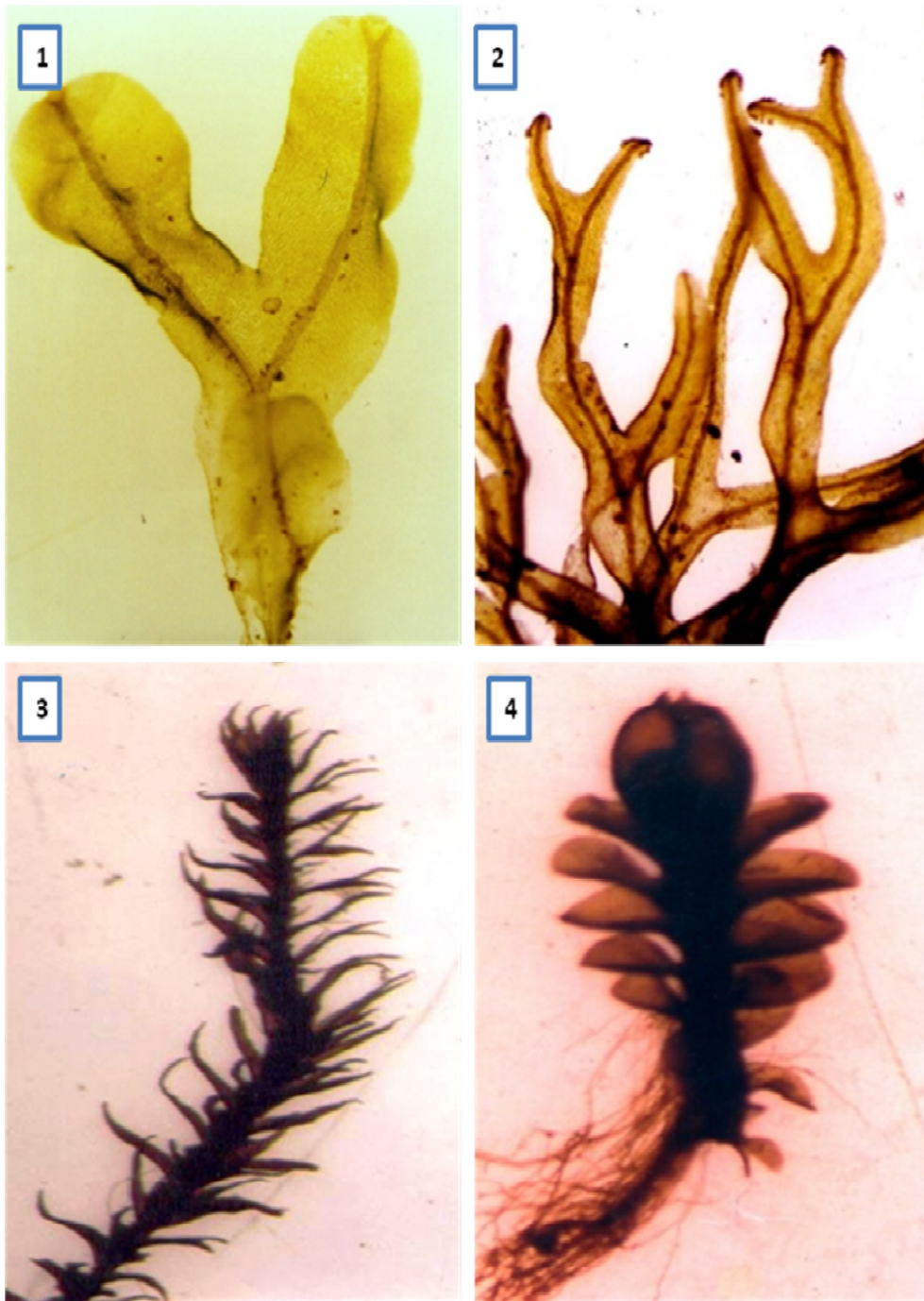
References

- ALAM, A. (2005). Studies in terrestrial liverworts of the Nilgiri and Palni hills. Ph.D thesis in Department of Botany, Lucknow University, Lucknow.
- ASTHANA, G. AND SRIVASTAVA, S. C. (2003). Indian *Cololejeunea*. (A taxonomic study). *Bryophytorum Bibliotheca*. **60**: 1-155. J. Cramer, Berlin, Stuttgart.
- ASTHANA, G.; SRIVASTAVA, S. C. AND ASTHANA, A.K. (1995). The genus *Cheilolejeunea* in India, *Lindbergia* **20** : 125 – 145.
- AWASTHI, U. S. AND SRIVASTAVA, S. C. (1988). Observation on the genus *Archeilejeunea* (Spruce) Schiffn. *Geophytology*. **18** (2): 206-211.
- AWASTHI, U.S., S.C. SRIVASTAVA, AND D. SHARMA. (2000). *Lopholejeunea* (Spruce) Schiffn. in India. *Geophytology*, **29**(1&2): 35-60.
- CHOPRA, R.S (1938). Notes on Indian Hepaticae. I. South India. *Proc. Indian Acad. Sci. ser. B* **7** : 239 – 251.
- DANIELS, A.E.D. AND P. DANIEL. (2002). Two new species of *Riccia* (Hepaticae: Marchantiales) from the Western Ghats of Tamil Nadu. *Bull. Bot. Surv.. India*. **44** (1- 4): 135 – 140.
- DIXIT, R. (1995). The genus *Plagiochila* (Dum.) Dum. in South India. Ph. D. Thesis, Department of Botany, University of Lucknow, Lucknow.
- GOTTSCHE, C. M; LINDENBERG J.B.G; AND NEES von ESENBECK, C.G. (1854). *Synopsis Hepaticarum*. Hamburg.

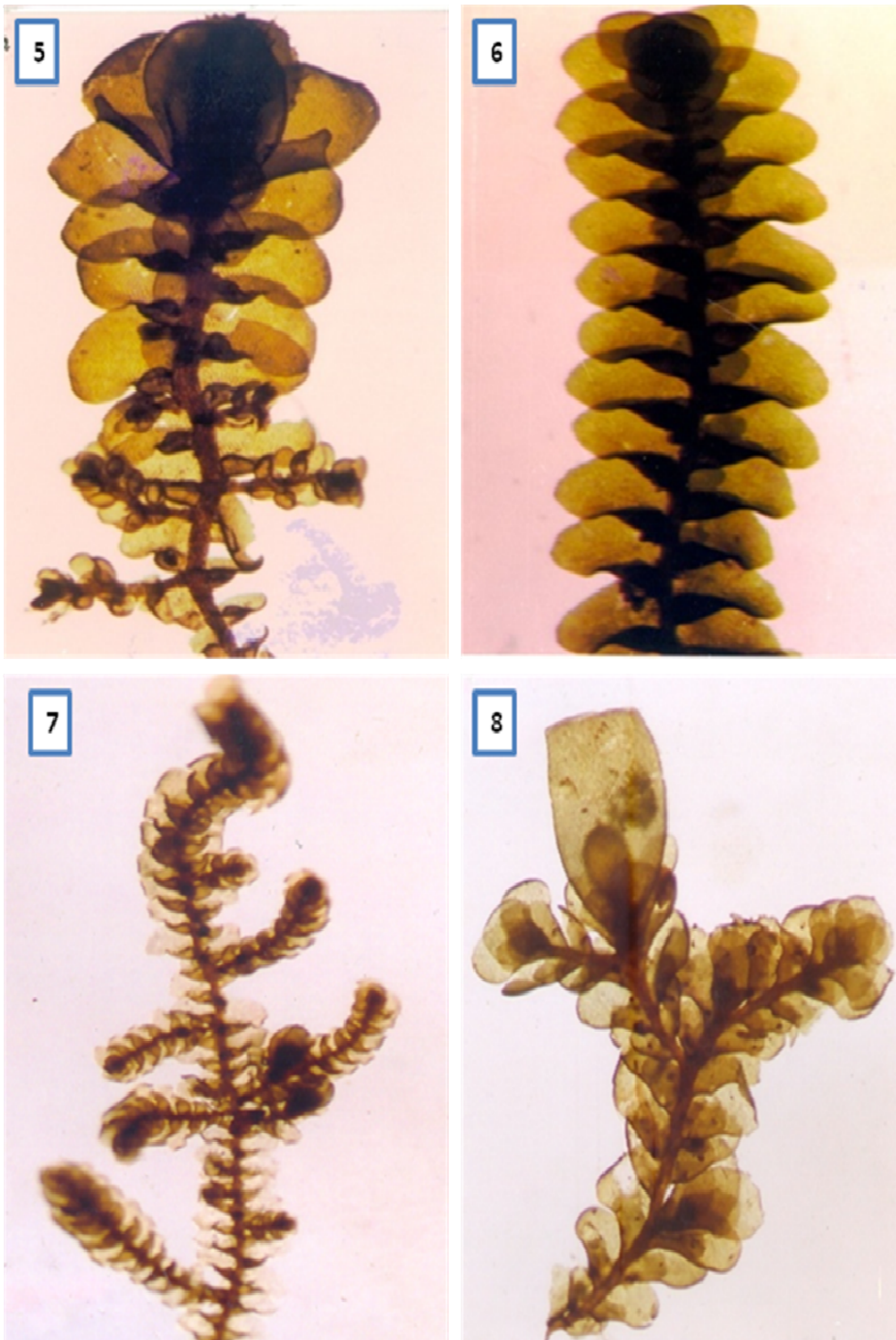
- GROLLE, R. AND REINER-DREHWALD, M. E. (1999). Review of the genus *Harpalejeunea* (Lejeuneaceae) including the description of *H. grandis*, a new species from the Paramos of Colombia. J. Bryol. 21: 101-107.**
- HATTORI, S. (1970). Studies of the Asiatic species of the genus *Porella* (Hepaticae). III. Journ. Hattori Bot. Lab. **33**: 41-87.
- HATTORI, S. (1973a). Notes on Asiatic species of the genus *Frullania*, Hepaticae III. **37**: 85-120.
- HATTORI, S. (1973b). Notes on Asiatic species of the genus *Frullania*, Hepaticae II. **37**: 55-84.
- HATTORI, S. (1974). Notes on the Asiatic species of the genus *Frullania* (Hepaticae). VI Journ. Hattori Bot. Lab. **38**: 223-274.
- HATTORI, S. (1970). Studies of the Asiatic species of the genus *Porella* (Hepaticae). VII. A synopsis of Asiatic Porellaceae. Journ. Hattori Bot. Lab. **44**: 91-120.
- HATTORI, S. (1971). Hepaticae. In: H. HARA (ed.) Flora of Eastern Himalaya Second report. Bull. Univ. Mus. Univ. Tokyo, **2**: 222-240.
- INOUE, H. (1984). The genus *Plagiochila* (Dum.) Dum. in southeast Asia. Tokyo: Academic Scientific Book Inc.**
- JOSHI, D.Y. AND BIRADAR, N. V. (1984). Studies in the liverwort flora of western ghats with special reference to Maharashtra., India. Journ. Hattori Bot. Lab. **56**: 45-52.
- KITGAWA, N. (1967). Studies on the Hepaticae of Thailand. I. The genus *Bazzania* with general introduction Journ. Hattori Bot. Lab. **30**: 249-270.
- LAL, D. G. (1998). Spore colour and ornamentation in the taxonomy of *Asterella* (Marchantiales, Aytoniaceae). In: BATES, J. W; ASHTON, N. W. AND DUCKETT, J. H. (eds.), Bryology for the twenty first century. Many, pp. 99-112.
- MITTEN, W. (1861). Hepaticae Indiae Orientalis: an enumeration of the Hepaticae of the East-Indies. J. Proc. Linn. Soc., Bot. **5**: 385 – 392 .
- MIZUTANI, M. (1961). A revision of Japanese Lejeuneaceae. Journ. Hattori Bot. Lab. **24**: 115-302.
- MIZUTANI, M. (1971). *Lejeunea* from the Himalayan region. Journ. Hattori Bot. Lab. **34**: 445-457.
- MONTAGNE, C. (1842). Cryptogamae nilgherienses seu plantarum cellularium in montibus peninsularum indicarum Neel-gherries dictis in a d Perrottet collectarum enumeration. Ann. Sci. Nat. II. **17**: 12-23. (Hepaticae, pp. 12-17).
- PANDE, S.K. AND BHARADWAJ, D.C. (1952). The present position of Indian Hepaticology with a note on the vegetation of the country. The Palaeobotanist (Birbal Sahni Memorial Volume), Pp. 368-381.
- PARIHAR, N.S; LAL, B. AND KATIYAR, N. (1994). Hepatics and Anthocerotae of India. A new annotated checklist. Central book depot. Allahabad.**
- SCHUSTER, R.M. (1984). Evolution, Phylogeny and Classification of the Hepaticae. In: SCHUSTER, R. M (ed.), New Manual of Bryology Vol. **2**: 760 - 1070. The Hattori Botanical Laboratory Nichinan, Miyazaki Japan.
- SHARMA D. AND SRIVASTAVA, S.C. (1993). Indian Lepidoziineae. A taxonomic revision. Bryophytorum. Bibliotheca. Band **47**: 1 – 354, Stuttgart.
- SINGH, S. K. AND SINGH, D. K. (2003). *Heterosyphus orbiculatus* Srivast et Srivast new to Himalayan bryoflora. Indian. J. For. **26**: 317-319.
- SRIVASTAVA, S.C. AND UDAR, R. (1975a). Taxonomy of the Indian Metzgeriaceae – A monographic study. New Botanist **2**: 1 – 57.
- SRIVASTAVA, S.C. AND UDAR, R. (1975b). The genus *Fossombronia* Raddi in India with a note on the Indian taxa of the family Fossombroniaceae. Nova Hedwigia. **26**: 799 – 845.
- SRIVASTAVA, S.C. AND UDAR, R (1976). Indian Aneuraceae – A monographic study. Biol. Mem. **1** : 121 – 154.
- SRIVASTAVA, S.C. (1994). Bryophyta - Morphology, Systematics, Reproductive Biology, In: JOHRI, B.M (ed.), Botany in India, History and Progress, Pp. 387 – 436. Oxford and IBH Publishing Company Pvt. Ltd. New Delhi.

- SRIVASTAVA, S.C. (1998). **Distribution of Hepaticae and Anthocerotae in India. In: CHOPRA, R.N. (ed.) Topics in Bryology. 53 – 85, Allied Publishers Ltd.**
- SRIVASTAVA, S.C. AND AGARWAL, A (1986). The genus *Rectolejeunea* in India. *The Bryologist*. **89**: 195-199.
- SRIVASTAVA, S.C. AND SHARMA, D. (2000). A preliminary study on the Liverwort and Hornwort flora of Silent Valley (Kerala). In: CHAUHAN, D. K, (ed.) Prof. D. D. Nautiyal Commemoration volume. Recent trends in Botanical research, Pp 55-76., Allahabad.
- SRIVASTAVA A. AND SRIVASTAVA, S.C. (2002). Indian Geocalycaceae (Hepaticae). – A taxonomic study. Bishen Singh Mahendra Pal Singh, Dehera Dun, Pp. 1 – 246.
- SRIVASTAVA S.C. AND SRIVASTAVA, S. (2002). Two new *Metzgerias* from Peninsular India. *Phytotaxonomy*. **4**: 79-86.
- SRIVASTAVA, S.C. AND UDAR, R. (1975a). Taxonomy of the Indian Metzgeriaceae – A monographic study. *New Botanist* **2**: 1 – 57.
- SRIVASTAVA, S.C. AND UDAR, R. (1975b). The genus *Fossombronia* Raddi in India with a note on the Indian taxa of the family Fossombroniaceae. *Nova Hedwigia*. **26**: 799 – 845.
- SRIVASTAVA, S.C AND VERMA, P.K. (2004a.) Genus *Arachniopsis* Spruce- new to India with *A. indica* sp. nov. as new to science. *Natl. Acad. Sci. Lett.* **27** (7&8): 269-272.
- SRIVASTAVA, S.C AND VERMA, P.K. (2004b). *Gongylanthus indicus* sp. nov. (Hepaticae) an interesting new addition from India (Nilgiri hills). *Indian Journ. of Forestry* **28** (2): 200- 205.
- SRIVASTAVA, S.C; RAWAT, K.K. AND VERMA, P.K. (2006). An Interesting *Plagiochila* from Kodaikanal (India) *Nat. Acad. Sci. Lett.* **29** (7 & 8): 267-270
- SO, M. L. (2001). *Plagiochila* (Hepaticae, Plagiochilaceae) in China. *Syst. Bot. Monogr.* **60**: 1 – 214.
- SO, M.L. AND GROLLE, R. (2000). Checklist of *Plagiochila* in Asia. *Journ. Hattori Bot. Lab.* **88**: 199 – 243.
- STEPHANI, F. (1898-1900). *Species Hepaticarum* **1**: 1- 413 (1898:1-96; 1899: 97-304; 1900: 305-413) Geneve.
- STEPHANI, F. (1901-1905). *Species Hepaticarum* **2**: 1- 615 (1901: 1-193; 1902: 194-341; 1903: 342-452; 1904: 453-502; 1905: 503-615) Geneve.
- STEPHANI, F. (1906-1909). *Species Hepaticarum* **3**: 1- 673 (1906: 1-146; 1907: 147-224; 1908: 225-516; 1909: 517-673) Geneve.
- STEPHANI, F. (1909-1912). *Species Hepaticarum* **4**: 1- 824 (1909: 1-96; 1910: 97-464; 1911: 465-736; 1912: 737-824) Geneve.
- STEPHANI, F. (1912-1916). *Species Hepaticarum* **5**: 1- 1044 (1912: 1-76; 1913: 177-480; 1914: 481-74; 1915: 705-848; 1916: 849-1044). Geneve
- STEPHANI, F. (1917 – 1924). *Species Hepaticarum* **6**: 1-763 (1917: 1-128; 1918: 129-176; 1921: 177-240; 1922 241-368; 1923: 369-432; 1924: 433-763). Geneve.
- STOTLER, R. AND CRANDAL, S. B. (1977). A check list of the liverworts and Hornworts of North America. *The Bryologist*. **80**: 405-428.
- STREIMANN, H. (1991). New Hepaticae record from New Guinea. *Journ. Hattori. Bot. Lab.* **69**:1-19.
- UDAR, R. (1965). *Riccia grollei* Udar nom. nov. a correction for *Riccia tuberculata* Pande *et* Udar from India. *Curr. Sci.* **34**: 126.
- UDAR R. (1976). *Bryology in India. The Chronica Botanica, New Delhi. Pp.1–200.*
- UDAR, R. AND AWASTHI, U.S. (1981). The genus *Archilejeunea* (Spruce) Schiffn. in India. *Geophytology*. **11**: 72-79
- UDAR, R. AND AWASTHI, U.S. (1982). The genus *Mastigolejeunea* (Spruce) Schiffn. in India. *Proc. Indian Acad. Sci (Plant Sci.)* **93**: 485-494.
- UDAR, R. AND AWASTHI, U.S. (1984). *Schiffneriolejeunea indica* (St.) Udar *et* Awasthi in Kerala *J. Indian . Bot. Soc.* **63**: 460-461.
- UDAR, R. AND CHANDRA, V. (1965). On two new species of *Mannia*, *M. foreau* Udar *et* Chandra and *M. personii* Udar *et* Chandra with a note on the genus on the genus and its India species *Candian Journ. Bot.* **43**: 147-160.

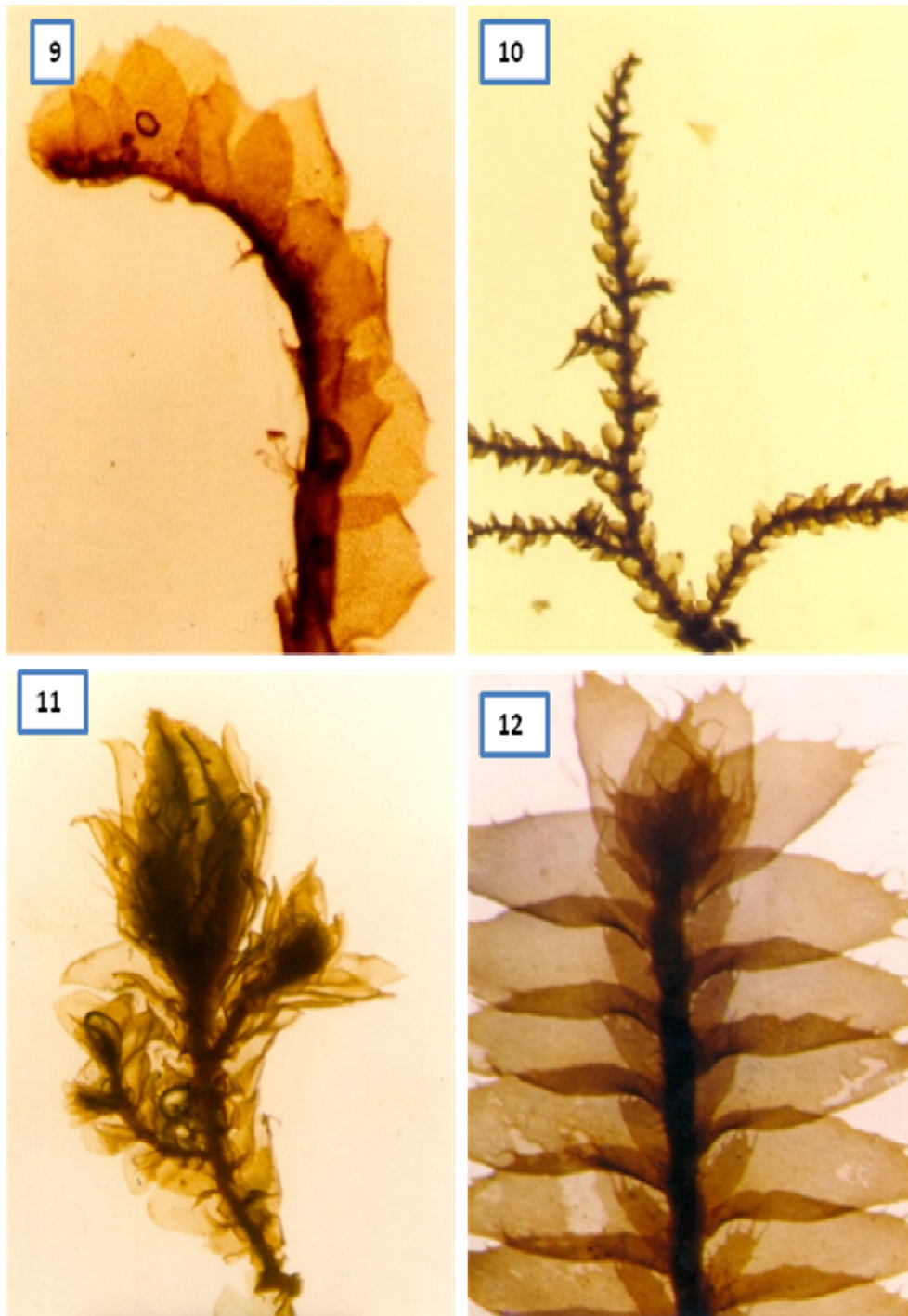
-
- UDAR, R. AND KUMAR, A. (1982). A new *Chonecolea* from India. *The Bryologist*. **85** (3): 315-318.
- UDAR, R. AND KUMAR, DH. (1982). A new hepaticae from south india. *Linbergia*. **9**: 133-136.
- UDAR, R. AND SHAHEEN, F. (1983a). *Marchantia kashyapii* sp. nov. from south India. *Indian Bot. Soc.* **5**: 5 1-6.
- UDAR, R. AND SRIVASTAVA, G (1982). Two new species of *Cololejeunea* from peninsular India. *J. Bryol.* **12**: 227-231
- UDAR, R. AND SRIVASTAVA, S.C. (1983). Rare and endangered liverworts of India. In: JAIN, S.K. AND RAO, R.R. (eds.), An assessment of threatened plants of India., Pp. 303 – 312. Botanical Survey of India (Department of Environment) Botanic Garden, Howrah.**
- UDAR, R; AWASTHI, U.S. AND SHAHEEN, F. (1982). A new *Cadalejeunea* from India. *The Bryologist* 85: (3): 329-331.**
- VERMA, P.K. (2005). Studies in Hepaticae of Nilgiri hills with special reference to epiphytic taxa. Ph.D thesis in Department of Botany, Lucknow University, Lucknow.
- VERMA, P. K. AND SRIVASTAVA, S.C. (2007). Diversity of genus *Taxilejeunea* (Spr.) Schiffn. in Western Ghats (India). *Proc. Nat. Acad. Sci, India*, **77** (B, II): 206 -214.
- YAMADA, K. (1979). A revision of Asian taxa of *Radula*. Hepaticae. *Journ. Hattori Bot. Lab.* **45**: 201-322.



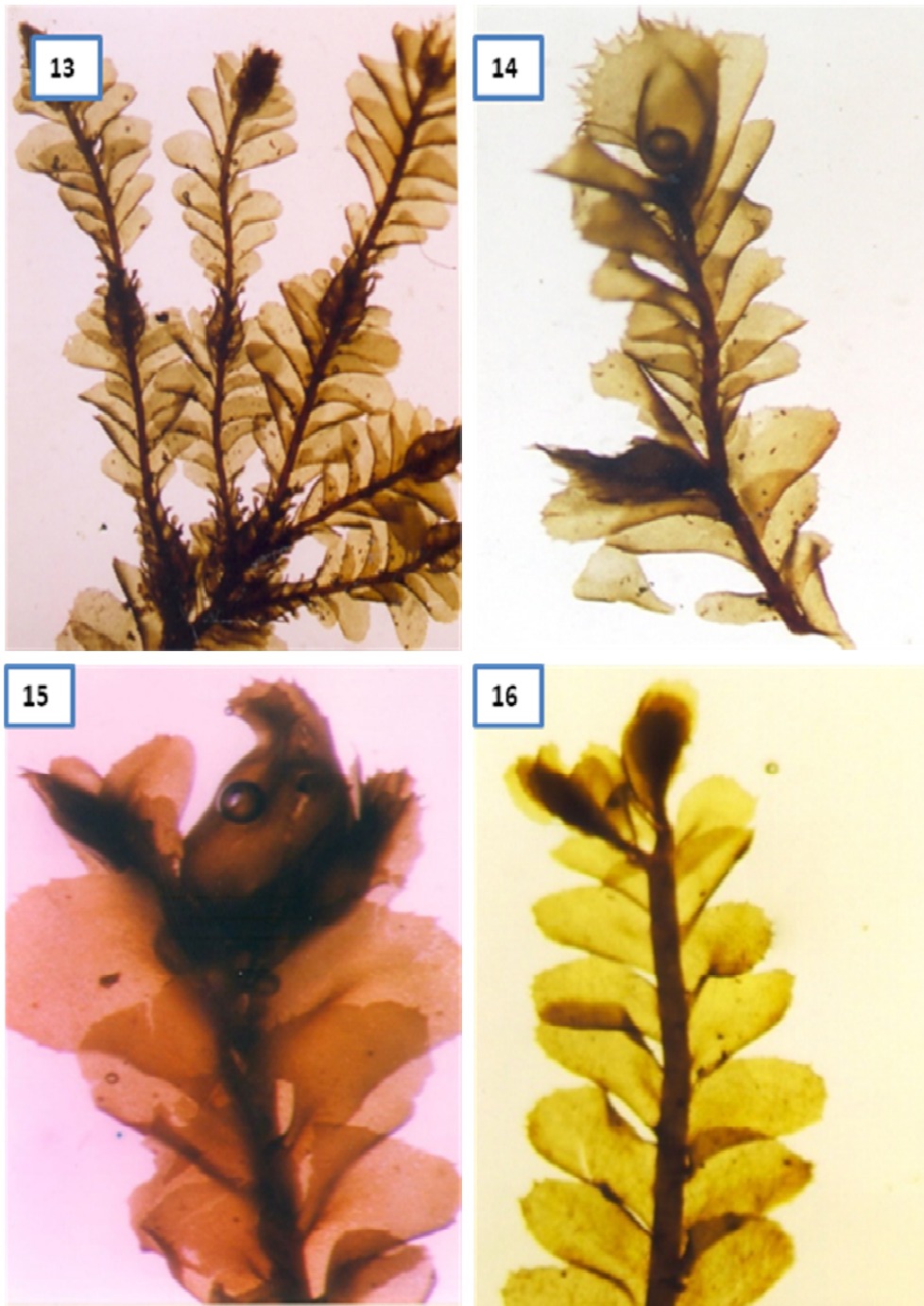
Taxa endemic to Western Ghats: 1. *Metzgeria pandei*, 2. *M. nilgiriensis*, 3. *Herbertus nilgiriensis*, 4. *Jungermannia pfeidereri*



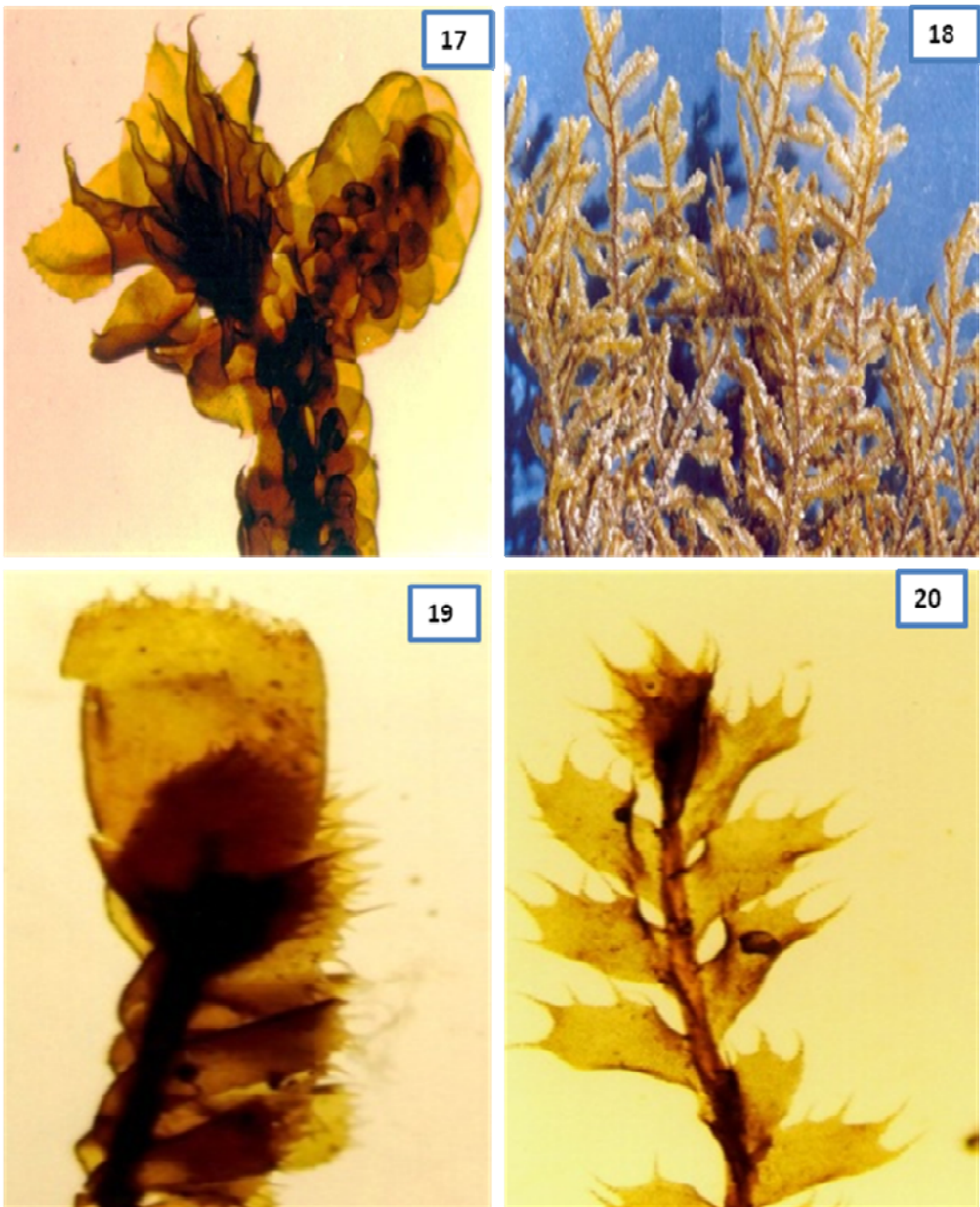
Taxa endemic to Western Ghats: 5. *Lopholejeunea nilgiriensis*, 6. *Schiffneriolejeunea indica*, 7. *Cheilolejeunea udarii*, 8. *Radula nilgiriensis*



Taxa introduced from Western Ghats, extended range of distribution: 9. *Heteroscyphus orbiculatus*. 10. *Lejeunea neelgherriana*, 11. *Frullania acutiloba*, 12. *Porella perrottetiana*



Taxa introduced from Western Ghats, extended range of distribution:
13, 14 *Plagiochila indica*, 15. *Plagiochila beddomei*, 16. *P. sisparensis*



Taxa introduced from Western Ghats, now treated as synonyms: 17. *Frullania wallichiana* (now *Frullania arecae*), 18. *Ptychanthus perrottetii* (now *Ptychnthus striatus*), 19. *Plagiochila nilgherriensis* (now *Plagiochila semidecurrens*), 20. *Plagiochila cornuta* (now *Plagiochila sciophila*)