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Invited Review Article

Epiphyllous Liverworts of India: An Overview

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Abstract

Taxonomy of the epiphyllous liverworts in India has been reviewed and their diversity and distribution has been discussed. A total of 160 species, one subspecies and two varieties of epiphyllous liverworts belonging to 23 genera in eight families have been recognized in Indian bryoflora, distributed only in eastern Himalaya and the north-east, Western Ghats, and the Andaman & Nicobar Islands. Eastern Himalaya, including the north-east, with 133 taxa shows the maximum diversity of epiphylls, whereas Sikkim with 80 taxa is the richest amongst the States. Lejeuneaceae with 131 species belonging to 16 genera is the most prolific family of epiphyllous liverworts accounting for over 80 per cent of their total diversity in India, while *Cololejeunea* with 54 species is the most dominant genus. Twenty species are endemic to India, of which 11 are restricted to eastern Himalaya, three to Western Ghats, and one to Andaman & Nicobar, while five species are common between eastern Himalaya and the Western Ghats.

Keywords

Epiphyllous liverworts; Diversity; Distribution; India

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Introduction

The vast geographical expanse of India and its extreme diversity of habitats have resulted in almost all types of ecosystems ranging from scrub to tropical evergreen rain forests, coastal mangroves to temperate and alpine vegetation in the country, with 10 distinct biogeographical zones, 27 biotic provinces and over 400 biomes. The biogeographically strategic location of the country at the confluence of three major global biogeographical realms, viz. Indo-Malayan, Eurasian and Afro-tropical has also contributed to the significant features of the Indian flora by the intermingling of the floristic elements from the surrounding countries. These biological attributes have contributed towards a rich biological diversity, including that of bryophytes, and have made India as one of the 17 mega

biodiverse countries of the world ranking fourth in Asia and eleventh in the world (Mittermeier *et al.*, 1997; Williams *et al.*, 2001), accounting for about 11 per cent of the total global floristic resources. Based on distribution and floristic affinities of the liverworts, however, Pandé (1958) and Singh (1992, 1997) recognized eight bryogeographical regions in the country. The Indian liverworts and the hornworts, in the present state of our knowledge, represent about 12.40 per cent of their global diversity.

Bryophytes, because of their general lack of cuticle, absorb water and nutrients through the general surface of their plant body. Even in some mosses, where the conducting tissues are fairly evolved, and liverworts where rhizoids are abundantly present, they normally depend on surface absorption of water and nutrients.

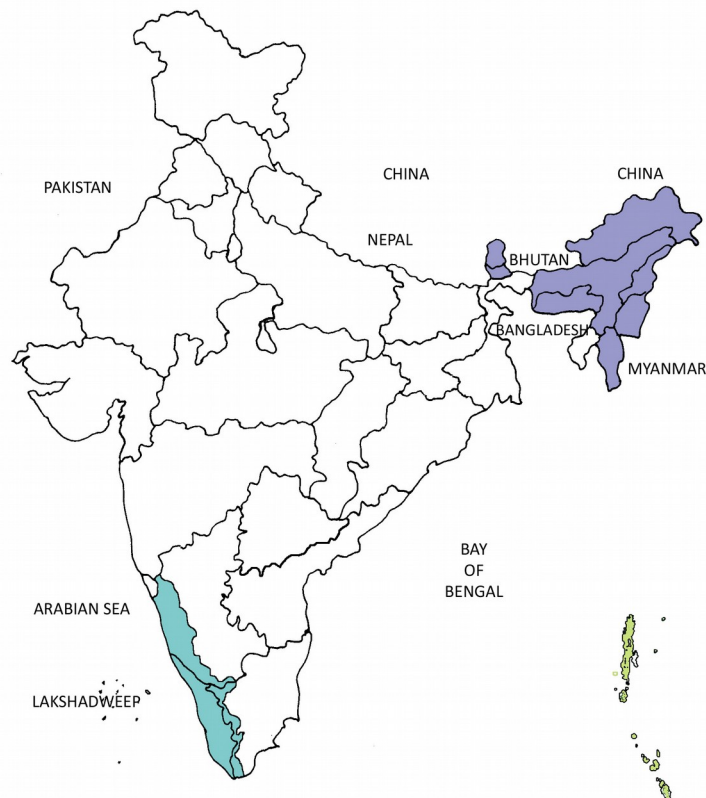


Fig. 1. Distribution of epiphyllous liverworts in India

Because of their poikilohydric nature, they grow on a variety of surfaces including abandoned articles, where usually no other plants will grow except algae, fungi and lichens. They may be terricolous, growing on soil; lignicolous, growing on decaying logs, leaf litter, etc; rupicolous or saxicolous, growing on bare rock surface; or corticolous, growing on the bark of vascular plants. In tropical and subtropical regions, which experience long periods of high humidity and where the condition of growth is very congenial, the bryophytes also grow as foliicolous or epiphyllous and form “phyllosphere” usually on the upper surface of leaves of vascular plants along with cyanobacteria, fungi and lichens. Interestingly, liverworts are the predominant constituents of the epiphyllous communities. In India eastern Himalaya, including the north-eastern region, Western Ghats and the Andaman & Nicobar Islands are the only bryogeographical regions of the country from where the epiphyllous liverworts have been recorded so far (Fig. 1).

Taxonomy of Epiphyllous Liverworts in India

The earliest report of epiphyllous liverwort from anywhere in the world dates back to later part of eighteenth century when Swartz (1788) described *Jungermannia flava* Sw. [= *Lejeunea flava* (Sw.) Nees], growing on fern fronds, from Jamaica. In India, Pandé and Misra (1943) for the first time described five epiphyllous species, viz. *Leptocolea lanciloba* (Steph.) A.Evans (= *Cololejeunea lanciloba*

Steph.), *Rectolejeunea aloba* (Sande Lac.) Steph. (= *Lejeunea aloba* Sande Lac.), *Cololejeunea hispidissima* (Steph.) Pandé, K.P.Srivast. & S.Ahmad. [= *C. haskarliana* (Lehm. & Lindenb.) Schiffn.] from Western Ghats and *Cololejeunea indica* Pandé & Misra and *Leptolejeunea himalayensis* Pandé & Misra (= *Lejeunea cocoes* Mitt.) from eastern Himalaya. Later, Herzog (1950) described two new species viz. *Strepsilejeunea ocellata* Herzog (= *Drepanolejeunea herzogii* R.L.Zhu & M.L.So) and *Leptolejeunea latifolia* Herzog from Darjeeling, while Kachroo (1951) reported epiphyllous *Cololejeunea venusta* (Sande Lac.) Schiffn. (*Cololejeunea haskarliana*) and *Leptocolea lanciloba* (= *Cololejeunea lanciloba*) from Assam. Few years later, Pandé *et al.* (1957) described *Taeniolejeunea peraffinis* (Schiffn.) Zwickel [= *Cololejeunea appressa* (A.Evans) Benedix], *Taeniolejeunea pseudofloccosa* (Horik.) Hatt. [= *Cololejeunea pseudofloccosa* (Horik.) Benedix], *Leptolejeunea schiffneri* Steph. [= *L. elliptica* (Lehm. & Lindenb.) Schiffn.] and *Drepanolejeunea foliicola* Horik. from Western Ghats and the eastern Himalaya with notes on the distribution of another 23 epiphyllous taxa from the above two bryogeographical regions of the country and the Andaman & Nicobar islands. Srivastava (1960) reported *Riccardia levieri* Schiffn. growing as epiphyllous on dicot leaves near Gersoppa falls in the Western Ghats of Karnataka. Lal (1977) reported *Colura tenuicornis* (A.Evans) Steph. from Darjeeling in eastern

Himalaya, and later he (Lal, 1980) and Udar and Awasthi (1985) reported *C. ari* Steph. and *C. acroloba* (Mont.) Jovet-Ast respectively from the Andaman Islands. Udar and Srivastava (1983, 1985) described *C. mizutaniana* Udar & G.Srivast. and *C. kashyapii* Udar & G.Srivast. from Karnataka. Earlier, Udar and Awasthi (1982, 1984) reported epiphyllous *Leptolejeunea foliicola* Steph. from Meghalaya and *Rhaphidolejeunea yunnanensis* P.C.Chen [= *Drepanolejeunea yunnanensis* (P.C.Chen) Grolle & R.L.Zhu] from Arunachal Pradesh, West Bengal and Karnataka, and Lal (1979) reported epiphyllous occurrence of *Metzgeria nilgiriensis* Udar & S.C.Srivast. from Manipur. Udar and Kumar (1984) described four epiphyllous species of *Radula* Dumort. from India, and Udar *et al.* (1985) reported the foliicolous occurrence of *Cololejeunea furcilibulata* (Berrie & E.W.Jones) R.M.Schust. from Karnataka. Whereas, Awasthi (1986) reported four epiphyllous species of genus *Leptolejeunea* (Spruce) Schiffn., and Srivastava and Srivastava (1989a, b) described six species of *Cololejeunea* from eastern Himalaya and the Western Ghats. Singh (1996) reported nine epiphyllous liverworts from Namdapha Tiger Reserve and National Park in Arunachal Pradesh belonging to five genera in two families.

Asthana and Srivastava (2003) described 26 epiphyllous species of *Cololejeunea* from India, whereas Zhu and Long (2003) reported four epiphyllous liverworts, *Colura tenuicornis*, *Lejeunea flava*, *L. punctiformis* Taylor [= *Microlejeunea punctiformis* (Taylor) Steph.] and *Leptolejeunea latifolia* from Darjeeling in eastern Himalaya. In a review of epiphyllous liverworts in India, Lal (2003) listed 38 species belonging to 13 genera of Lejeuneaceae and *Metzgeria nilgiriensis* of Metzgeriaceae. Singh *et al.* (2007) for the first time reported foliicolous existence of nine taxa of *Metzgeria* Raddi from Arunachal Pradesh, Sikkim and Himalayan West Bengal, while Singh and Singh (2008) reported foliicolous *M. conjugata* Lindb. from Sikkim. Daniels and Daniel (2004) reported the epiphyllous occurrence of *Leptolejeunea balansae* Steph. from Western Ghats, while Singh *et al.* (2006a) reported epiphyllous *Cololejeunea desciscens* Steph., *Leptolejeunea balansae*, *L. epiphylla* (Mitt.) Steph. and *L. maculata* (Mitt.) Schiffn. from Andaman Islands.

Asthana and Shukla (2009) described *Drepanolejeunea fleischeri* (Steph.) Grolle & R.L.Zhu and *D. pentadactyla* (Mont.) Steph. for the first time in Indian liverwort flora from Karnataka, while Daniels and Daniel (2009) described *Cololejeunea distalopapillata* (E.W.Jones) R.M.Schust. and *C. vidaliana* Tixier from Tamil Nadu. Dey and Singh (2012) described 87 species and two varieties of epiphylls spreading across 19 genera and seven families from Arunachal Pradesh, Sikkim and Himalayan West Bengal. Singh *et al.* (2010a, b) reported 17 species belonging to five genera from Manipur, and five species belonging to genera *Cololejeunea* and

Leptolejeunea from Little Andaman respectively. Singh and Dey (2012) described *Drepanolejeunea devendrae* Sushil K. Singh & M.Dey from Meghalaya, while Singh and Barbhuiya (2012) reported 31 species of epiphyllous liverworts from Assam. Daniels and Daniel (2013) reported eight species of epiphyllous liverworts from southern Western Ghats. Singh and Singh (2013) described *Cololejeunea pluridentata* P.C.Wu & J.S.Lou for the first time in Indian liverwort flora and reported another five species of epiphyllous liverworts from Sikkim, while Singh and Barbhuiya (2013) recorded *Cololejeunea chenii* Tixier for the first time in India from Mizoram, and Singh *et al.* (2014) recorded *Chielolejeunea osumiensis* (S.Hatt.) Mizut. for the first time in India from Arunachal Pradesh and Sikkim. Singh and Dey (2014) reported *Cololejeunea epiphylla* G. Asthana & A. Shukla and *C. gottschei* (Steph.) Mizut. from Mizoram, while Singh *et al.* (2015) and Kumar *et al.* (2015) reported *Lejeunea kashyapii* Dey *et al.*, and *Drepanolejeunea fleischeri* and *D. yunnanensis* respectively from Meghalaya. Recently, Dey and Singh (2016a, b) described *Cololejeunea andamansis* M.Dey & D.K.Singh and recorded *C. pseudoschmidtii* Tixier, *C. equalbi* Tixier, *Colura pluridentata* Ast and *Drepanolejeunea thwaitesiana* (Mitt.) Steph. var. *thwaitesiana* for the first time in Indian bryoflora from Andman & Nicobar Islands. Whereas, Singh *et al.* (2016) recorded 26 epiphylls, including six species of the genus *Radula* Dumort. from Andman & Nicobar Islands.

Synopsis of the Epiphyllous Liverworts in India

The data presented here is based on the published information available to the authors. A careful analysis of all the published binomials of epiphyllous taxa in India revealed the occurrence of 160 species, one subspecies and two varieties belonging to 23 genera in eight families in three bryogeographical territories of the country, viz. Eastern Himalaya (including the north-east), Western Ghats and the Andaman & Nicobar (Table 1). This accounts for 18.31 per cent of the total liverwort diversity of the country. However, no epiphyllous liverworts have so far been recorded from Tripura in the north-east, the Western Ghats of Goa, Dadra, Nagar & Haveli and Maharashtra, and other bryogeographical regions of the country. Lejeuneaceae with 131 species belonging to 16 genera is the most prolific family of epiphyllous liverworts accounting for 80.36 per cent of the total taxa, followed distantly by Radulaceae and Metzgeriaceae with nine taxa each in genera *Radula* and *Metzgeria* respectively (5.5%), Plagiochilaceae with six species (3.6%), Frullaniaceae with four taxa (2.4%), Lophocoleaceae with two species (1.2%) and family Aneuraceae and Jubulaceae with one species each (0.61%) (Table 1). *Cololejeunea* with 54 species is the largest genus of epiphylls in India, followed by *Lejeunea* (19), *Drepanolejeunea* (14),

Leptolejeunea (11), *Metzgeria* and *Radula* (09 each), *Cheilolejeunea* and *Colura* (07 each), *Plagiochila* (06), *Frullania*, *Lopholejeunea* and *Microlejeunea* (04 each), *Acrolejeunea* (03) and *Caudalejeunea* and *Heteroscyphus* (02 each). On the other hand seven genera, viz. *Acanthocoleus*, *Jubula*, *Lepidolejeunea*, *Metalejeunea*, *Ptychanthus*, *Riccardia* and *Tuyamaella* are represented by a single species only. While all the seven species of the genus *Colura* hitherto known in Indian liverwort flora are epiphyllous, thus showing cent per cent epiphyllously, 96.42 per cent of Indian species of the genus *Cololejeunea*, 91.66 per cent of *Leptolejeunea*, 77.77 per cent of *Drepanolejeunea*, 42.85 per cent of *Metzgeria*, 38 per cent of *Lejeunea*, etc. occur as epiphyllous as well.

Table 1. Conspectus of epiphyllous liverworts in India

Order	Family	Genus	Species
Metzgeriales	Aneuraceae	<i>Riccardia</i>	1
	Metzgeriaceae	<i>Metzgeria</i>	8 (1)
	Radulaceae	<i>Radula</i>	9
Porellales	Frullaniaceae	<i>Frullania</i>	2 (2)
	Jubulaceae	<i>Jubula</i>	1
		<i>Acanthocoleus</i>	1
		<i>Acrolejeunea</i>	3
		<i>Archilejeunea</i>	1
		<i>Caudalejeunea</i>	2
		<i>Cheilolejeunea</i>	7
		<i>Cololejeunea</i>	54
		<i>Colura</i>	7
		<i>Drepanolejeunea</i>	14
		<i>Lejeunea</i>	19
		<i>Lepidolejeunea</i>	1
		<i>Leptolejeunea</i>	11
		<i>Lopholejeunea</i>	4
		<i>Metalejeunea</i>	1
		<i>Microlejeunea</i>	4
<i>Ptychanthus</i>	1		
<i>Tuyamaella</i>	1		
Jungermanniales	Lophocoleaceae	<i>Heteroscyphus</i>	2
	Plagiochilaceae	<i>Plagiochila</i>	6
Total	8	23	163

The figures in parenthesis represent the infraspecific taxa.

The taxa at the rank of genus and above are treated as per the classification proposed by Crandall-Stotler *et al.* (2009) with some modifications based on Gradstein (2013) and Wang *et al.* (2014). The genera, and the species within each genus, are arranged alphabetically. Currently

accepted binomials are provided in boldface, while the basionyms, if any, and the synonyms are in italic font. The name of a taxon is followed by nomenclatural citation, state-wise distribution with the names of the states given alphabetically in acronym, and the relevant literature reference. The names of the authors of plant names have been abbreviated according to Brummitt and Powell (1992), while the journals have been abbreviated as per Bridson *et al.* (2004a, b).

Acronyms used: AN: Andaman & Nicobar; AR: Arunachal Pradesh; AS: Assam; EH: Eastern Himalaya; KA: Karnataka; KL: Kerala; ML: Meghalaya; MN: Manipur; MZ: Mizoram; NL: Nagaland; SK: Sikkim; TN: Tamil Nadu; WG: Western Ghats; WB: West Bengal.

Enumeration

Acanthocoleus R.M.Schust. (Lejeuneaceae)

- **Acanthocoleus gilvus** (Gottsche) Kruijt, Bryophyt. Biblioth. 36: 79. 1988. ML, SK, WB (Lal, 2003; Dey and Singh, 2012).

Acrolejeunea (Spruce) Schiffn. (Lejeuneaceae)

- **Acrolejeunea infusca** (Mitt.) J.Wang bis & Gradst. in Wang *et al.*, Bry. Div. Evo. 36: 38. 2014. SK (Dey and Singh, 2012 as *Trocholejeunea infusca*).
- **Acrolejeunea pusilla** (Steph.) Grolle & Gradst., J. Hattori Bot. Lab. 38: 332. 1974. SK (Singh and Singh, 2013).
- **Acrolejeunea sandvicensis** (Gottsche) J.Wang bis & Gradst., in Wang *et al.*, Bry. Div. Evo. 36: 39. 2014. AR, SK (Dey *et al.*, 2009; Dey and Singh, 2012, both as *Trocholejeunea sandvicensis*).
- *Aneura levieri* Schiffn. ex Steph., Bull. Herb. Boissier 7: 751. 1899 & Sp. Hepat. 1: 261. 1899 = **Riccardia levieri**
- *Aphanolejeunea diaphana* (A.Evans) R.M.Schust., Hep. Anthoc. N. Amer. 4: 1294. 1980. *nom. illeg.*, non *Aphanolejeunea diaphana* Herzog. = **Cololejeunea diaphana**
- *Aphanolejeunea grossepapillosa* Horik., J. Sci. Hiroshima Univ., Ser. B, Div. 2, Bot. 1: 92. 1932 = **Cololejeunea grossepapillosa**
- *Aphanolejeunea truncatifolia* Horik., J. Sci. Hiroshima Univ., Ser. B, Div. 2, Bot. 2: 284. 1934 = **Cololejeunea grossepapillosa**
- Archilejeunea** (Spruce) Schiffn. (Lejeuneaceae)
- *Archilejeunea apiculifolia* Steph., Sp. Hepat. 6: 558. 1924 = **Archilejeunea planiuscula**
- *Archilejeunea apiculifolia* Steph. var. *dentifolia* U.S. Awasthi & S.C. Srivast. Geophytology 18: 207. 1988 = **Archilejeunea planiuscula**
- **Archilejeunea planiuscula** (Mitt.) Steph., Sp. Hepat. 4: 731. 1911. AS (Singh and Barbhuiya, 2012).

- *Archilejeunea pusilla* Steph., Sp. Hepat. 4: 731. 1911 = **Acrolejeunea pusilla**
- *Brachiolejeunea andamana* Steph., Sp. Hepat. 5: 130. 1912 = **Ptychanthus striatus**
- *Brachiolejeunea infusata* (Mitt.) R.M.Schust., Beih. Nova Hedwigia 9: 105. 1963 = **Acrolejeunea infusata**
- *Brachiolejeunea levieri* Steph., Sp. Hepat. 5: 134. 1912 = **Acrolejeunea infusata**
- *Brachiolejeunea sandvicensis* (Gottsche) A.Evans, Trans. Connecticut Acad. Arts 10: 419. 1900 = **Acrolejeunea sandvicensis**
- *Bryopteris nepalensis* Steph., Sp. Hepat. 5: 9. 1912 = **Ptychanthus striatus**
- Caudalejeunea** (Steph.) Schiffn. (Lejeuneaceae)
 - **Caudalejeunea lehmanniana** (Gottsche) A.Evans, Bull. Torrey Bot. Club 34: 544. 1907. AR (Dey and Singh, 2009; Dey and Singh, 2012).
 - *Caudalejeunea pluriplicata* Udar, U.S. Awasthi & Shaheen, Bryologist 85: 329. 1982 = **Caudalejeunea reniloba**
 - **Caudalejeunea reniloba** (Gottsche) Steph., Sp. Hepat. 5: 16. 1912. AN, AS, KA (Lal, 2003; Singh and Barbhuiya, 2012; Singh *et al.*, 2016 as *C. recurvistipula*).
- Cheilolejeunea** (Spruce) Schiffn. (Lejeuneaceae)
 - *Cheilolejeunea imbricata* (Nees) S. Hatt., Misc. Bryol. Lichenol. 1(14): 1. 1957 = **Cheilolejeunea trapezia**
 - **Cheilolejeunea intertexta** (Lindenb.) Steph., Hedwigia 29: 85. 1890. AN (Lal, 2003).
 - *Cheilolejeunea katschalliana* Steph., Hedwigia 34: 242. 1895 = **Cheilolejeunea intertexta**
 - *Cheilolejeunea kurzii* Steph., Bot. Gaz. 15: 284. 1890 = **Cheilolejeunea intertexta**
 - **Cheilolejeunea laeviuscula** (Mitt.) Steph., Sp. Hepat. 5: 668. 1914. AS, SK (Dey and Singh, 2012; Singh and Barbhuiya, 2012 as *Cheilolejeunea longiloba*).
 - *Cheilolejeunea longiloba* (G.Hoffm.) J.J. Engel & B.C.Tan, J. Hattori Bot. Lab. 60. 294. 1986 = **Cheilolejeunea laeviuscula**
 - **Cheilolejeunea osumiensis** (S.Hatt.) Mizut., Misc. Bryol. Lichenol. 8: 148. 1980. AR, SK (Singh *et al.*, 2014).
 - **Cheilolejeunea serpentina** (Mitt.) Mizut., J. Hattori Bot. Lab. 26: 171. 1963. AS (Singh and Barbhuiya, 2012).
 - **Cheilolejeunea subopaca** (Mitt.) Mizut., J. Hattori Bot. Lab. 26: 183. 1963. KL (Manju *et al.*, 2012).
 - **Cheilolejeunea trapezia** (Nees) Kachroo & R.M.Schust., J. Linn. Soc. London, Bot. 56: 509. 1961. AR, SK, TN, WB (Lal, 2003 as *C. ceylanica*; Dey and Singh, 2012).
 - *Cheilolejeunea trapezia* (Nees) Mizut., J. Hattori Bot. Lab. 24: 282. 1961 = **Cheilolejeunea trapezia**
 - **Cheilolejeunea trifaria** (Reinw., Blume & Nees) Mizut., J. Hattori Bot. Lab. 27: 132. 1964. AS (Singh and Barbhuiya, 2012).
 - *Chiloscyphus communis* Steph., Bull. Herb. Boissier, Ser. 2, 7: 839. 1907 & Sp. Hepat. 3: 211. 1907 = **Heteroscyphus bescherellei**
 - *Chiloscyphus gammianus* Steph., Bull. Herb. Boissier, Ser. 2, 7: 845. 1907 & Sp. Hepat. 3: 217. 1907 = **Heteroscyphus hyalinus**
- Cololejeunea** (Spruce) Schiffn. (Lejeuneaceae)
 - *Cololejeunea acinacifolia* (Steph.) Kitag., J. Hattori Bot. Lab. 36: 451. 1972 = **Cololejeunea longifolia**
 - **Cololejeunea aequabilis** (Sande Lac.) Schiffn., Consp. Hep. Archip. Indici 242. 1898. AR (Dey and Singh, 2011a, 2012).
 - **Cololejeunea andamanensis** M.Dey & D.K.Singh, Cryptog. Bryol. 37(2): 150. 2016. AN (Dey and Singh, 2016b).
 - **Cololejeunea appresa** (A.Evans) Benedix, Feddes Repert. Beih. 134: 31.1953. AS, KA, TN, WB (Asthana and Srivastava, 2003; Verma and Srivastava, 2008; Singh and Barbhuiya, 2012).
 - **Cololejeunea bhutanica** Grolle & Mizut., J. Bryol. 15: 281. 1988. SK (Dey and Singh, 2011a, 2012).
 - *Cololejeunea bolombensis* (Steph.) Vanden Berghen, Bull. Jard. Bot. Belg. 42: 475. 1975 = **Cololejeunea lanciloba**
 - **Cololejeunea cardiocarpa** (Mont.) A.Evans, Hedwigia 29. 91. 1890. KL, TN (Asthana and Srivastava, 2003; Verma and Srivastava, 2008).
 - **Cololejeunea ceratilobula** (P.C.Chen) R.M.Schust., Beih. Nova Hedwigia 9: 179. 1963 AN, AR, SK (Dey and Singh, 2012; Singh and Singh, 2013; Singh *et al.*, 2016).
 - **Cololejeunea ceylanica** Onr., Acta Bot. Acad. Sci. Hung. 25: 107. 1979. AR (Asthana and Srivastava, 2003; Dey and Singh, 2012).
 - **Cololejeunea chenii** Tixier, Bryphot. Biblioth. 27. 219. 1985. MZ, SK (Singh and Barbhuiya, 2013; Singh and Singh, 2013).
 - **Cololejeunea denticulata** (Horik.) S.Hatt., Bull. Tokyo Sci. Mus. 11: 99. 1944. AS (Singh and Barbhuiya, 2012).
 - *Cololejeunea dentifolia* Udar & G. Srivast., J. Bryol. 12: 229. 1982 = **Cololejeunea gottschei**
 - **Cololejeunea desciscens** Steph., Hedwigia 24. 248. 1895. AN, AS (Singh *et al.*, 2006a, 2010b; Singh and Barbhuiya, 2012).
 - **Cololejeunea diaphana** A.Evans, Bull. Torrey Bot. Club 32: 184. 1905. AR, SK, WB (Asthana and Srivastava, 2003; Dey and Singh, 2012, both as *C. truncatifolia*).

- **Cololejeunea distalopapillata** (E.W.Jones) R.M.Schust., Beih. Nova Hedwigia 9: 173. 1963. TN (Daniels and Daniel, 2009, 2013).
- **Cololejeunea dozyana** (Sande Lac.) Schiffn., Consp. Hepat. Arch. Ind. 242. 1898. SK (Dey and Singh, 2011a, 2012).
- **Cololejeunea epiphylla** G. Asthana & A. Shukla, Cryptog. Bryol. 31: 218. 2010. KA, MZ (Asthana and Shukla, 2010; Singh and Dey, 2014).
- **Cololejeunea equialbi** Tixier, Ann. Fasc. Sci. Univ. Phnom Penh. 3: 178. 1970. AN (Singh *et al.*, 2016; Dey and Singh, 2016a).
- **Cololejeunea floccosa** (Lehm. & Lindenb.) Schiffn., Consp. Hepat. Arch. Ind. 243. 1898. AN, AR, SK (Dey and Singh, 2012; Singh *et al.*, 2016).
- **Cololejeunea foliicola** S.C.Srivast. & G. Srivast., Proc. Indian Acad. Sci., Pl. Sci. 99: 86. 1989. AS, KA, KL (Asthana and Srivastava, 2003; Manju *et al.*, 2012; Singh and Barbhuiya, 2012).
- **Cololejeunea furcilobulata** (Berrie & E.W.Jones) R.M.Schust., Beih. Nova Hedwigia 9: 178. 1963. KA (Asthana and Srivastava, 2003)
- *Cololejeunea goebelii* (Gottsche ex K.I. Goebel) Schiffn., Consp. Hepat. Arch. Ind. 244. 1898 = **Cololejeunea trichomanis**
- *Cololejeunea goebelii* (Gottsche ex K.I. Goebel) Schiffn. var. *acrotremae* (Schiffn.) Schiffn., Consp. Hepat. Arch. Ind. 244. 1898 = **Cololejeunea jelinekii**
- **Cololejeunea gottschei** (Steph.) Mizut., J. Hattori Bot. Lab. 28: 117. 1965. AN, KA, MZ (Udar & Srivastava, 1982; Lal, 2003, both as as *C. dentifolia*; Asthana and Srivastava, 2003; Singh *et al.*, 2010b; Singh and Dey, 2014).
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 - *Euosmolejeunea osumiensis* S.Hatt., Bull. Tokyo Sci. Mus. 11: 105. 1944 = **Cheilolejeunea osumiensis**
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 - *Euosmolejeunea trifaria* (Reinw., Blume & Nees) Steph., Hedwigia 29: 78. 1890 = **Cheilolejeunea trifaria**
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- *Frullania apiculata* (Reinw., Blume & Nees) Dumort., Recueil Observ. Jungerm. 13. 1835. AS (Singh and Barbhuiya, 2012).
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 - *Frullania muscicola* Steph. var. **inuena** (Steph.) Kamim., J. Hattori Bot. Lab. 24: 25. 1961. SK (Dey and Singh, 2012).
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- *Hygrolejeunea sordida* (Nees) Steph., Sp. Hepat. 5: 570. 1914 = **Lejeunea sordida**
- Jubula** Dumort. (Jubulaceae)
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- *Jungermannia calyptrifolia* Hook., Brit. Jungermann. Pl. 43: 1-13. 1813 = **Colura calyptrifolia**
- *Jungermannia cucullata* Reinw., Blume & Nees, Nova Acta Phys.-Med. Acad. Caes. Leop.-Carol. Nat. Cur. 12: 227. 1825 = **Metalejeunea cucullata**
- *Jungermannia elliptica* Lehm. & Lindenb. in Lehm., Nov. Stirp. Pug. 5: 13. 1833 = **Leptolejeunea elliptica**
- *Jungermannia flava* Sw., Prodr. 144. 1788 = **Lejeunea flava**
- *Jungermannia floccosa* Lehm. & Lindenb. in Lehm., Nov. Stirp. Pug. 5: 26. 1833 = **Cololejeunea floccosa**
- *Jungermannia fulvifolia* Hook.f. & Taylor, London J. Bot. 4: 85. 1845 = **Radula fulvifolia**
- *Jungermannia furcata* L., Sp. Pl. 1136. 1753 = **Metzgeria furcata** var. **furcata**
- *Jungermannia sordida* Nees, Enum. Pl. Crypt. Jav. 41. 1830 = **Lejeunea sordida**
- *Jungermannia striata* Lehm. & Lindenb. in Lehm., Nov. Stirp. Pug. 4: 16. 1832 = **Ptychanthus striatus**
- *Jungermannia tamarisci* L., Sp. Pl. 1134. 1753 = **Frullania tamarisci** subsp. **tamarisci**
- *Jungermannia tenuis* Reinw., Blume & Nees, Nova Acta Acad. Caes. Leop.-Carol. German. Nat. Cur. 12: 226. 1824 = **Drepanolejeunea angustifolia**
- *Jungermannia thymifolia* Nees var. *imbricata* Nees, Enum. Pl. Crypt. Jav. 42. 1830 = **Cheilolejeunea trapezia**
- *Jungermannia trapezia* Nees, Enum. Pl. Crypt. Jav. 41. 1830 = **Cheilolejeunea trapezia**
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- *Jungermannia violacea* Ach., F. Weber & D. Mohr, Beitr. Naturk. 1: 77. 1805 = **Metzgeria violacea**
- *Jungermannia wallichiana* Lehm., Nov. Stirp. Pug. 3: 5. 1831 = **Microlejeunea wallichiana**
- Lejeunea** Lib. (Lejeuneaceae)
- *Lejeunea aequabilis* Sande Lac., Ann. Mus. Bot. Lugduno-Batavi 1: 310. 1864 = **Cololejeunea aequabilis**
- **Lejeunea alata** Gottsche, in Gottsche, Lindenb. & Nees, Syn. Hepat. 406. 1845. AR, SK, WB (Dey and Singh, 2008b; Dey and Singh, 2012).
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- **Lejeunea anisophylla** Mont., Ann. Sci. Nat., Bot., Sér. 2. 19: 263. 1843. AN, AR, SK (Dey *et al.*, 2009; Dey and Singh, 2012; Singh *et al.*, 2016).
- **Lejeunea apiculata** Sande Lac., Ned. Kruidk. Arch. 3: 421. 1851. SK (Dey *et al.*, 2009 as *Stenolejeunea apiculata*; Dey and Singh, 2012).
- *Lejeunea appendiculata* Mitt., J. Proc. Linn. Soc. Bot., 5: 113. 1861 = **Microlejeunea wallichiana**
- *Lejeunea boninensis* Horik., J. Sci. Hiroshima Univ., Ser. B, Div. 2, Bot. 1: 24. 1931 = **Lejeunea anisophylla**
- *Lejeunea borneensis* Steph., Sp. Hepat. 5: 769. 1915 = **Lejeunea anisophylla**
- *Lejeunea cardiocarpa* Mont., Hist. Phys. Cuba, Bot., Pl. Cell. 476. 1842 = **Cololejeunea cardiocarpa**
- **Lejeunea cocois** Mitt., J. Proc. Linn. Soc., Bot. 5: 114. 1861. TN, WB (Pande & Misra, 1943 as *Leptolejeunea himalayensis*; Daniels and Daniel, 2013 as *Lejeunea himalayensis*).
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- *Lejeunea cucullata* (Reinw., Blume & Nees) Nees, Naturgesch. Eur. Leberm. 3: 293. 1838 = **Metalejeunea cucullata**
- **Lejeunea curviloba** Steph., Sp. Hepat. 5: 774. 1915. SK (Dey and Singh, 2012).
- **Lejeunea discreta** Lindenb., Gottsche, Lindenb. & Nees, Syn. Hepat. 361. 1845. SK, TN, WB (Lal, 2003; Dey and Singh, 2012).

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- *Lejeunea dozyana* Sande Lac., Syn. Hepat. Jav. 63. 1856 = **Cololejeunea dozyana**
- **Lejeunea eifrigii** Mizut., J. Hattori Bot. Lab. 33: 244. 1970. SK (Dey *et al.*, 2007; Dey and Singh, 2012).
- *Lejeunea epiphylla* Mitt., J. Proc. Linn. Soc., Bot. 5: 118. 1861 = **Cololejeunea epiphylla**
- *Lejeunea eulopha* Taylor, London J. Bot. 5: 391. 1846 = **Lopholejeunea eulopha**
- **Lejeunea flava** (Sw.) Nees, Naturgesch. Eur. Leberm. 3: 277. 1838. AR, AS, MN, SK, WB (Singh *et al.*, 2010a; Dey and Singh, 2012; Singh and Barbhuiya, 2012; Singh and Singh, 2013).
- *Lejeunea gilva* Gottsche, Abh. Naturwiss. Vereine Bremen 7: 353. 1882 = **Acanthocoleus gilvus**
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- *Lejeunea gracillima* Mitt., J. Proc. Linn. Soc., Bot. 5: 115. 1861 = **Microlejeunea punctiformis**
- *Lejeunea haskarliana* Lehm. & Lindenb. in Lehm., Nov. Stirp. Pug. 8: 26. 1844 = **Cololejeunea haskarliana**
- *Lejeunea himalayensis* (Pande & R.N. Misra) A.E.D. Daniels & P. Daniel, Bryofl. South. W. Ghats India 205. 2013 = **Lejeunea cocoes**
- *Lejeunea imbricata* (Nees) Gottsche, Lindenb. & Nees, Syn. Hepat. 359. 1845 = **Cheilolejeunea trapezia**
- *Lejeunea infuscata* Mitt., J. Proc. Linn. Soc., Bot. 5: 111. 1861 = **Acrolejeunea infuscata**
- *Lejeunea intertexta* Lindenb. in Gottsche *et al.*, Syn. Hepat. 379. 1845 = **Cheilolejeunea intertexta**
- **Lejeunea kashyapii** M.Dey, D.K.Singh & D. Singh, J. Bryol. 30: 126. 2008. ML, SK (Dey *et al.*, 2008b; Dey and Singh, 2012; Singh *et al.*, 2015).
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- *Lejeunea lehmanniana* Gottsche in Gottsche *et al.*, Syn. Hepat. 325. 1845 = **Caudalejeunea lehmanniana**
- *Lejeunea longifolia* Mitt., J. Proc. Linn. Soc., Bot. 5: 117. 1861 = **Cololejeunea longifolia**
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- *Lejeunea planiuscula* Mitt., J. Proc. Linn. Soc., Bot. 5: 111. 1861 = **Archilejeunea planiuscula**
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- *Lejeunea ternatensis* Gottsche in Gottsche *et al.*, Syn. Hepat. 346. 1845 = **Drepanolejeunea ternatensis**

- *Lejeunea thwaitesiana* Mitt., J. Proc. Linn. Soc., Bot. 5: 117. 1861 = **Drepanolejeunea thwaitesiana** var. **thwaitesiana**
- *Lejeunea trichomanis* Gottsche in Abh. Naturwiss. Vereine Bremen 7: 362. 1882 = **Cololejeunea trichomanis**
- **Lejeunea tuberculosa** Steph., Sp. Hepat. 5: 790. 1915. AN, AR, AS, MN, SK, WB (Singh *et al.*, 2010a; Singh and Barbhuiya, 2012; Dey and Singh, 2012; Singh *et al.*, 2016).
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- *Lejeunea venusta* Sande Lac., Syn. Hep. Jav. 64. 1856 = **Cololejeunea haskarlina**
- *Lejeunea wallichiana* (Lehm.) Lindenb. in Gottsche *et al.*, Syn. Hepat. 361. 1845 = **Microlejeunea wallichiana**
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- *Leptolejeunea dapitana* Steph., Bull. Herb. Boissier 5: 79. 1897 = **Leptolejeunea elliptica**
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 - **Lopholejeunea nigricans** (Lindenb.) Schiffn., Consp. Hepat. Arch. Indici 293. 1898. AS (Singh and Barbhuiya, 2012).
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 - **Metalejeunea cucullata** (Reinw., Blume & Nees) Grolle, Bryophyt. Biblioth. 48: 100. 1995. TN (Verma *et al.*, 2013).
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 - *Metzgeria darjeelingensis* Kuwah., J. Hattori Bot. Lab. 39: 365. 1975, *p.p.* = **Metzgeria consanguinea**
 - *Metzgeria decipiens* (C.Massal.) Schiffn., Forschungsr. Gazelle 4: 43. 1890 = **Metzgeria furcata** var. **furcata**
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 - *Metzgeria lutescens* Steph., Sp. Hepat. 6: 54. 1917 = **Metzgeria furcata** var. **furcata**
 - **Metzgeria nilgiriensis** Udar & S.C.Srivast., New Botanist 2: 24. 1975. MN, TN (Lal, 2003).
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 - *Microlejeunea gracillima* (Mitt.) Carr. & Pears, Proc. Linn. Soc. N.S. Wales Ser. 2, 2: 1040. 1888 = **Microlejeunea punctiformis**
 - *Microlejeunea longirostris* Steph., Sp. Hepat. 6: 422. 1923 = **Microlejeunea wallichiana**
 - **Microlejeunea minutistipula** Steph., Hedwigia 29: 89. 1890. AN (Lal, 2003).
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- *Phragmicoma sandvicensis* Gottsche, Ann. Sci. Nat., Bot., Ser. 4, 8: 344. 1857 = **Acrolejeunea sandvicensis**
- *Physocolea acinacifolia* Steph., Sp. Hepat. 5: 887. 1916 = **Cololejeunea longifolia**
- *Physocolea angustifolia* (Mitt.) Steph., Sp. Hepat. 5: 887. 1916 = **Drepanolejeunea angustifolia**
- *Physocolea bolombensis* Steph., Sp. Hepat. 5: 868. 1916 = **Cololejeunea lanciloba**
- *Physocolea denticulata* Horik., J. Sci. Hiroshima Univ., Ser. B, Div. 2, Bot. 2: 287. 1934 = **Cololejeunea denticulata**
- *Physocolea diversifolia* (Mitt.) Steph., Sp. Hepat. 5: 892. 1916 = **Cololejeunea longifolia**
- *Physocolea dozyana* (Sande Lac.) Steph., Sp. Hepat. 5: 891. 1916 = **Cololejeunea dozyana**
- *Physocolea gottschei* Steph., Sp. Hepat. 5: 894. 1916 = **Cololejeunea gottschei**
- *Physocolea hispidissima* (Steph.) Herzog, Ann. Bryol. 4: 94. 1931 = **Cololejeunea haskarliana**
- *Physocolea longifolia* (Mitt.) Steph., Sp. Hepat. 5: 898. 1916 = **Cololejeunea longifolia**
- *Physocolea madothecoides* Steph., Sp. Hepat. 5: 898. 1916 = **Cololejeunea madothecoides**
- *Physocolea raduliloba* (Steph.) Steph., Sp. Hepat. 5: 903. 1916 = **Cololejeunea raduliloba**
- *Physocolea serrulata* Steph., Sp. Hepat. 5: 906. 1916 = **Cololejeunea serrulata**
- *Physocolea spinosa* Horik., J. Sci. Hiroshima Univ., Ser. B, Div. 2, Bot. 1: 70. 1931 = **Cololejeunea spinosa**
- *Physocolea trianguliloba* Steph., Sp. Hepat. 5: 907. 1916 = **Cololejeunea peraffinis**
- *Physocolea trichomanis* (Gottsche) Steph., Sp. Hepat. 5: 912. 1916 = **Cololejeunea trichomanis**
- Plagiochila** (Dumort.) Dumort. (Plagiochilaceae)
- *Plagiochila acanthophylla* Gottsche, Bot. Zeitung (Berlin) 16, Beil. 37: 38. 1858 = **Plagiochila sciophila**
- *Plagiochila brevifolia* Steph., Bull. Herb. Boissier, Ser. 2, 3: 876. 1903 = **Plagiochila nepalensis**
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- *Plagiochila cornuta* Steph., Bull. Herb. Boissier, Ser. 2, 3: 874. 1903 & Sp. Hepat. 2: 359. 1903 = **Plagiochila nepalensis**
- *Plagiochila cuspidata* Steph., Sp. Hepat. 6: 144. 1918 = **Plagiochila parvifolia**
- *Plagiochila decolyana* Schiffn. ex Steph., Sp. Hepat. 6: 144. 1918 = **Plagiochila nepalensis**
- **Plagiochila denticulata** Mitt., J. Proc. Linn. Soc., Bot. 5: 95. 1861. SK (Dey and Singh, 2012).
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- *Plagiochila flavovirens* Steph., Sp. Hepat. 6: 156. 1918 = **Plagiochila sciophila**
- **Plagiochila fordiana** Steph., Bull. Herb. Boissier (ser. 2) 3: 104. 1902. AS (Singh and Barbhuiya, 2012).
- **Plagiochila furcifolia** Mitt., Trans. Linn. Soc. London, Bot. ser 2, 3: 194. 1891. AS (Singh and Barbhuiya, 2012).
- *Plagiochila gammiana* Steph., Bull. Herb. Boissier, Ser. 2, 3: 963. 1903 & Sp. Hepat. 2: 378. 1903 = **Plagiochila nepalensis**
- *Plagiochila gollanii* Steph., Bull. Herb. Boissier, Ser. 2, 3: 883. 1903 & Sp. Hepat. 2: 368. 1903 = **Plagiochila nepalensis**
- *Plagiochila gollanii* var. *triquetra* Herzog, Ann. Bryol. 12: 76. 1939 = **Plagiochila nepalensis**
- *Plagiochila grata* Steph., Sp. Hepat. 6: 160. 1918 = **Plagiochila nepalensis**
- *Plagiochila horridula* Steph., Sp. Hepat. 6: 168. 1918 = **Plagiochila denticulata**
- *Plagiochila luethiana* Steph., Sp. Hepat. 6: 180. 1921 = **Plagiochila nepalensis**
- *Plagiochila neorupicola* Inoue, Bryologist 68: 218. 1965 = **Plagiochila parvifolia**
- **Plagiochila nepalensis** Lindenb., Sp. Hepat. (*Plagiochila* fasc. 2 – 4): 93. 1840. AR (Dey and Singh, 2012).
- *Plagiochila orientalis* Taylor, London J. Bot. 5: 261. 1846 = **Plagiochila sciophila**
- **Plagiochila parvifolia** Lindenb., Sp. Hepat. (*Plagiochila* fasc. 1): 28. 1839. AS (Singh and Barbhuiya, 2012).
- *Plagiochila phalangea* Taylor, London J. Bot. 5: 264. 1846 = **Plagiochila parvifolia**
- *Plagiochila pseudorientalis* Inoue, J. Hattori Bot. 30: 126. 1967 = **Plagiochila nepalensis**
- *Plagiochila remotistipula* Steph., Sp. Hepat. 6: 201. 1921 = **Plagiochila nepalensis**
- **Plagiochila sciophila** Nees ex Lindenb., Sp. Hepat. (*Plagiochila* fasc. 2 – 4): 100. 1840. AR, SK (Dey and Singh, 2012).

- *Plagiochila semiaperta* Schiffn. ex Steph., Sp. Hepat. 6: 210. 1921 = **Plagiochila nepalensis**
 - *Plagiochila subsymmetrica* Steph., Sp. Hepat. 6: 212. 1921 = **Plagiochila parvifolia**
 - *Plagiochila trochantha* Schiffn. ex Steph., Sp. Hepat. 6: 226. 1921 = **Plagiochila sciophila**
 - *Plagiochila ventricosa* Steph., Bull. Herb. Boissier, Ser. 2, 3: 964. 1903 & Sp. Hepat. 2: 379. 1903 = **Plagiochila parvifolia**
 - *Plagiochila vygensis* Steph., Sp. Hepat. 6: 237. 1921 = **Plagiochila sciophila**
 - *Plagiochila yokogurensis* Taylor, Bull. Herb. Boissier 5: 104. 1897 = **Plagiochila parvifolia**
- Ptychanthus** Nees (Lejeuneaceae)
- *Ptychanthus argutus* Steph., Sp. Hepat. 4: 745. 1912 = **Ptychanthus striatus**
 - *Ptychanthus birmensis* (Steph.) Steph., Sp. Hepat. 4: 745. 1912 = **Ptychanthus striatus**
 - *Ptychanthus chinensis* Steph., Sp. Hepat. 4: 744. 1912 = **Ptychanthus striatus**
 - *Ptychanthus effusus* Steph., Sp. Hepat. 4: 746. 1912 = **Ptychanthus striatus**
 - *Ptychanthus nietneri* (Steph.) Schiffn., Oesterr. Bot. Z. 49: 205. 1899 = **Ptychanthus striatus**
 - *Ptychanthus perrottetii* (Steph.) Steph., Sp. Hepat. 4: 750. 1912 = **Ptychanthus striatus**
 - *Ptychanthus pyriformis* (Steph.) Steph., Sp. Hepat. 4: 751. 1912 = **Ptychanthus striatus**
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 - *Ptychanthus striatus* var. *retusus* (Reinw., Blume & Nees) Verd., Ann. Bryol. Suppl. 4: 121. 1934 = **Ptychanthus striatus**
 - *Ptychanthus wightii* Gottsche in Gottsche *et al.*, Syn. Hepat. 291. 1845 = **Ptychanthus striatus**
 - *Ptychocoleus cucullatus* (Reinw., Blume & Nees) Steph., Sp. Hepat. 5: 41. 1912 = **Metalejeunea cucullata**
 - *Ptychocoleus planiusculus* (Mitt.) Verd., Ann. Bryol. Suppl. 4: 126. 1934 = **Cheilolejeunea laeviuscula**
 - *Ptychocoleus saccatus* (Mitt.) Steph., Sp. Hepat. 5: 53. 1912 = **Acrolejeunea infuscata**
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Tuyamaella S.Hatt.

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Distribution of epiphyllous liverworts

The epiphyllous liverworts show maximum diversity in eastern Himalaya, including the north-east, with 133 taxa. Of these, 91 taxa are restricted to this region in Indian liverwort flora. This is followed by the Western Ghats with 47 taxa of which 20 are restricted to this territory alone in India, whereas Andman & Nicobar Islands have 34 taxa of which 13 are restricted to this region. While, seven taxa have been found to grow in all the three biogeographical regions, 18 taxa are common between Eastern Himalaya and Western Ghats, 11 between Eastern Himalaya and Andman & Nicobar Islands, and only *Cololejeunea gottschei* and *Drepanolejeunea pentadactyla* are common between Western Ghats and the Andman & Nicobar Islands (Fig. 2).

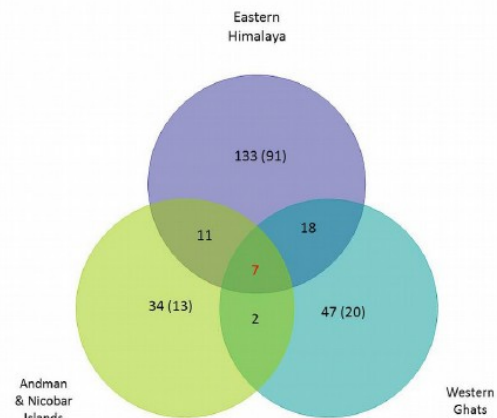


Fig. 2. Bryogeographical region-wise distribution of epiphyllous liverworts in India

Sikkim with 80 taxa shows the maximum diversity of epiphyllous liverworts, followed by Arunachal Pradesh with 57 taxa, West Bengal with 45 taxa, Andman & Nicobar Islands with 34 taxa, Assam with 30 taxa, Tamil Nadu with 27 taxa, Karnataka with 23 taxa, Manipur with 17 taxa, Meghalaya with 12 taxa, Kerala with seven taxa, Mizoram with four taxa and Nagaland with just a single taxon (Fig. 3).

Endemism

Twenty species of epiphyllous liverworts are endemic to India. Of these, 11 species are confined to the eastern Himalayan

bryogeographical region, *Cololejeunea karnatakensis*, *Lejeunea kudremukhensis* and *Leptolejeunea sikkimensis* are restricted to Western Ghats, while only *Cololejeunea andamanensis* is so far known as endemic only to Andaman & Nicobar Islands. *Cololejeunea epiphylla*, *C. foliicola*, *C. kashyapii*, *C. udarii* and *Metzgeria nilgiriensis* are common between eastern Himalaya and the Western Ghats (Table 2).

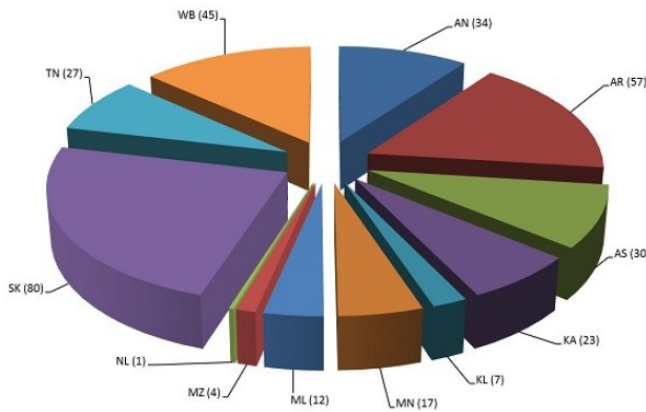


Fig. 3. State-wise distribution of epiphyllous liverworts in India

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Table. 2. List of the endemic epiphyllous liverworts in India

Sl. no.	Name of the species	Family	Distribution		
			EH	WG	AN
1.	<i>Cololejeunea andamanensis</i> M.Dey & D.K.Singh	Lejeuneaceae	–	–	+
2.	<i>Cololejeunea epiphylla</i> G. Asthana & A. Shukla	Lejeuneaceae	+	+	–
3.	<i>Cololejeunea foliicola</i> S.C.Srivast. & G. Srivast.	Lejeuneaceae	+	+	–
4.	<i>Cololejeunea karnatakensis</i> G.Asthana & S.C.Srivast.	Lejeuneaceae	–	+	–
5.	<i>Cololejeunea kashyapii</i> Udari & G. Srivast.	Lejeuneaceae	+	+	–
6.	<i>Cololejeunea mizutaniana</i> Udari & G. Srivast.	Lejeuneaceae	+	–	–
7.	<i>Cololejeunea nilgiriensis</i> G. Asthana & S.C. Srivast.	Lejeuneaceae	+	–	–
8.	<i>Cololejeunea siangensis</i> G.Asthana & S.C.Srivast.	Lejeuneaceae	+	–	–
9.	<i>Cololejeunea tixieriana</i> M.Dey, D. Singh & D.K.Singh	Lejeuneaceae	+	–	–
10.	<i>Cololejeunea udarii</i> G.Asthana & S.C.Srivast.	Lejeuneaceae	+	+	–
11.	<i>Drepanolejeunea devendrae</i> Sushil K. Singh & M. Dey	Lejeuneaceae	+	–	–
12.	<i>Frullania pran-nathii</i> M.Dey & D.K.Singh	Frullaniaceae	+	–	–
13.	<i>Lejeunea kashyapii</i> M.Dey, D.K.Singh & D. Singh	Lejeuneaceae	+	–	–
14.	<i>Lejeunea kudremukhensis</i> Sushil K. Singh & Pócs	Lejeuneaceae	–	+	–
15.	<i>Lejeunea mehrana</i> M.Dey, D.K.Singh & D. Singh	Lejeuneaceae	+	–	–
16.	<i>Leptolejeunea mirikana</i> M.Dey & D.K.Singh	Lejeuneaceae	+	–	–
17.	<i>Leptolejeunea sikkimensis</i> Udari & U.S.Awasthi	Lejeuneaceae	–	+	–
18.	<i>Lopholejeunea udarii</i> M.Dey & D.K.Singh	Lejeuneaceae	+	–	–
19.	<i>Metzgeria nilgiriensis</i> Udari & S.C.Srivast.	Metzgeriaceae	+	+	–
20.	<i>Metzgeria sikkimensis</i> S.C.Srivast. & K.K.Rawat	Metzgeriaceae	+	–	–

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