

A SYNOPTIC FLORA OF LIVERWORTS AND HORNWORTS OF MANIPUR

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ABSTRACT

The flora includes 111 species and one variety belonging to 46 genera and 20 families of liverworts and seven species belonging to three genera in family Anthocerotaceae of the hornworts from Manipur. Of these 92 taxa (91 species and 01 variety) are recorded for the first time from the State of Manipur. *Bazzania orientalis* (Steph.) Parihar, is new to the Himalayan region, whereas *Porella madagascariensis* (Nees & Mont.) Trevis. and *Phaeoceros kashyapii* A.K.Asthana & S.C.Srivast. are new to the East Himalayan bryo-geographical region.

Keywords : First records, liverworts, hornworts, Manipur, Synoptic key.

INTRODUCTION

The State of Manipur, one of the seven-sister states of North-east India, is situated between 23°50' to 25°41' N latitudes and 93°6' to 94°47' E longitudes and covers an area of 22,327 sq. km. The major portion of the state is covered by hill ranges with the altitudes ranging between 550 – 3,600 m above mean sea level. Politically divided into nine districts, the State is bound on the north by the State of Nagaland, Mizoram and Chin Hills of Myanmar on south, Chindwin district of Myanmar on the east and Cachar and North Cachar districts of Assam on the west. The minimum temperature ranges between 1 – 3° C during January, while the maximum temperature varies from 32 – 38° C during August – September. The annual rainfall ranges between 1600 – 3430 mm, while the humidity ranges between 80 – 96% during July – September and 45% during March. Such diverse topography and phytoclimatic conditions support a rich growth of bryophytes, including liverworts and the hornworts.

George Watt was perhaps the first person to collect liverworts from the State during the Government demarcation survey of 1881 – 82. His collections deposited in the Cryptogamic section of the Central National Herbarium, Botanical Survey of India, Howrah (CAL) include *Trichocolea tomentella* (Ehrh.) Dumort., *Plagiochila nepalensis* Lindenb. and *Riccardia levieri* Schiffn. Later, Kashyap reported *Monosolenium tenerum* Griff. from Imphal (Kashyap, 1923) and *Riccia sanguinea* Kashyap (= *R. frostii* Austin) (Kashyap, 1929) on the basis of collections by S.L. Hora in 1920. Biswas and Calder (1936) reported *Ricciocarpos natans* (L.) Corda from the Loktak lake. Chopra (1943) reported *Anthoceros punctatus* L.

However, like other states of the North-east, barring Meghalaya and Arunachal Pradesh, Manipur also got only occasional attention of bryologists from both within and outside the country. D.B. Deb made sporadic bryological collections in and around Imphal valley during 1951 – 53 and reported *Ricciocarpos natans* (L.) Corda from Loktak lake (Deb, 1954). Based on his collections, Kachroo and Deb (1954) reported *Phaeoceros laevis* (L.) Prosk. (= *Anthoceros laevis* L.), *Marchantia paleacea* Bertol. subsp. *paleacea* (= *Marchantia nepalensis* Lehm. & Lindenb.), *Marchantia linearis* Lehm. & Lindenb., *Asterella blumeana* (Nees) Kachroo, *Asterella wallichiana* (Lehm. & Lindenb.) Pandé & al. ex Grolle (= *Asterella sanguinea* (Lehm. & Lindenb.) Kachroo), *Reboulia hemisphaerica* (L.) Raddi (= *Reboulia hemisphaerica* (L.) Raddi var. *pangiensis* Kashyap), *Plagioclasma appendiculatum* Lehm. & Lindenb., *Ricciocarpos natans* (L.) Corda, *Jamesoniella elongella* (Taylor) Steph., *Heteroscyphus argutus* (Reinw. & al.) Schiffn. [= *Chiloscyphus argutus* (Reinw. & al.) Nees] and *Chiloscyphus himalayensis* Steph. from the State. Jagdish Lal and B.D. Kar made extensive collections of bryophytes from the state during 1978 and later J.P. Ghosh collected liverworts and hornworts from the state during 1984. Based on these collections Lal (1979a, 1979b, 2003) reported *Frullania tuyamae* S.Hatt. & Thaitong and *Metzgeria nilgiriensis* Udar & S.C.Srivast. from Ukhrul. Adarsh Kumar and U.S. Awasthi made extensive collections of liverworts and hornworts from the state, especially in and around Imphal Valley and Ukhrul, during 1979. Based on these collections deposited in LWU, Kumar and

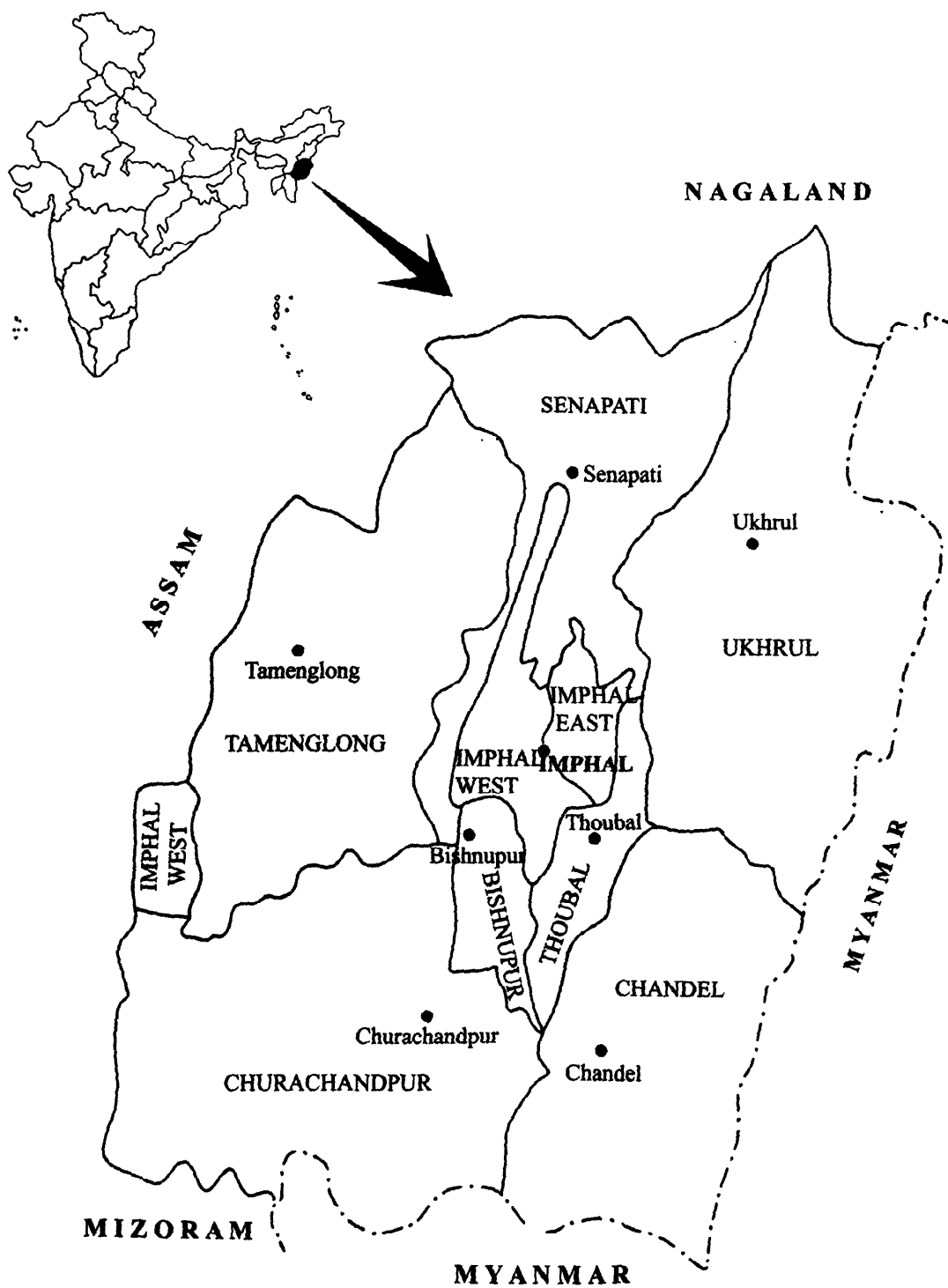


Fig. 1. Map of Manipur.

Udar (1985) described *Jamesoniella elongella* (Taylor) Steph. in detail from Ukhrul; Asthana and Srivastava (1991) reported *Anthoceros bharadwajii* Udar & A.K.Asthana, *Anthoceros erectus* Kashyap, *Phaeoceros carolinianus* (Michx.) Prosk. (= *Phaeoceros laevis* (L.) Prosk. subsp. *carolinianus* Prosk.) and *P. laevis* (L.) Prosk. (= *P. laevis* (L.) Prosk. subsp. *laevis*) from Ukhrul; Awasthi & al. (2000) reported *Lopholejeunea nigricans* (Lindenb.) Schiffn. (= *L. sikkimensis* Steph.) from Kanchipur; Srivastava and Srivastava (2002) reported *Heteroscyphus argutus* (Reinw. & al.) Schiffn. from Kanchipur in Imphal valley and Ukhrul and *H. pandei* S.C.Srivast. & Abha Srivast. from Kanchipur and Asthana and Srivastava (2003) reported *Cololejeunea latilobula* (Herzog) Tixier from Ukhrul and *C. planissima* (Mitt.) Abeyw. from Kanchipur and Ukhrul. Sharma and Srivastava (1993) reported *Lepidozia reptans* (L.) Dumort. from Manipur on the basis of collections by G. Watt. Rawat and Srivastava (2007) reported 3 species, viz. *Plagiochila parvifolia* Lindenb. and *P. perserrata* Herzog based on the collections of Adarsh Kumar and U.S. Awasthi from Vishnupur and *P. uniformis* Mitt. on the basis of collections of George Watt from an unknown locality in the State.

The present checklist is an assimilation of the published information available to the authors on the liverworts and hornworts of Manipur and the inferences derived from the critical examination of the specimens deposited in the Cryptogamic section of the Central National Herbarium, Botanical Survey of India, Howrah (CAL). The taxa enumerated here, however, do not represent an exhaustive list as not only the major portion of the State is still bryologically unexplored, but even the collections made so far and deposited in herbaria outside BSI have yet not been fully worked out.

SYNOPSIS OF THE FLORA

ORDER JUNGERMANNIALES (87)

Herbertaceae: *Herbertus* (2); **Trichocoleaceae:** *Trichocolea* (2); **Lepidoziaceae:** *Bazzania* (8), *Lepidozia* (1); **Cephaloziaceae:** *Cephalozia* (1), *Odontochisma* (1); **Jungermanniaceae:** *Anastrepta* (1), *Anastrophyllum* (1), *Jamesoniella* (1), *Notoscyphus* (1), *Plicanthus* (1), *Solenostoma* (2); **Geocalycaceae:** *Chiloscyphus* (1), *Heteroscyphus* (6), *Lophocolea* (1); **Plagiochilaceae:** *Plagiochila* (10); **Radulaceae:** *Radula* (3); **Porellaceae:** *Porella* (4/1); **Jubulaceae:** *Frullania* (8), *Jubula* (1); **Lejeuneaceae:** *Cheilolejeunea* (2), *Cololejeunea* (8), *Drepanolejeunea* (3), *Lejeunea* (8), *Leptolejeunea* (2), *Lopholejeunea* (1), *Mastigolejeunea* (1), *Ptychanthus* (1), *Spruceanthus* (1), *Trocholejeunea* (2), *Tuzibeanthus* (1).

ORDER METZGERIALES (10)

Pelliaceae: *Pellia* (1); **Aneuraceae:** *Aneura* (1); **Riccardia** (3); **Metzgeriaceae:** *Apometzgeria* (1), *Metzgeria* (4).

ORDER MARCHANTIALES (15)

Targioniaceae: *Targionia* (1); **Conocephalaceae:** *Conocephalum* (1); **Aytoniaceae:** *Asterella* (3), *Plagiochasma* (1), *Reboulia* (1); **Monosoleniaceae:** *Monosolenium* (1); **Marchantiaceae:** *Dumortiera* (1), *Marchantia* (3); **Ricciaceae:** *Riccia* (2), *Ricciocarpos* (1).

ORDER ANTHOCEROTALES (07)

Anthocerotaceae: *Anthoceros* (3), *Folioceros* (1), *Phaeoceros* (3).

Key to the orders, families, genera and species

- 1a. Cells usually with a single plate-like chloroplast with or without a central pyrenoid; oil-bodies absent; sporophyte indeterminate in growth, columellate or not; antheridia endogenous; capsule long cylindrical with basal meristematic zone, bivalved; capsule wall with or without stomata; true elaters absent (except *Megaceros* and *Dendroceros*) ... 2. (Anthocerotales) Anthocerotaceae
- 1b. Cells with numerous chloroplast; oil-bodies usually present; sporophyte determinate in growth; antheridia exogenous; capsule globose – ovoid without meristematic zone and columella; capsule wall always without stomata; true elaters present (except in Ricciaceae) ... 8
- 2a. Thallus compact, without schizogenous cavities; spores yellowish with granulose – papillose sporoderm ... 3. *Phaeoceros*

- 2b. Thallus with schizogenous cavities; spores dark brown – black with spinose – baculate, reticulate – reticuloid sporoderm ... 5
- 3a. Sporoderm with lamellate marking ... *P. kashyapii*
- 3b. Sporoderm without lamellate marking ... 4
- 4a. Plants monoecious; tri-radiate mark loosely impregnated with papillae, proximal surface with a group of papillae arranged in the center of each face ... *P. carolinianus*
- 4b. Plants dioecious; tri-radiate mark densely impregnated with papillae, proximal surface with uniformly distributed papillae in each face ... *P. laevis*
- 5a. Thallus spongy; proximal surface of spores devoid of distinct triradiate mark; sporoderm baculate; pseudoelater thick-walled with dark, narrow lumen ... *Folioceros assamicus*
- 5b. Thallus not spongy; proximal surface of spores with a distinct and bold triradiate mark; sporoderm reticulate; pseudoelater thin-walled with light, broad lumen ... 6. *Anthoceros*
- 6a. Capsule wall with 6 – 11 stomata/sq. mm; sporoderm reticuloid – pseudolamellate ... *A. bharadwajii*
- 6b. Capsule wall with 5 – 8 or 7 – 9 stomata/sq. mm; sporoderm reticulate ... 7
- 7a. Reticulations of sporoderm studded with thick tubercles with blunt apices; trilete mark of proximal face bordered on both sides by unsculptured stripe ... *A. erectus*
- 7b. Reticulations of sporoderm studded with spines with subacute, occasionally bifurcating apices; trilete mark of proximal face not bordered by unsculptured stripe ... *A. punctatus*
- 8a. Plant body always thalloid; dorsal pores and air chambers usually present; rhizoids usually tuberculate and smooth-walled; ventral scales always present; sporophyte highly reduced; sporogonium not exerted at maturity; capsule wall single-layered ... 9. *Marchantiales*
- 8b. Plant body either leafy or thalloid; dorsal pores and air chambers absent; rhizoids only smooth-walled; ventral scales usually absent; sporophyte well developed; sporogonium exerted at maturity on a long seta; capsule wall 2 – many-layered ... 23
- 9a. Sporophyte completely embedded in thallus, without a distinct foot and seta; capsules cleistocarpous; elaters absent ... 10. *Ricciaceae*
- 9b. Sporophyte not embedded in thallus, with distinct foot and seta; capsule never cleistocarpous, dehiscing by means of operculum or valve; elaters present ... 12
- 10a. Plants free-floating, aquatic; epidermal pores distinct; ventral surface with numerous conspicuous linear, serrulate sword-like or lingulate ventral scales; antheridia and archegonia in median grooves ... *Ricciocarpos natans*
- 10b. Plants terrestrial, epidermal pores absent or reduced; ventral surface never with sword-like or lingulate ventral scales; antheridia and archegonia scattered in thallus ... 11. *Riccia*
- 11a. Plants monoecious; thallus *Euriccia*-type; spores 80 – 150 μ m in diameter; sporoderm reticulate ... *R. billardieri*
- 11b. Plants dioecious; thallus *Ricciella*-type; spores 42 – 60 μ m in diameter; sporoderm lamellate ... *R. frostii*
- 12a. Sporophyte not aggregated into archegoniophores, solitary, terminal yet superficially displaced ventrally, enclosed within naviculate, bilabiate involucre ... (Targioniaceae) *Targionia hypophylla*

- 12b. Sporophyte aggregated into dorsal or terminal complex, sub sessile or stalked archegoniophores, never solitary, not enclosed in bilabiate involucre ... 13
- 13a. Thallus not differentiated into assimilatory and storage zones; pores absent; spores usually in tetrads; elaters 1 – 3-celled, reduced, chlorophyllose ... (Monosoleniaceae) *Monosolenium tenerum*
- 13b. Thallus well differentiated into assimilatory and storage zones; pores well developed (reduced in *Dumortiera*); spores not united; elaters well developed ... 14
- 14a. Air-chambers with nonchlorophyllose partitions; terminal cells of photosynthetic filaments beak-like near pore; appendages of ventral scale reniform; spores isopolar; sporoderm granulate – papillate ... (Conocephalaceae) *Conocephalum conicum*
- 14b. Air-chambers with chlorophyllose partitions; terminal cells of photosynthetic filaments not beak like; appendages of the ventral scale never reniform; spores anisopolar; sporoderm reticulate – lamellate ... 15
- 15a. Epidermal pores of thallus compound, formed of several super imposed rings of cells, barrel-shaped (reduced or absent in *Dumortiera*); gemma present (except in *Dumortiera*) capsule wall with thickening ... 16. Marchantiaceae
- 15b. Epidermal pores of thallus simple, formed of a single layer of cells, not barrel-shaped; gemmae absent; capsule wall devoid of thickenings ... 19. Aytoniaceae
- 16a. Plants translucent; epidermal pores and air chambers vestigial or absent; ventral scales vestigial or absent; gemma cup absent; antheridiophores sessile; both male and female receptacles having bristles on margins ... *Dumortiera hirsuta*
- 16b. Plants not translucent; epidermal pores and air chambers well developed; ventral scales well developed in 4 – 6 rows; gemma cup present; antheridiophores stalked; both male and female receptacles devoid of bristles at margins ... 17. *Marchantia*
- 17a. Plants 7 – 11 mm wide, without mid-dorsal line; inner opening of epidermal pores highly constricted; appendage of ventral scale with obtuse – acute apices, 12 – 20 cells wide in the middle ... *M. paleacea*
- 17b. Plants 3 – 6 mm wide, with distinct mid-dorsal line; inner opening of epidermal pores prominent; appendage of ventral scale with apiculate – acuminate or sometimes acute apices, 5 – 12 cells wide in the middle ... 18
- 18a. Appendage of ventral scales broadly ovate – oblong-ovate, 7 – 14 cells wide in the middle, apex 1 – 3 cells uniseriate towards apex; female receptacle 6 – 9-lobed, dorsal surface smooth ... *M. linearis*
- 18b. Appendage of ventral scales lanceolate, 5 – 7 cells wide in the middle, apex 4 – 7 cells uniseriate towards apex; female receptacle 4 – 6-lobed, dorsal surface verrucose by large projecting epidermal pores ... *M. subintegra*
- 19a. Plants foetid, smelling like fish; antheridiophore cushion-shaped, borne on lateral adventitious branches; archegoniophore always terminal; pseudoperianth present, beak-like; capsule surrounded by an exerted sheath 20. *Asterella*
- 19b. Plants not foetid; antheridiophores terminal on the main thallus or just behind the archegoniophore, horse-shoe-shaped or disciform; archegoniophore dorsal or terminal; pseudoperianth absent; capsule not surrounded by an exerted sheath ... 22
- 20a. Plants dioecious; spores 62.5 – 87.5 μ m in diameter; sporoderm with wavy ridges on both distal and proximal surface ... *A. wallichiana*

- 20b. Plants monoecious; spores 70.0 – 100.0 μm in diameter; sporoderm reticulate on both distal and proximal surface ... 21
- 21a. Distal surface of spore with large primary reticulations 11 – 23 μm in diameter, which are again minutely reticulated ... *A. khasyana*
- 21b. Distal surface of spore with small reticulations 1.5 – 3 μm in diameter ... *A. blumeana*
- 22a. Plants monoecious; ventral scales with a single rounded, ovate or broadly triangulate appendage; male receptacle horse-shoe-shaped; female receptacle dorsal ... *Plagiochasma appendiculatum*
- 22b. Plants dioecious; ventral scales with 1 – 2 (– 3) linear – lanceolate appendage; male receptacle disciform; female receptacle terminal ... *Reboulia hemisphaerica*
- 23a. Plant body usually thalloid, sometimes leafy; when leafy, not clearly differentiated into stem and leaves; rhizoids scattered; sporophyte anacrogynous, dorsal, ventral or lateral in position, never in the axil of leaf ... 24. Metzgeriales
- 23b. Plant body usually differentiated into stem and leaves; rhizoids scattered or fasciculate; sporophyte acrogynous, terminal on main or lateral branches, always in the axil of leaves ... 33. Jungermanniales
- 24a. Thallus always broad, light – pale green, often pigmented; midrib and hairs absent; male gametangia not defined, antheridia scattered on dorsal surface; gynoecia strictly dorsal; capsules spherical, never with terminal elaterophore ... (Pelliaceae) *Pellia epiphylla*
- 24b. Thallus broad, dark green, without midrib and hairs, or linear, light – pale green, with midrib and hairs; both androecia and gynoecia on lateral or ventral branches; capsules ovoid, ellipsoid or cylindrical; terminal elaterophores present ... 25
- 25a. Thallus not differentiated into midrib and wing; hairs absent; androecia and gynoecia borne on lateral branches ... 26. Aneuraceae
- 25b. Thallus well differentiated into midrib and unistratose wing; hairs present; androecia and gynoecia borne on ventral branches ... 29. Metzgeriaceae
- 26a. Thallus 2.5- 5 mm broad, simple – furcate; seta 8 – 12 cells across the diameter with numerous outer and inner cells ... *Aneura maxima*
- 26b. Thallus narrow, 0.3 – 1.5 (– 2) mm broad; profusely pinnately – palmately or irregularly branched; seta 4 cells across the diameter with 11 – 12 outer and 4 inner cells ... 27. Riccardia
- 27a. Plants monoecious; 0.3 – 0.4 mm wide; transverse section of main thallus 4 – 6 cells thick ... *R. tenuicostata*
- 27b. Plants dioecious; 0.6 – 1.2 mm wide; transverse section of main thallus 6 – 13 cells thick ... 28
- 28a. Transverse section of main thallus 6 – 9 cells thick; primary branches 3 – 4 cells thick; cells with pigmented walls absent ... *R. levieri*
- 28b. Transverse section of main thallus 11 – 14 cells thick; primary branches 6 – 7 cells thick; cells with pigmented walls present ... *R. sikkimensis*
- 29a. Midrib with 6 – 9 epidermal cells rows, more or less similar to medullary cells in transverse section; hairs present on both dorsal and ventral surface of thallus; seta 8 – 9 cells across in transverse section with about 30 outer surrounding cells and numerous inner cells ... *Apometzgeria pubescens*

- 29b. Midrib with 2 – 4 epidermal cell rows, much larger than medullary cells in transverse section; hairs absent on dorsal surface, sometimes present only on the ventral surface of thallus; seta 4 – 6 cells across in transverse section with 14 – 16 outer cells surrounding 5 – 9 inner cells ... 30. *Metzgeria*
- 30a. Plants dioecious; gemmae present ... 31
- 30b. Plants monoecious; gemmae absent ... 32
- 31a. Plants tubular – ribbon like; marginal hairs paired, falcate ... *M. leptoneura*
- 31b. Plants flat; marginal hairs single, straight ... *M. furcata*
- 32a. Hairs present on ventral surface of thallus and male branches; ventral epidermal cells of midrib in 2 – 4 rows; spores densely tuberculate ... *M. conjugata*
- 32b. Hairs absent on ventral surface of thallus and male branches; ventral epidermal cells of midrib in 2 rows; spores finely granulose ... *M. lindbergii*
- 33a. Leaves isophyllous, arranged in 3 equal rows; vitta cells present, extending in to the lobes of leaf and underleaf ... 34. (Herbertaceae) *Herbertus*
- 33b. Leaves anisophyllous, not arranged in 3 equal rows; vitta cells absent (except in some species of *Plagiochila* and *Cololejeunea*) ... 35
- 34a. Stem 0.14 – 0.20 x 0.12 – 0.18 mm, 9 – 13 cells across diameter; cortical cells in 2 layers; leaves oblong, bilobed to 3/5 – 2/3 of lobe length, leaf length / width ratio 2.6:1 – 3.3:1 ... *H. aduncus*
- 34b. Stem 0.35 – 0.40 x 0.30 – 0.35 mm, 14 – 18 cells across diameter; cortical cells in 2 – 3 layers; leaves ovate, bilobed to 2/5 – 1/2 of lobe length, leaf length/width ratio 1.6:1 – 2.0:1 ... *H. dicranus*
- 35a. Leaves (2 –) 3 – 4 (– 5)-lobed or (3 –) 4 – 6 (– 8)-lobed ... 36
- 35b. Leaves 1 – 2-lobed ... 46
- 36a. Leaves 4 – 6 (– 8)-lobed; lobes fringed into cilia ... 37. (Trichocoleaceae) *Trichocolea*
- 36b. Leaves (2 –) 3 – 4 (– 5)-lobed or dentate; lobes not ciliate ... 38. Lepidoziaceae
- 37a. Stem 0.3 – 0.4 x 0.26 – 0.35 mm, 10 – 14 cells across diameter; cortical cells in one layer, thin-walled; paraphyllia very rare or absent; leaves 3 – 4-lobed ... *T. tenera*
- 37b. Stem 0.5 – 0.8 x 0.35 – 0.6 mm, 20 – 30 cells across diameter; cortical cells in 3 – 4 layers, thick-walled; paraphyllia abundant; leaves (4 –) 5 – 7 (– 8)-lobed ... *T. tomentella*
- 38a. Plants regularly 1 – 2 (– 3) pinnately branched or monopodial; branching *Microlepidozia*-type; leaves and underleaves deeply lobed ... *Lepidozia reptans*
- 38b. Plants with pseudodichotomous, *Acromastigium*-type of branching; leaves and underleaves shallowly lobed ... 39. *Bazzania*
- 39a. Underleaves connate with one lateral leaf at base ... *B. sumbavensis*
- 39b. Underleaves not connate with lateral leaf at base ... 40
- 40a. Underleaf cells thick-walled, similar to leaf cells ... 41
- 40b. Underleaf cells thin-walled, not similar to leaf cells ... 44
- 41a. Underleaves with auriculate, irregularly lobed appendage at base ... *B. appendiculata*
- 41b. Underleaves without appendage at base ... 42
- 42a. Leaves oblong – rectangulate; vitta-like cells present; underleaves ovate, as long as wide or longer than wide ... *B. ovistipula*

- 42b. Leaves triangular-ovate; vitta-like cells absent; underleaves rotundate orbicular, always wider than long ... 43
- 43a. Stem cells undifferentiated; underleaves distant ... *B. tricrenata*
- 43b. Stem cells differentiated into 1 – 2 layers of cortical cells and larger inner medullary cells; underleaves imbricate ... *B. praerupta*
- 44a. Underleaves distant, reniform; outer wall of marginal cells of underleaves thick-walled and slightly pigmented ... *B. himalayana*
- 44b. Underleaves closely imbricate, quadrate – subquadrate or rotundate; outer wall of marginal cells of underleaves thin-walled and hyaline ... 45
- 45a. Underleaves as wide as long or wider than long; apex obtuse – rounded or irregularly sinuate – lobate ... *B. orientalis*
- 45b. Underleaves always longer than wide; apex truncate – shortly angulate ... *B. tridens*
- 46a. Leaves succubous, not complicate bilobed ... 47
- 46b. Leaves incubous, complicate bilobed ... 73
- 47a. Stem dorso-ventrally flattened; well developed underleaves present ... 48. Geocalycaceae
- 47b. Stem not dorso-ventrally flattened; underleaves absent or vestigial (present in *Notoscyphus*, *Plicanthus*) ... 55
- 48a. Leaves distinctly bilobed; female bracts and bracteoles larger than leaves and underleaves respectively; gynoecia always terminal on main shoot ... *Lophocolea bidentata*
- 48b. Leaves not distinctly bilobed; female bracts and bracteoles much smaller than leaves and underleaves respectively; gynoecia terminal on short lateral branches ... 49
- 49a. Plants monoecious; leaf cells usually devoid of trigones; underleaves free, lobes usually parallel; androecia intercalary on main shoot; male bracts similar to vegetative leaves ... *Chiloscyphus himalayensis*
- 49b. Plants dioecious; leaf cells with indistinct tri-radiate or bulging trigones; underleaves united on one or both sides with leaves, lobes divergent or convergent; androecia on abbreviated lateral intercalary branches; male bracts much smaller than vegetative leaves ... 50. *Heteroscyphus*
- 50a. Underleaves connate with adjoining leaves on both sides; apex of leaf lobes bidentate ... *H. bescherellei*
- 50b. Underleaves connate with adjoining leaves on one side only; apex of leaf lobes (0 –) 3 – 5 (– 10)- dentate ... 51
- 51a. Leaves orbicular, broadest in middle, apex entire – dentate ... *H. orbiculatus*
- 51b. Leaves not orbicular, broadest at base, apex dentate ... 52
- 52a. Dentitions at leaf apex 5 – 10 in number, 2 – 8 cells long ... *H. argutus*
- 52b. Dentitions at leaf apex 1 – 5 in number, 1 – 5 cells long ... 53
- 53a. Leaves subopposite; underleaves 0.36 – 0.50 mm wide; lamina 10 – 15 cells wide ... *H. hyalinus*
- 53b. Leaves alternate; underleaves 0.11 – 0.37 mm wide; lamina 6 – 9 cells wide ... 54
- 54a. Plants 0.5 – 1.2 mm wide; cells of stem undifferentiated; leaves 0.25 – 0.66 mm long, 0.24 – 0.60 mm wide ... *H. parvus*
- 54b. Plants 1.2 – 2.5 mm wide; cells of stem differentiated; leaves 0.7 – 1.3 mm long, 0.6 – 1.2 mm wide ... *H. pandei*

- 55a. Leaves margin toothed (except few species); perianth mouth wide ... 56. Plagiochilaceae: *Plagiochila*
- 55b. Leaves entire; perianth mouth contracted ... 65
- 56a. Leaves with distinct vitta cells ... 57
- 56b. Leaves without vitta cells ... 58
- 57a. Leaves ventrally secund, orbicular-ovate – oblong-ovate; apical leaf cells thick-walled; trigones nodulose ... *P. semidecurrans*
- 57b. Leaves not ventrally secund, triangular-ovate; apical leaf cells thin-walled; trigones minute ... *P. perserrata*
- 58a. Branching mostly terminal ... 59
- 58b. Branching mostly intercalary ... 62
- 59a. Leaves rectangulate-ovate, not fragile ... *P. fruticosa*
- 59b. Leaves oblong-ovate, fragile ... 60
- 60a. Leaves distant – loosely imbricate, apex usually shortly bilobed, ventral margin weakly ampliate, ventral crest absent ... *P. hattorii*
- 60b. Leaves closely imbricate, apex never bilobed, ventral margin strongly ampliate forming ventral crest ... 61
- 61a. Leaf margin spinose – dentate; tooth straight, 2 – 5 (– 7) cells long, 1 – 3 cells uniseriate towards apex, length/breadth ratio of terminal cell 3.3 – 3.8: 1 ... *P. parvifolia*
- 61b. Leaf margin ciliate – dentate; tooth falcate, 2 – 14 cells long, 2 – 11 cells uniseriate towards apex, length/breadth ratio of terminal cell 5.6 – 6.8: 1 ... *P. subtropica*
- 62a. Teeth 5 – 16 per leaf ... 63
- 62b. Teeth 28 – 60 per leaf ... 64
- 63a. Leaves with long decurrent base; teeth 10 – 16 per leaf; trigones large, nodulose ... *P. nepalensis*
- 63b. Leaves with short decurrent base; teeth 5 – 9 per leaf; trigones minute or indistinct ... *P. sciophila*
- 64a. Plants 70 – 190 mm long, 5 – 10 mm wide; teeth 38 – 60 per leaf; trigones minute or indistinct ... *P. elegans*
- 64b. Plants up to 30 mm long, 4 mm wide; teeth 28 – 35 per leaf; trigones distinct, triangular or nodulose ... *P. uniformis*
- 65a. Stem leptodermous; flagelliform branches present ... 66. Cephaloziaceae
- 65b. Stem not leptodermous; flagelliform branches absent ... 67. Jungermanniaceae
- 66a. Leaves bilobed; leaf cells with indistinct trigones; cuticle smooth; underleaf absent; gemmae unicellular ... *Cephalozia darjeelingensis*
- 66b. Leaves not bilobed; leaf cells with nodulose trigones; cuticle papillose; underleaf present, vestigial; gemmae bicellular ... *Odontoschisma denudatum*
- 67a. Underleaves present, well developed ... 68
- 67b. Underleaves absent or minute near apex ... 69
- 68a. Leaves asymmetrically 3 – 4-lobed; underleaves with numerous tooth; true perianth present ... *Plicanthus hirtellus*
- 68b. Leaves entire or retuse – slightly bilobed; underleaves with 1 – 2 tooth; pseudoperianth present ... *Notoscyphus darjeelingensis*
- 69a. Leaves bilobed; gemmae present ... 70

- 69b. Leaves entire or slightly retuse; gemmae absent ... 71
- 70a. Leaves dorsally secund, transversely inserted dorsally, boat-shaped, both margins strongly incurved ... *Anastrophyllum joergensenii*
- 70b. Leaves not dorsally secund, obliquely inserted dorsally, ovate – broadly-ovate, ventral margin occasionally incurved ... *Anastrepta orcadensis*
- 71a. Female bracts and bracteoles laciniate ... *Jamesoniella elongella*
- 71b. Female bracts entire; bracteoles rudimentary or absent ... 72. *Solenostoma*
- 72a. Stem 14 – 18 cells across the diameter; leaves rectangular-ovate or lingulate ... *S. comatum*
- 72b. Stem 10 – 14 cells across the diameter; leaves ovate ... *S. truncatum*
- 73a. Underleaves always absent; rhizoids arising from a convex rhizoidal initial area in the middle of leaf lobule; perianth mouth wide ... 74. (Radulaceae) *Radula*
- 73b. Underleaves usually present (except *Cololejeunea*); rhizoids arising near underleaf base (from rhizoidal initial area on stem surface in *Cololejeunea*); perianth mouth constricted ... 76
- 74a. Gemmae present on the ventral surface of leaf lobe, oriented at right angles to the leaf surface ... *R. acuminata*
- 74b. Gemmae present along the dorsal margins of leaf lobe, not oriented at right angle ... 75
- 75a. Stem 7 – 11 cells across diameter; base of leaf lobule covering almost half of stem; rhizoid initial area weakly convex ... *R. lindbergiana*
- 75b. Stem 4 – 5 cells across diameter; base of leaf lobule not covering stem; rhizoid initial area strongly convex ... *R. tjibodensis*
- 76a. Leaf lobules lingulate – lanceolate; perianth mouth not beaked; capsule wall 3 – 6-layered ... 77. (Porellaceae) *Porella*
- 76b. Leaf lobules not lingulate – lanceolate (except certain species of *Frullania* and *Jubula*); perianth mouth beaked; capsule wall 2-layered ... 81
- 77a. Leaf lobule and underleaf with entire margin ... 78
- 77b. Leaf lobule and underleaf with dentate margin ... 79
- 78a. Leaf lobe ovate; margin entire ... *P. madagascariensis*
- 78b. Leaf lobe oblong-ovate; margin dentate ... *P. plumosa*
- 79a. Leaf lobes oblong – ovate; dentition 11 – 21 cells long, 9 – 13 cells uniseriate at apex; underleaves oblong ... *P. perrottetiana*
- 79b. Leaf lobes triangular – ovate; dentition 3 – 10 cells long, 2 – 5 cells uniseriate at apex; underleaves oblong-ovate or triangular ... 80
- 80a. Leaf lobe ovate – oblong-ovate with rounded, sub truncate, obtuse or acute apices; perianth campanulate, plicae smooth at margin; lower half of outer layer of capsule wall with sheet like thickenings on radial walls ... *P. campylophylla* var. *campylophylla*
- 80b. Leaf lobe triangular ovate with acute – acuminate apices; perianth elongated, plicae crenulate at margin; lower half of outer layer of capsule wall with trigonous thickenings at angles ... *P. campylophylla* var. *ligulifera*
- 81a. Leaf lobules galeate, cucullate, or explanate; hyaline papilla absent in lobules; (1 –) 2 – 5 archegonia per gynoeceum ... 82. Jubulaceae
- 81b. Leaf lobules saccate; hyaline papilla present in lobules; 1 (-2) archegonia per gynoeceum ... 90. Lejeuneaceae

- 82a. Leaf cells with minute trigones, devoid of intermediate thickenings; male bracteoles present throughout the androecium; gynoecia with 1 – 2 subfloral innovations of *Radula*-type; seta with 16 outer cells surrounding 4 inner cells; spores without rosette-like ornamentations ... *Jubula pennsylvanica*
- 82b. Leaf cells with small – large trigones and intermediate thickenings; male bracteoles present only at the base of androecia; gynoecia without or rarely with 1 subfloral innovation of *Frullania*-type or *Lejeunea*-type; seta with many irregularly arranged rows of undifferentiated cells; spores with several irregular rosette-like ornamentations ... 83. *Frullania*
- 83a. Leaf lobes with acute apices; intermediate thickenings absent in apical leaf cells; numerous ocelli present in leaf lobes ... *F. tamarisci*
- 83b. Leaf lobes with rounded – obtuse apices; intermediate thickenings present in apical leaf cells; ocelli absent in leaf lobes ... 84
- 84a. Leaf lobes with numerous marginal gemmae ... *F. tuyamae*
- 84b. Leaf lobes without gemmae ... 85
- 85a. Plants with entire or slightly retuse underleaves; perianth ovate ... *F. physantha*
- 85b. Plants with bilobed underleaves; perianth oblong – pyriform or obovoid ... 86
- 86a. Plants monoecious; leaf and underleaf margin undulate – crispate; female bracts connate with bracteoles; perianth 7 – 10-keeled ... *F. arecae*
- 86b. Plants dioecious; leaf and underleaf margin not undulate – crispate; female bracts not connate; perianth 3 – 5 (– 6)-keeled ... 87
- 87a. Leaf lobe ovate – oblong-ovate ... 88
- 87b. Leaf lobe orbicular – suborbicular ... 89
- 88a. Dorsal margin of leaf lobes with a large auriculate appendage at base; basal cells of leaf lobe with trabeculately elongated trigones; leaf lobules without piliferous beak; underleaf base appendiculate, lobes subacute – obtuse ... *F. nepalensis*
- 88b. Dorsal margin of leaf lobes with small rounded – quadrate appendage at base; basal cells of leaf lobe with subtriangular trigones; leaf lobules with piliferous beak; underleaf base non appendiculate; lobes acute – acuminate ... *F. acutiloba*
- 89a. Perianth oblong-ovate, 3-keeled, surface tuberculate ... *F. ericoides*
- 89b. Perianth obovoid – pyriform, 5 (– 6)-keeled, surface smooth ... *F. muscicola*
- 90a. Underleaves entire, with or without dentate apex; seta with 16 (– 17) outer cells and 4 (– 10) inner cells; cells of inner layer of capsule wall with brown fenestrate sheet-like thickenings ... 91
- 90b. Underleaves bilobed or absent; seta with 12 outer cells and 4 inner cells; cells of inner layer of capsule wall without fenestrate sheet-like thickenings ... 97
- 91a. Margins of leaf lobe and underleaf dentate towards apex ... 92
- 91b. Margins of leaf lobe and underleaf entire ... 93
- 92a. Plants pinnately branched; oil-bodies segmented; gynoecia usually with 1-subfloral innovation; intermediate nodular thickenings present in the cells of the outer layer of capsule wall ... *Ptychanthus striatus*
- 92b. Plants irregularly branched; oil-bodies homogeneous, smooth; gynoecia usually with 2-subfloral innovations; intermediate nodular thickenings absent in the cells of the outer layer of capsule wall ... *Spruceanthus semirepandus*

- 93a. Stem 14 – 20 cells across the diameter; oil-bodies segmented; apex of underleaves truncate – retuse, recurved ... 94
- 93b. Stem 6 – 10 cells across the diameter; oil-bodies homogeneous; apex of underleaves rounded, not recurved ... 95
- 94a. Plants dioecious; cortical cells of stem smaller than medullary cells; leaf cells with triradiate trigones; leaf lobule 1/12 of lobe, without or with inconspicuous tooth; perianth pluriplicate ... *Tuzibeanthus chinensis*
- 94b. Plants monoecious; cortical cells of stem larger than medullary cells; leaf cells with cordate trigones; leaf lobule 1/3 – 1/2 of lobe, with 0 – 5 teeth; perianth 3-plicate ... *Mastigolejeunea auriculata*
- 95a. Leaf cells with triradiate trigones; cell walls with brown – black pigmentation; leaf lobule with a single tooth; perianth obovate with 4 – 5, laciniate keels ... *Lopholejeunea nigricans*
- 95b. Leaf cells with cordate trigones; cell walls without brown – black pigmentation; leaf lobule with 2 – 4 teeth; perianth turbinate or ellipsoidal with 6 – 10, knot-like or flexuose keels ... 96. *Trocholejeunea*
- 96a. Plants dioecious; stem with 9 – 11 vertical rows of cortical cells; leaf lobes with obtuse apices; free margin of lobule slightly auriculate at base; perianth turbinate with irregularly knot-like expanded keels ... *T. infuscata*
- 96b. Plants monoecious; stem with 13 – 17 vertical rows of cortical cells; leaf lobes with rounded apices; free margin of lobule not auriculate at base; perianth ellipsoidal with slightly flexuose keels ... *T. sandvicensis*
- 97a. Underleaves present ... 98
- 97b. Underleaves absent ... 112. *Cololejeunea*
- 98a. Medullary cells of stem thick-walled; hyaline papilla of leaf lobule present at the distal side of second tooth ... 99. *Cheilolejeunea*
- 98b. Medullary cells of stem thin-walled; hyaline papilla of leaf lobule present at the proximal side of first tooth ... 100
- 99a. Leaf lobe oblong with rounded apices; trigones indistinct; underleaves bilobed up to 1/2 of their length; perianth 5-keeled ... *C. trapezia*
- 99b. Leaf lobe ovate with obtuse apices; trigones large; underleaves bilobed to 1/4 – 1/3 of their length; perianth 3-keeled ... *C. giraldiana*
- 100a. Ocelli present in leaves ... 101
- 100b. Ocelli absent in leaves (except few species) ... 105. *Lejeunea*
- 101a. Intermediate thickenings present in leaf cells, usually 1 – 3 along each side of the wall; underleaf lamina with 6 large marginal cells surrounding numerous small rhizoid initial cells; gynoecial innovation absent ... 102. *Leptolejeunea*
- 101b. Intermediate thickenings in leaf cells absent or 1 along each side of the wall; underleaf lamina without 6 large marginal cells surrounding numerous small rhizoid initial cells; gynoecial innovation present or absent ... 103. *Drepanolejeunea*
- 102a. Ocelli 1 – 3 per leaf lobe; underleaf lobes 2 cells wide at base; perianth with horizontally spreading keels ... *L. balansae*
- 102b. Ocelli 3 – 5 (– 15) per leaf lobe; underleaf lobes 1 cell wide at base; perianth with obliquely – erectly spreading keels ... *L. elliptica*

- 103a. Free lateral margin of leaf lobule bordered by 4 rectangular – linear cells; underleaves bilobed to 1/2 – 2/3 of its length; underleaf lobes triangular – triangular-lanceolate, 4 – 10 cells wide at base ... *D. erecta*
- 103b. Free lateral margin of leaf lobule bordered by 7 – 12 sub quadrate – rectangular cells; underleaves bilobed to 3/4 of its length; underleaf lobes linear – lanceolate, 2 – 6 cells wide at base ... 104
- 104a. Underleaf lobes very widely spreading, nearly horizontal, 2 – 3 cells wide at base ... *D. yunnanensis*
- 104b. Underleaf lobes slightly spreading, 4 – 6 cells wide at base ... *D. herzogii*
- 105a. Plants 0.2 – 0.3 mm wide; stem 4 cells across the diameter with medullary cells in 3 vertical rows ... *L. punctiformis*
- 105b. Plants 0.5 – 1.7 mm wide; stem 5 – 8 cells across the diameter with medullary cells in 8 – 20 vertical rows ... 106
- 106a. Leaf lobes with acute, apiculate or acuminate apices ... *L. neelgherriana*
- 106b. Leaf lobes with rounded – obtuse apices ... 107
- 107a. Outer margins of underleaves with a single blunt tooth; perianth obcordate ... *L. anisophylla*
- 107b. Outer margins of underleaves entire; perianth obovate – pyriform ... 108
- 108a. Leaf cells without intermediate thickenings; perianth keels wing-like at apex ... *L. alata*
- 108b. Leaf cells with intermediate thickenings; perianth keels not wing-like at apex ... 109
- 109a. Leaf cuticle verrucose; underleaves large, 0.36 – 0.565 x 0.32 – 0.52 mm ... 110
- 109b. Leaf cuticle smooth or punctate; underleaves small, 0.14 – 0.34 x 0.13 – 0.33 mm ... 111
- 110a. Leaf lobe flat, ovate – oblong-ovate; underleaves imbricate – contiguous ... *L. flava*
- 110b. Leaf lobe incurved, broadly-ovate – triangular-ovate; underleaves distant ... *L. princeps*
- 111a. Plants 1.3 – 1.9 mm wide; leaf cuticle smooth; leaf lobule 1/7 – 1/5 as long as the lobe; perianth surface and keels smooth ... *L. obscura*
- 111b. Plants 0.5 – 0.9 mm wide; leaf cuticle punctate; leaf lobule 1/4 – 1/3 as long as the lobe; perianth surface mamilllose, keels crenulate ... *L. tuberculosa*
- 112a. Leaf lobe margins bordered by hyaline cells; leaf lobules dimorphic, both lingulate and inflated with apical hyaline papilla ... 113
- 112b. Leaf lobe margins not bordered by hyaline cells; leaf lobules inflated only with basal hyaline papilla ... 116
- 113a. Leaf lobule with a single large tooth, second tooth completely absent ... *C. latilobula*
- 113b. Leaf lobule with 2 – 3 teeth ... 114
- 114a. Leaf cuticle punctuate; oil-bodies smooth ... *C. udarii*
- 114b. Leaf cuticle smooth; oil-bodies segmented ... 115
- 115a. Ventral margin of leaf bordered by hyaline cells; leaf lobules narrowly lingulate or triangular lanceolate, rarely ovate or triangular ... *C. lanciloba*
- 115b. Ventral margin of leaf not bordered by hyaline cells; leaf lobules mostly ovate or triangular, rarely lingulate or triangular lanceolate ... *C. planissima*
- 116a. Dorsal protrusion present in leaf cells ... 117
- 116b. Dorsal protrusion absent in leaf cells ... 118
- 117a. Plants dioecious; leaf cells with spinose dorsal protrusions; second tooth of leaf lobule unicellular ... *C. haskarliana*

- 117b. Plants monoecious; leaf cells with shortly cylindric dorsal protrusions;
second tooth of leaf lobule 2 – 4 cells long ... *C. pseudofloccosa*
- 118a. Leaf lobes elliptical – lanceolate with acute apices; leaf cells with
intermediate thickenings; stylus absent ... *C. longifolia*
- 118b. Leaf lobes oblong – ovate with obtuse – slightly rounded apices;
leaf cells without intermediate thickenings; stylus present ... *C. trichomanis*

ENUMERATION

HERBERTACEAE

Herbertus aduncus (Dicks.) Gray, Nat. Arr. Brit. Pl. 1: 705. 1821; Juslén in Ann. Bot. Fenn. 43: 413. 2006. *Jungermannia adunca* Dicks., Pl. Crypt. Brit. Fasc. 3: 12. 1793. *Herbertus darjeelingensis* H.A.Mill. in J. Hattori Bot. Lab. 28: 307. 1965. *Herbertus fragilis* (Steph.) H.A.Mill. in J. Hattori Bot. Lab. 28: 311. 1965. subsp. **aduncus**.

Specimen examined : Terricolous. India: Eastern Himalaya, Manipur, West Mountain, 24.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1253B).

Distribution : India [Eastern Himalaya (Manipur – present study, Meghalaya, Sikkim, West Bengal)], Nepal, Bhutan, China, Japan, Philippines, Korea, Canada, USA (Herzog, 1939; Hattori, 1966, 1971, 1975; Miller, 1965; Tan & Engel, 1986; Piippo, 1990; Juslén, 2006; Yamada & Iwatsuki, 2006; Song & Yamada, 2006; Singh & Nath, 2007).

Herbertus dicranus (Taylor ex Gottsche & al.) Trevis. in Mem. R. Istit. Lombardo Sci. (ser. 3) 4: 397. 1877; Juslén in Ann. Bot. Fenn. 43: 419. 2006. *Schisma dicrana* Taylor ex Gottsche & al., Syn. hepat. 239. 1845. *Herberta chinensis* Steph. in Hedwigia 34: 43. 1895. *Herberta fleischeri* (Steph.) H.A.Mill. in J. Hattori Bot. Lab. 28: 307. 1965. *Herberta himalayana* (Steph.) H.A.Mill. in J. Hattori Bot. Lab. 28: 319. 1965. *Herberta nicholsonii* Herzog in Ann. Bryol. 12: 80. 1939. *Herberta mastigophoroides* Herzog & W.E. Nicholson ex H.A.Mill. in J. Hattori Bot. Lab. 28: 324. 1965. *Herberta pinnata* (Steph.) H.A.Mill. in J. Hattori Bot. Lab. 28: 299. 1965. *Herberta pseudoceylanica* S. Hatt. in Hara, The Flora of Eastern Himalaya 2: 225. 1971. *Herberta sikkimensis* (Steph.) W.E. Nicholson in Handel-Mazzetti, Symb. sin. 5: 28. 1930. *Herberta wichurae* Steph. in Hedwigia 34: 45. 1895.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, Ukhrul district, Sirohi Hill, 25.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1254A).

Distribution: India [Eastern Himalaya (Manipur – present study, Meghalaya, Sikkim, West Bengal); Western Ghats (Tamil Nadu)], Nepal, Bhutan, China, Sri Lanka, Indonesia, Philippines, Japan, Malaysia, Thailand, Vietnam, Hawaii, New Caledonia, Uganda, Kenya, Tanzania, Rwanda, DR Congo, Madeira, Mauritius, Réunion, Canada, USA (Chopra, 1938, 1943; Herzog, 1939; Miller, 1965; Hattori, 1966, 1971, 1975; Piippo, 1990; Long, 1979; Long & Grolle, 1990; Juslén, 2006; Singh & Nath, 2007; Lai & al., 2008).

TRICHOCOLEACEAE

Trichocolea tenera Udar & D. K. Singh in Geophytology 7: 69. 19. 1977; A. P. Singh & V. Nath, Hepaticae of Khasi and Jaintia Hills: Eastern Himalayas 11. 2007.

Specimen examined : Terricolous. India: Eastern Himalaya, Manipur, Ukhrul district, Sirohi Hill, c.1900 m, 25.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1521B).

Distribution : India [Eastern Himalaya (Manipur – present study, Meghalaya, Sikkim, West Bengal)] (Udar & Singh, 1977; Singh & Nath, 2007; Dey & al., 2009).

Trichocolea tomentella (Ehrh.) Dumort. in Nees, Naturgesch. eur. Leberm. 3 (1838) 105; Mitt. in J. Proc. Linn. Soc., Bot. 5: 103. 1861. *Jungermannia tomentella* Ehrh., Beitr. Zur Nat. 2: 150. 1788.

Specimen examined : Terricolous. India: Eastern Himalaya, Manipur, 1881 – 1882, G. Watt 6579.

Distribution : India [Eastern Himalaya (Manipur – present study, Sikkim, West Bengal)], Bhutan, China, Japan, Thailand, Indonesia, Philippines, Europe, North America (Mitten, 1861; Hattori, 1966;

Long, 1979; Tan & Engel, 1986; Long & Grolle, 1990; Piippo, 1990; Yamada & Iwatsuki, 2006; Lai & al., 2008).

LEPIDOZLACEAE

Bazzania appendiculata (Mitt.) S.Hatt. in Hara, Flora of Eastern Himalaya 505. 1966; D. Sharma & S. C. Srivast. in Bryophyt. Biblioth. 47: 128. 1993. *Mastigobryum appendiculatum* Mitt. in J. Proc. Linn. Soc., Bot. 5: 105. 1861. *Mastigobryum cuspidatum* Steph., Sp. hepat. 3: 495. 1908.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, West Mountain, 24.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1255).

Distribution : India [Eastern Himalaya (Assam, Manipur – present study, Meghalaya, Sikkim, West Bengal)], Nepal, Bhutan, China, Myanmar, Thailand (Long & Grolle, 1990; Piippo, 1990; Sharma & Srivastava, 1993; Singh & Nath, 2007; Lai & al., 2008).

Bazzania himalayana (Mitt.) Schiffn. in Oesterr. Bot. Z. 49: 132. 1899; D. Sharma & S. C. Srivast. in Bryophyt. Biblioth. 47: 111. 1993. *Mastigobryum himalayanum* Mitt. in J. Proc. Linn. Soc., Bot. 5: 105. 1861. *Mastigobryum gammianum* Steph., Sp. hepat. 3: 461. 1908. *Mastigobryum rupicolum* Steph., Sp. hepat. 6: 479. 1924.

Specimen examined : Corticolous. India: Eastern Himalaya, Manipur, West Mountain, 24.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1256); Ukhrul district, Sirohi Hill, c.1900 m, 25.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1257).

Distribution : India [Eastern Himalaya (Meghalaya, Manipur – present study, Sikkim, West Bengal)], Nepal, Bhutan, China, Philippines, Thailand (Mitten, 1861; Tan & Engel, 1986; Long & Grolle, 1990; Piippo, 1990; Sharma & Srivastava, 1993; Singh & Nath, 2007; Lai & al., 2008).

Bazzania orientalis (Steph.) Parihar, An annotated revised census of Indian hepatics 6. 1961 – 1962. *Mastigobryum orientale* Steph., Sp. hepat. 6: 476. 1924.

Specimen examined : Terricolous. India: Eastern Himalaya, Manipur, Liton, 19.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1258).

Distribution : India [Eastern Himalaya (Manipur – present study), Western Ghat (Tamil Nadu)] (Sharma & Srivastava, 1993).

Bazzania ovistipula (Steph.) Abeyw. in Ceylon J. Sci. 2: 1: 45. 1959; D. Sharma & S. C. Srivast. in Bryophyt. Biblioth. 47: 135. 1993. *Mastigobryum ovistipulum* Steph., Sp. hepat. 3: 444. 1908. *Bazzania nudistipula* Pandé & al., Proc. 36th Indian Sci. Cong. 9. 1949. *Bazzania pusilla* (Steph.) S. Hatt. in Hara, Flora of Eastern Himalaya 506. 1966.

Specimen examined : Terricolous. India: Eastern Himalaya, Manipur, Ukhrul district, Sirohi Hill, c.1900 m, 25.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1259).

Distribution : India [Eastern Himalaya (Arunachal Pradesh, Assam, Manipur – present study, Meghalaya, Sikkim, West Bengal), Western Ghat (Karnataka)], Sri Lanka, Bhutan, Nepal, China, Philippines, Thailand, Vietnam, Japan (Onraedt, 1981; Tan & Engel, 1986; Long & Grolle, 1990; Piippo, 1990; Sharma & Srivastava, 1993; Singh, 1996; Yamada & Iwatsuki, 2006; Singh & Nath, 2007; Lai & al., 2008).

Bazzania praerupta (Reinw. & al.) Trevis., Mem. R. Instit. Lombardo (ser. 3) 4: 414. 1877; D. Sharma & S. C. Srivast. in Bryophyt. Biblioth. 47: 151. 1993. *Jungermannia praerupta* Reinw. & al. in Nova Acta Phys.-Med. Acad. Caes. Leop.-Carol. Nat. Cur. 12: 229. 1824. *Bazzania decurva* (Nees) Trevis., Mem. R. Istit. Lombardo (ser. 3) 4: 414. 1877. *Mastigobryum praeruptum* (Reinw. & al.) Lindenb. in Gottsche & al., Syn. hepat. 224. 1845.

Specimen examined : Terricolous and corticolous. India: Eastern Himalaya, Manipur, West Mountain, 24.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1260, 1253A); Ukhrul district, Sirohi Hill, c.1900 m, 25.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1261).

Distribution : India [Eastern Himalaya (Arunachal Pradesh, Meghalaya, Manipur – present study, Sikkim, West Bengal), Western Himalaya (Uttarakhand), Western Ghat], Sri Lanka, Bhutan, Nepal, China,

Myanmar, Philippines, Indonesia, Thailand, Japan, Vietnam, Hawaii (Onraedt, 1981; Tan & Engel, 1986; Long & Grolle, 1990; Piippo, 1990; Sharma & Srivastava, 1993; Singh, 1996; Yamada & Iwatsuki, 2006; Singh & Nath, 2007; Lai & al., 2008).

Bazzania sumbavensis (Gottsche ex Steph.) Steph. in Hedwigia 32: 204. 1893; D.Sharma & S.C.Srivast. in Bryophyt. Biblioth. 47: 107. 1993. *Mastigobryum sumbavense* Gottsche ex Steph. in Hedwigia 25: 236. 1886.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, Thengnoupal district, Moreh, c.1391 m, 26.03.1984, J.P. Ghosh 58073.

Distribution: India [Eastern Himalaya (Manipur – present study, Meghalaya, Sikkim, West Bengal)], Nepal, Bhutan, Thailand, Indonesia, New Guinea, Samoa (Long & Grolle, 1990; Sharma & Srivastava, 1993; Singh & Nath, 2007; Lai & al., 2008).

Bazzania tricenata (Wahlenb.) Lindb. in Brotherus, Musci Fenn. Exs., (Fasc. 2): 2. 1872; D.Sharma & S.C.Srivast. in Bryophyt. Biblioth. 47: 143. 1993. *Jungermannia tricenata* Wahlenb., Fl. carpath. 364. 1814. *Mastigobryum deflexum* (Mart.) Gottsche in Gottsche & al., Syn. hepat. 231. 1835. *Mastigobryum longanum* Steph., Sp. hepat. 6: 472. 1924. *Mastigobryum perrottetii* Steph., Sp. hepat. 3: 434. 1909.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, West Mountain, 24.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1263).

Distribution: India [Western Himalaya (Himachal Pradesh); Eastern Himalaya (Arunachal Pradesh, Manipur – present study, Sikkim, West Bengal); Western Ghats (Tamil Nadu)], Nepal, Bhutan, China, Korea, Japan, Europe, North America, (Schuster, 1969; Long & Grolle, 1990; Piippo, 1990; Sharma & Srivastava, 1993; Singh, 1996; Song & Yamada, 2006; Yamada & Iwatsuki, 2006).

Bazzania tridens (Reinw. & al.) Trevis., Mem. R. Instit. Lombardo (ser. 3) 4: 415. 1877; D.Sharma & S.C.Srivast. in Bryophyt. Biblioth. 47: 121. 1993. *Jungermannia tridens* Reinw. & al. in Nova Acta Phys.-Med. Acad. Caes. Leop.-Carol. Nat. Cur. 12: 228. 1824. *Mastigobryum cardotii* Steph., Sp. hepat. 3: 515. 1908. *Mastigobryum oblongum* Mitt. in J. Proc. Linn. Soc., Bot. 5: 106. 1861. *Mastigobryum pinniformae* Steph., Sp. hepat. 3: 462. 1908. *Mastigobryum tridens* (Reinw. & al.) Nees in Gottsche & al., Syn. hepat. 227. 1845. *Bazzania lobulistipa* (Steph.) S.Hatt. in Hara, Flora of eastern Himalaya 505. 1966. *Bazzania pinniformis* (Steph.) S.Hatt. in Hara, Flora of Eastern Himalaya 506. 1966.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, Ukhrul district, Liton, 19.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1264, 1265, 1266, 1267, 1268C).

Distribution: India [Eastern Himalaya (Arunachal Pradesh, Manipur – present study, Meghalaya, Sikkim, West Bengal), Western Ghat (Tamil Nadu)], Sri Lanka, Nepal, Bhutan, China, Myanmar, Philippines, Indonesia, Japan, Korea, Thailand, Vietnam, Samoa, Australia (Onraedt, 1981; Tan & Engel, 1986; Long & Grolle, 1990; Piippo, 1990; Sharma & Srivastava, 1993; Singh, 1996; Yamada & Iwatsuki, 2006; McCarthy, 2006; Singh & Nath, 2007; Lai & al., 2008).

Lepidozia reptans (L.) Dumort., Recueil observ. Jungerm. 19: 1835; D.Sharma & S.C.Srivast. in Bryophyt. Biblioth. 47: 64. 1993. *Jungermannia reptans* L., Sp. pl. 2: 1133. 1753. *Lepidozia tridens* Steph., Sp. hepat. 3: 617. 1909. *Lepidozia macrocalyx* Steph. in Mem. Soc. Sci. Nat. Cherbourg 29: 216. 1894. *Lepidozia hokiensis* Steph. in Mem. Soc. Nat. Math. Cherbourg. 29: 216. 1894. *Lepidozia himalayensis* Steph., Sp. hepat. 3: 617. 1909.

Manipur, G. Watt, 438 (G) (fide Sharma & Srivastava, loc.cit.).

Distribution: India [Western Himalaya (Jammu and Kashmir, Uttarakhand); Eastern Himalaya (Assam, Manipur, Meghalaya, Sikkim, West Bengal); Western Ghats (Tamil Nadu)], Nepal, Bhutan, China, Pakistan, Japan, Philippines, Thailand, Europe, North, Central and South America (Kashyap, 1932; Tan & Engel, 1986; Long & Grolle, 1990; Piippo, 1990; Sharma & Srivastava, 1993; Piippo & al., 1997; Yamada & Iwatsuki, 2006; Singh & Nath, 2007).

CEPHALOZACEAE

Cephalozia darjeelingensis Udar & D.Kumar in Geophytology 6: 36. 1976.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, Savatvakhong, 22.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1269C).

Distribution: India [Eastern Himalaya (Manipur – present study, West Bengal)], Bhutan (Udar & Kumar, 1976; Long & Grolle, 1990).

Odontoschisma denudatum (Nees) Dumort., Recueil observ. Jungerm. 19. 1835; D.G. Long in Cryptogamie, Bryol. 26: 99. 2005. *Jungermannia denudata* Nees in Mart., Fl. Crypt. Erlang. 14. 1817.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, Ukhrul district, Tushen, 21.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1270, 1271).

Distribution: India [Eastern Himalaya (Manipur – present study, Sikkim)], Nepal, China, Japan, Thailand, Europe, South Africa, North, Central, and South America (Hattori, 1971; Schuster, 1974; Long & Grolle, 1990; Piippo, 1990; Long, 2005; Yamada & Iwatsuki, 2006; Lai & al., 2008).

JUNGERMANNIACEAE

Anastrepta orcadensis (Hook.) Schiffn. in Engl. & Prantl, Nat. Pflanzenfam. 3: 85. 1893; S.Hatt. in Hara, Flora of Eastern Himalaya 507. 1966. *Jungermannia orcadensis* Hook., Brit. Jungermann. 71. 1814. *Anastrepta sikkimensis* Steph., Sp. hepat. 6: 19. 1917.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, Ukhrul district, Sirohi Hill, c.1900 m, 25.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1272).

Distribution: India [Eastern Himalaya (Manipur – present study, Sikkim, West Bengal)], Nepal, Bhutan, China, Japan, Hawaii, Europe, North America (Chopra, 1938, 1943; Herzog, 1939; Hattori, 1966; Kitagawa, 1966; Long, 1979; Long & Grolle, 1990; Piippo, 1990; Yamada & Iwatsuki, 2006).

Anastrophyllum joergensenii Schiffn. in Hedwigia 49: 396. 1910; D.Schill & D.G.Long in J. Hattori Bot. Lab. 94: 139. 2003. *Anastrophyllum alpinum* Steph., Sp. hepat. 6: 103. 1917.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, Ukhrul district, Sirohi Hill, c.1900 m, 25.02.1978, J. Lal & B. D. Kar, s.n. (acc. no.1273).

Distribution: India [Western Himalaya (Uttarakhand); Eastern Himalaya (Manipur – present study, Sikkim)], Nepal, Bhutan, China, Europe (Chopra, 1943; Hattori, 1966, Long & Grolle, 1990; Piippo, 1990; Paton, 1999; Nath & al., 2002; Schill & Long, 2003).

Jamesoniella elongella (Taylor) Steph., Sp. hepat. 2: 93. 1906; Kachroo & D.B.Deb in J. Univ. Gauhati 5: 120. 1954; Adarsh Kumar & Udar in Geophytology 15: 2. 1985. *Jungermannia elongella* Taylor in J. Bot. 5: 274. 1846.

Ukhrul, c.1860 m (fide Kumar & Udar, loc.cit.).

Distribution: India [Western Himalaya (Himachal Pradesh, Uttarakhand); Eastern Himalaya (Assam, Manipur, Meghalaya, Sikkim)], Nepal, Bhutan, China, Sri Lanka (Kashyap, 1932; Kachroo & Deb, 1954; Kumar & Udar, 1985; Long & Grolle, 1990; Piippo, 1990; Singh & Nath, 2007; Singh & Singh, 2009).

Solenostoma comatum (Nees) C.Gao, Fl. Hepat. Chin. Boreali-Orient. 73. 1981; Vana & D.G.Long in Nova Hedwigia 89: 497. 2009. *Jungermannia comata* Nees, Hepat. Jav. 78. 1830. *Jungermannia stevensiana* Steph., Sp. hepat. 6: 93. 1924.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, Savatvakhong, 22.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1274, 1275).

Distribution: India [Eastern Himalaya (Assam, Manipur – present study, Meghalaya, Sikkim, West Bengal)], Nepal, China, Korea, Japan, Myanmar, Philippines, Thailand, Indonesia, Malaysia, New Guinea (Amakawa, 1960, 1970; Váda, 1972; Tan & Engel, 1986; Piippo, 1990; Yamada & Iwatsuki, 2006; Singh & Nath, 2007; Lai & al., 2008; Singh & al., 2008a; Váda & Long, 2009).

Solenostoma truncatum (Nees) R.M.Schust. ex Vana & D.G.Long in Nova Hedwigia 89: 509. 2009. *Jungermannia truncata* Nees, Hepat. Jav. 29. 1830. *Jungermannia polyrhiza* Hook., in Lehmann, 6: 34. 1834.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, Waka forest, 17.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1276, 1277, 1278); Savatvakhong, 22.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1279).

Distribution: India [Western Himalaya (Uttarakhand), Eastern Himalaya (Assam, Manipur – present study, Meghalaya, Sikkim, West Bengal), Western Ghats (Tamil Nadu)], Pakistan, Nepal, Bhutan, Sri Lanka, China, Japan, Indonesia, Myanmar, Philippines, Thailand, Australia (Chopra, 1943; Amakawa, 1972; Váða, 1974; Hattori, 1975; Tan & Engel, 1986; Long & Grolle, 1990; Piippo, 1990; Yamada & Iwatsuki, 2006; McCarthy, 2006; Lai & al., 2008; Váða & Long, 2009).

Notoscyphus darjeelingensis Udar & A.Kumar in J. Hattori Bot. Lab. 49: 250. 1981.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, Ukhrul district, Tusshen, 21.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1280).

Distribution: India [Eastern Himalaya (Arunachal Pradesh, Manipur – present study, Sikkim, West Bengal)] (Udar & Kumar, 1981; Singh, 1996; Dey & al., 2009).

Plicanthus hirtellus (F.Weber) R.M.Schust. in Nova Hedwigia 74: 492. 2002. *Jungermannia hirtella* F.Weber, Hist. Musc. Hep. Prodr. 50. 1815. *Chandonanthus hirtellus* (F.Weber) Mitt. in Hooker, Handb. New Zealand Fl. 2: 861. 1857.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, Ukhrul district, Sirohi Hill, 25.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1281), Khangkhui forest, 26.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1282, 1283, 1284).

Distribution: India: Eastern Himalaya (Arunachal Pradesh, Manipur – present study, Meghalaya, Sikkim, West Bengal)], Nepal, Bhutan, Sri Lanka, China, Thailand, Japan, Philippines, Australia, Africa, North America (Mitten, 1861; Hattori, 1971; Long, 1979; Onraedt, 1981; Udar & Kumar, 1982; Tan & Engel, 1986; Long & Grolle, 1990; Piippo, 1990; Singh, 1996; Wigginton & Grolle, 1996; Yamada & Iwatsuki, 2006; McCarthy, 2006; Singh & Nath, 2007; Lai & al., 2008).

GEOCALYCACEAE

Chiloscyphus himalayensis Steph., Sp. hepat. 3 : 209. 1907; Abha Srivast. & S.C.Srivast., Indian Geocal. 122. 2002; Kachroo & D.B.Deb in J. Univ. Gauhati 5: 120. 1954.

Imphal, D.B. Deb, s.n. (fide Kachroo & Deb, loc.cit.).

Distribution: India [Western Himalaya (Jammu & Kashmir, Himachal Pradesh, Uttarakhand) Eastern Himalaya (Manipur)] (Kachroo & Deb, 1954; Srivastava & Srivastava, 2002; Singh & Singh, 2009).

Heteroscyphus argutus (Reinw. & al.) Schiffn. in Oesterr. Bot. Z. 60: 172. 1910; Abha Srivast. & S.C.Srivast., Indian Geocal. 122. 2002. *Jungermannia arguta* Reinw. & al. in Nees, Hepat. Java. 1: 206. 1824. *Chiloscyphus argutus* (Reinw. & al.) Nees in Gottsche & al., Syn. hepat. 183. 1845; Kachroo & D.B.Deb in J. Univ. Gauhati 5: 120. 1954.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, Ukhrul district, Liton, 19.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1285); Ukhrul district, Sirohi Hill, c.1900 m, 25.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1286); Hongva forest, 27.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1287A).

Distribution: India [Western Himalaya (Himachal Pradesh, Uttarakhand) Eastern Himalaya (Manipur, Meghalaya, Sikkim, West Bengal), Central India (Madhya Pradesh), Western Ghats (Karnataka, Kerala, Tamil Nadu)], Nepal, Bhutan, Sri Lanka, China, Thailand, Indonesia, Korea, Japan, New Guinea, Hawaii, Australia, New Zealand (Kachroo & Deb, 1954; Onraedt, 1981; Long & Grolle, 1990; Srivastava & Srivastava, 2002; McCarthy, 2006; Song & Yamada, 2006; Yamada & Iwatsuki, 2006; Singh & Nath, 2007; Lai & al., 2008).

Heteroscyphus bescherellei (Steph.) S.Hatt. in Bot. Mag. (Tokyo) 58: 39. 1944; Abha Srivast. & S.C.Srivast., Indian Geocal. 105: 2002. *Chiloscyphus bescherellei* Steph. in Bull. Herb. Boissier 5: 87. 1897. *Chiloscyphus communis* Steph., Sp. hepat. 3: 211. 1906. *Lophocolea sendaica* Steph., Sp. hepat. 6: 292. 1922.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, Senapati district, Mao, c.1757 m, 14.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1288).

Distribution: India [Eastern Himalaya (Arunachal Pradesh, Manipur – present study, Meghalaya, Sikkim, West Bengal)], Nepal, China, Japan, Philippines, New Guinea, Australia (Tan & Engel, 1986; Srivastava & Srivastava, 2002; Yamada & Iwatsuki, 2006; Singh & Nath, 2007; Singh & al., 2008a).

Heteroscyphus hyalinus (Steph.) S.C.Srivast. & Abha Srivast., Indian Geocal. 118. 2002. *Lophocolea hyalina* Steph. in Bull. Acad. Soc. Roy. Sci. Belgique 38: 254. 1899. *Chiloscyphus gammianus* Steph., Sp. hepat. 3: 217. 1906.

Specimen examined: Terricolous and corticolous. India: Eastern Himalaya, Manipur, Waka forest, 17.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1289B); Ukhrul district, Liton, 19.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1290); West Mountain, 24.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1291).

Distribution: India [Eastern Himalaya (Arunachal Pradesh, Manipur – present study, Meghalaya, Sikkim, West Bengal)], Nepal (Srivastava & Srivastava, 2002; Singh & Nath, 2007; Singh & al., 2008a; Dey & al., 2009).

Heteroscyphus orbiculatus Abha Srivast. & S.C.Srivast., Indian Geocal. 140. 2002; Sushil K.Singh & D.K.Singh in Indian J. Forest. 26: 317. 2003.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, on way to Kangpoki, 15.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1292); Waka forest, 17.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1293); Ukhrul district, Liton, 19.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1294).

Distribution: India [Western Himalaya (Himachal Pradesh), Eastern Himalaya (Manipur – present study, Sikkim), Western Ghats (Tamil Nadu)] (Srivastava & Srivastava, 2002; Singh & Singh, 2003, 2009; Dey & al., 2009).

Heteroscyphus pandei S.C.Srivast. & Abha Srivast. in Lindbergia 15: 197. 1989; Abha Srivast. & S.C.Srivast., Indian Geocal. 134. 2002.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, Waka forest, 17.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1295A).

Distribution: India [Western Himalaya (Himachal Pradesh, Uttarakhand), Eastern Himalaya (Manipur, Sikkim, West Bengal)], Nepal (Srivastava & Srivastava, 2002; Singh & Singh, 2009).

Heteroscyphus parvus Abha Srivast. & S.C.Srivast., Indian Geocalyaceae 112. 2002.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, Waka forest, 17.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1296); Liton, 19.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1488B).

Distribution: India [Eastern Himalaya (Manipur – present study, Sikkim), Central India (Madhya Pradesh)], Nepal (Srivastava & Srivastava, 2002).

Lophocolea bidentata (L.) Dumot., Recueil observ. Jungerm. 17. 1835; Abha Srivast. & S.C.Srivast., Indian Geocalyaceae 187. 2002. *Jungermannia bidentata* L., Sp. pl. 2: 1132. 1753.

Specimens examined: Terricolous and corticolous. India: Eastern Himalaya, Manipur, West Mountain, 24.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1297); Hongva forest, 27.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1287B, 1298).

Distribution: India [Western Himalaya (Uttarakhand), Eastern Himalaya (Arunachal Pradesh, Manipur – present study, Meghalaya, Sikkim, West Bengal), Western Ghats (Tamil Nadu)], Nepal, Bhutan, Korea, Europe, North, Central & South America, Africa, Australia, New Zealand (Long & Grolle, 1990; Singh, 1996; Srivastava & Srivastava, 2002; Song & Yamada, 2006; Yamada & Iwatsuki, 2006; Singh & Nath, 2007).

PLAGIOCHILACEAE

Plagiochila elegans Mitt. in J. Proc. Linn. Soc., Bot. 5: 97.1861; M.L.So in Syst. Bot. Monog. 60: 184. 2001; K.K.Rawat & S.C.Srivast., Genus *Plagiochila* in Eastern Himalaya (India), 188. 2007. *Plagiochila consimilis* Steph., Sp. hepat. 6: 141.1918. *Plagiochila hartlessiana* Steph., Bull. Herb. Boissier (ser. 2) 3: 881.1903. *Plagiochila permagna* Schiffn. ex Steph., Sp. hepat. 6: 198.1921. *Plagiochila pluridentata* Steph. in Renault and Cardot, Bull. Soc. Roy. Bot. Belgique 41, Mém. 122. 1905.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, Ukhrul district, Sirohi Hill, c.1900 m, 25.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1299).

Distribution: India [Western Himalaya (Himachal Pradesh); Eastern Himalaya (Manipur – present study, Sikkim, West Bengal); Western Ghats (Karnataka, Tamil Nadu)], Nepal, Bhutan, China, Japan (Long & Grolle, 1990; Piippo, 1990; So, 2001; Yamada & Iwatsuki, 2006; Rawat & Srivastava, 2007; Singh & Singh, 2007a).

Plagiochila fruticosa Mitt. in J. Proc. Linn. Soc. (Bot. 5): 94: 1861; M.L.So in Syst. Bot. Monog. 60: 66. 2001; K.K.Rawat & S.C.Srivast., Genus *Plagiochila* in Eastern Himalaya (India), 96. 2007. *Plagiochila bipinnata* Steph., Sp. hepat. 6: 131. 1918.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, Hongava Hill, 27.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1300B).

Distribution: India [Western Himalaya (Uttarakhand); Eastern Himalaya (Assam, Manipur – present study, Meghalaya, Sikkim, West Bengal); Western Ghats (Karnataka, Kerala, Tamil Nadu)], Nepal, Bhutan, China, Thailand, Japan, Philippines, Vietnam (Long & Grolle, 1990; Piippo, 1990; So, 2001; Yamada & Iwatsuki, 2006; Rawat & Srivastava, 2007; Lai & al., 2008).

Plagiochila hattorii Inoue in Bull. Nat. Sci. Mus. Tokyo Ser. B (Bot.) 2: 69. 1976; K.K.Rawat & S.C.Srivast., Genus *Plagiochila* in Eastern Himalaya (India), 105. 2007.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, Senapati district, Mao, c.1757 m, 14.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1524); West Imphal district, Jiribam, 05.03.1984, J. P. Ghosh 58019.

Distribution: India [Eastern Himalaya (Manipur – present study, Meghalaya)], Japan (Rawat & Srivastava, 2007).

Plagiochila nepalensis Lindenb., Sp. hepat. (*Plagiochila* fasc. 2 – 4): 93. 1840; M.L.So in Syst. Bot. Monog. 60: 156. 2001; K.K.Rawat & S.C.Srivast., Genus *Plagiochila* in Eastern Himalaya (India), 176. 2007. *Plagiochila brevifolia* Steph., Bull. Herb. Boissier (ser. 2), 3: 876. 1903. *Plagiochila cornuta* Steph., Bull. Herb. Boissier (ser. 2) 3: 874. 1903. *Plagiochila decolyana* Schiffn. ex Steph., Sp. hepat. 6: 144. 1918. *Plagiochila gammiana* Steph., Bull. Herb. Boissier (ser. 2), 3: 963. 1903. *Plagiochila gollanii* Steph., Bull. Herb. Boissier (ser. 2) 3: 883. 1903. *Plagiochila gollanii* var. *triquetra* Herzog in Ann. Bryol. 12: 76. 1939. *Plagiochila grata* Steph., Sp. hepat. 6: 160. 1918. *Plagiochila luethiana* Steph. Steph., Sp. hepat. 6: 180. 1921. *Plagiochila pseudorientalis* Inoue in J. Hattori Bot. 30: 126. 1967. *Plagiochila remotistipula* Steph., Sp. hepat. 6: 201. 1921. *Plagiochila semiaperta* Schiffn. ex Steph., Sp. hepat. 6: 210. 1921.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, 1881 – 1882, G. Watt 7504; Tamenglong district, 13.03.1984, J. P. Ghosh 58072.

Distribution: India [Eastern Himalaya (Arunachal Pradesh, Assam, Manipur – present study, Meghalaya, Sikkim, West Bengal), Western Himalaya (Himachal Pradesh, Uttarakhand), Western Ghats (Karnataka, Kerala, Tamil Nadu), Punjab & Rajasthan plains (Punjab)], Nepal, Bhutan, China, Japan, Myanmar, Philippines, Indonesia, Thailand, Vietnam (Tan & Engel, 1986; Piippo, 1990; Long & Grolle, 1990; Srivastava & Dixit, 1996; So, 2001; Zhu & So, 2001; Yamada & Iwatsuki, 2006; Rawat & Srivastava, 2007; Singh & Singh, 2007a, 2009; Verma & Srivastava, 2008; Singh & al., 2008a; Lai & al., 2008; Dey & al., 2009).

Plagiochila parvifolia Lindenb., Sp. hepat. (*Plagiochila* fasc. 1): 28.1839; M.L.So in Syst. Bot. Monog. 60: 88. 2001; K.K.Rawat & S.C.Srivast., Genus *Plagiochila* in Eastern Himalaya (India), 111. 2007.

Plagiochila cuspidata Steph., Sp. hepat. 6: 144. 1918. *Plagiochila neorupicola* Inoue in Bryologist 68: 218. 1965. *Plagiochila phalangea* Taylor in J. Bot. 5: 264. 1846. *Plagiochila subsymmetrica* Steph., Sp. hepat. 6: 212. 1921. *Plagiochila yokogurensis* Taylor, Bull. Herb. Boissier 5: 104. 1897.

Specimen examined: Terricolous and corticolous. India: Eastern Himalaya, Manipur, Ukhrul district, Tushen, 21.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1303); West Mountain, 24.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1304); Tengnoupal district, Lock-chou nala, 25.03.1984, J. P. Ghosh 58068, 58069.

Distribution: India [Western Himalaya (Himachal Pradesh, Uttarakhand), Eastern Himalaya (Assam, Manipur, Meghalaya, Sikkim, West Bengal)], Bhutan, China, Taiwan, Bangladesh, Sri Lanka, Indonesia, Philippines, Japan, Korea, Myanmar, Thailand, Vietnam, Papua New Guinea (Long & Grolle, 1990; Piippo, 1990; So, 2001; Yamada & Iwatsuki, 2006; Rawat & Srivastava, 2007; Singh & Singh, 2007a, 2009; Singh & Nath, 2007; Lai & al., 2008).

Plagiochila perserrata Herzog in Handel-Mazzetti, Symb. Sin. 5: 19. 1903; M.L. So in Syst. Bot. Monog. 60: 48. 2001; K.K. Rawat & S.C. Srivast., Genus *Plagiochila* in Eastern Himalaya (India), 83. 2007.

Vishnupur, U.S. Awasthi and A. Kumar 3871/79 (LWU) (fide Rawat & Srivastava, loc.cit.).

Distribution: India [Eastern Himalaya (Manipur)], Nepal, Bhutan, China, Indonesia (Hattori, 1975; Long & Grolle, 1990; Piippo, 1990; So, 2001; Rawat & Srivastava, 2007).

Plagiochila sciophila Nees ex Lindenb., Sp. hepat. (*Plagiochila* fasc 2 – 4: 100. 1840; M.L. So in Syst. Bot. Monog. 60: 112. 2001; K.K. Rawat & S.C. Srivast., Genus *Plagiochila* in Eastern Himalaya (India), 116. 2007. *Plagiochila acanthophylla* Gottsche, Bot. Zeitung (Berlin) 16, Beil. 37, 38. 1858. *Plagiochila chiloscyphoidea* Steph., Sp. hepat. 2: 301. 1906. *Plagiochila fla ovirens* Steph., Sp. hepat. 6: 156. 1918. *Plagiochila orientalis* Taylor in J. Bot. 5: 261. 1846. *Plagiochila trochantha* Schiffn. ex Steph., Sp. hepat. 6: 226. 1921. *Plagiochila vygensis* Steph., Sp. hepat. 5: 237. 1921.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, Senapati district, Mao, c.1757 m, 14.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1307); West Mountain, 24.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1308B, 1309); Ukhrul district, Sirohi Hill, c.1900 m, 25.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1310, 1311, 1312).

Distribution: India [Western Himalaya (Himachal Pradesh, Jammu & Kashmir, Uttarakhand), Eastern Himalaya (Arunachal Pradesh, Assam, Meghalaya, Manipur – present study, Sikkim, West Bengal), Western Ghats (Kerala, Tamil Nadu), Andaman & Nicobar Islands (South Andaman)], Pakistan, Nepal, Bhutan, China, Japan, Korea, Philippines, Malaysia, Thailand, Vietnam, Indonesia, Papua New Guinea, Samoa, eastern North America, Australia (Tan & Engel, 1986; Piippo, 1990; Long & Grolle, 1990; So, 2001; Yamada & Iwatsuki, 2006; Song & Yamada, 2006; McCarthy, 2006; Rawat & Srivastava, 2007; Singh & Singh, 2007a, 2009; Verma & Srivastava, 2008; Singh & al., 2008a; Lai & al., 2008; Dey & al., 2009).

Plagiochila semidecurrens (Lehm. & Lindenb.) Lindenb., Sp. hepat. (*Plagiochila* fasc. 5): 142. 1843; M.L. So in Syst. Bot. Monog. 60: 51. 2001; K.K. Rawat & S.C. Srivast., Genus *Plagiochila* in Eastern Himalaya (India), 71. 2007. *Jungermannia semidecurrens* Lehm. & Lindenb. in Lehmann, 4: 21. 1832. *Plagiochila aequalis* Mitt. in J. Proc. Linn. Soc. (Bot. 5): 98: 1861. *Plagiochila asymmetrica* Steph., Sp. hepat. 6: 125. 1917. *Plagiochila grossevitta* Steph., Spec. hepat. 6: 161. 1918. *Plagiochila inermis* Schiffn ex Steph., Sp. hepat. 6: 169. 1918. *Plagiochila kamaounensis* Taylor in J. Bot. 5: 262. 1846. *Plagiochila longicalyx* Steph. in Bull. Herb. Boissier (ser. 2) 3: 532. 1903. *Plagiochila nidulans* Herzog in Ann. Bryol. 5: 73. 1932. *Plagiochila nilgherriensis* Steph., Spec. hepat. 6: 189. 1921. *Plagiochila renitens* (Nees) Lindenb., Spec. Hepat. (fasc. 2 – 4): 90. 1840. *Plagiochila schaulina* Schiffn. ex Steph., Sp. hepat. 6: 210. 1921. *Plagiochila semidecurrens* (Lehm. & Lindenb.) Lindenb. var. *undulata* Carl. in Ann. Bryol., Suppl. 2: 98. 1931.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, Ukhrul district, Sirohi Hill, c.1900 m, 25.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1254B).

Distribution: India [Eastern Himalaya (Assam, Manipur – present study, Sikkim, West Bengal)], Nepal, Bhutan, China, Thailand, Indonesia, Korea, Japan, Papua New Guinea, (Long & Grolle, 1990; Piippo,

1990; So, 2001; Yamada & Iwatsuki, 2006; Song & Yamada, 2006; Rawat & Srivastava, 2007; Lai & al., 2008).

Plagiochila subtropica Steph. in Bull. Soc. Roy. Bot. Belgique (1899) 38, Mem. 46.1900; M.L.So in Syst. Bot. Monog. 60: 93. 2001; K.K.Rawat & S.C.Srivast., Genus *Plagiochila* in Eastern Himalaya (India), 107. 2007. *Plagiochila deterrmii* Steph. in Bull. Herb. Boissier (ser. 2) 3: 876. 1903. *Plagiochila diffracta* Herzog in Mem. Soc. Fauna Fl. Fenn. 26: 25. 1949 – 1950. *Plagiochila kitagawae* Inoue in J. Hattori Bot Lab. 38: 560. 1974.

Specimen examined: Corticolous. India: Eastern Himalaya, Manipur, Ukhrul district, Sirohi Hill, c.1900 m, 25.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1313).

Distribution: India [Eastern Himalaya (Arunachal Pradesh, Manipur – present study, Meghalaya, Sikkim, West Bengal), Western Ghats (Kerala, Tamil Nadu)], Nepal, Bhutan, China, Thailand (Piippo, 1990; So, 2001; Rawat & Srivastava, 2007; Singh & Nath, 2007; Lai & al., 2008).

Plagiochila uniformis Mitt. in J. Proc. Linn. Soc., Bot. 5: 98. 1861; K.K.Rawat & S.C.Srivast., Genus *Plagiochila* in Eastern Himalaya (India), 195. 2007. *Plagiochila ambigua* Mitt. in J. Proc. Linn. Soc., Bot. 5: 98. 1861. *Plagiochila mittenii* Steph. in Bull. Herb. Boissier 5: 83. 1897. *Plagiochila simlana* Mitt. ex Steph. in Bull. Herb. Boissier (ser. 2) 3: 525. 1903.

Manipur, G. Watt, s.n. (NY) (fide Rawat & Srivastava, loc.cit.).

Distribution: India [Western Himalaya (Himachal Pradesh, Uttarakhand), Eastern Himalaya (Assam, Manipur, Meghalaya, West Bengal)], Pakistan, Nepal, Bhutan, Thailand (Mitten, 1861; Long & Grolle, 1990; So & Grolle, 2000; Rawat & Srivastava, 2007; Lai & al., 2008; Singh & Singh, 2009).

RADULACEAE

Radula acuminata Steph., Sp. hepat. 4: 230. 1910; Udar & Dh. Kumar in Geophytology 14: 162. 1984; R.L.Zhu & M.L.So in Nova Hedwigia 121: 60. 2001. *Radula yunnanensis* P.C.Chen in Feddes Repert. 58: 39. 1955. *Radula acuminata* Steph. fo. *corticola* S.Hatt. in Bull. Tokyo Sci. Mus. 11: 81. 1944.

Specimen examined: Follicolous. India: Eastern Himalaya, Manipur, Ukhrul district, Tushen, 21.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1314, 1315); West Mountain, 25.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1316).

Distribution: India [Eastern Himalaya (Arunachal Pradesh, Manipur – present study, Meghalaya, Sikkim)], Nepal, China, Sri Lanka, Japan, Indonesia, Malaysia, Philippines, Fiji, Papua New Guinea, Thailand, Vietnam, Cambodia (Yamada, 1979; Onraedt, 1981; Udar & Kumar, 1984a; Tan & Engel, 1986; Piippo, 1990; Singh, 1996; Zhu & So, 2001; Yamada & Iwatsuki, 2006; Singh & Nath, 2007; Lai & al., 2008; Dey & al., 2009).

Radula lindbergiana Gottsche ex Hartm., Handb. Skand. Fl. 9: 98. 1864; Udar & Dh. Kumar in Biol. Mem. 9: 76. 1984; Sushil K.Singh & D.K.Singh, Hepaticae and Anthocerotae of Great Himalayan National Park and its environs (HP), India 155. 2009.

Specimen examined: Corticolous. India: Eastern Himalaya, Manipur, Ukhrul district, Sirohi Hill, c.1900 m, 20.02.1978, J. Lal & B. D. Kar, s.n. (acc. no 1317); Tushen, 21.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1318); West Mountain, 24.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1319).

Distribution: India [Western Himalaya (Himachal Pradesh, Jammu & Kashmir, Uttarakhand), Eastern Himalaya (Manipur – present study, Sikkim, West Bengal), Western Ghat (Tamil Nadu)], Nepal, China, Korea, Iran, CIS, Macronesia, Europe, Africa, North America (Schuster, 1980; Udar & Kumar, 1984b; Piippo, 1990; Paton, 1999; Singh & Singh, 2009).

Radula tjiibodensis K.I.Goebel in Ann. Jard. Bot. Buitenzorg 7: 53. 1888; Yamada in J. Hattori Bot. Lab. 45: 294. 1979; Udar & Dh. Kumar in Geophytology 14: 168. 1984. *Radula flavescens* Steph., Sp. hepat. 4: 203. 1910. *Radula reineckeana* Steph., Sp. hepat. 4: 225. 1910. *Radula tayabensis* Steph., Sp. hepat. 6: 516. 1924.

Specimen examined: Foliicolous. India: Eastern Himalaya, Manipur, Ukhrul district, Tushen, 21.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1320).

Distribution: India [Eastern Himalaya (Arunachal Pradesh, Manipur – present study, Meghalaya, Sikkim, West Bengal)], Sri Lanka, China, Fiji, Indonesia, Malaysia, Thailand, Philippines, Samoa, Vietnam, New Caledonia, Papua New Guinea (Yamada, 1979; Onraedt, 1981; Udar & Kumar, 1984a; Tan & Engel, 1986; Zhu & So, 2001; Lal, 2003; Singh & al., 2008a; Lai & al., 2008).

PORELLACEAE

Porella campylophylla (Lehm. & Lindenb.) Trevis. in Mem. Reale. Ist. Lombardo Sci. Ser. 3, 4: 408. 1877; F. Shaheen & S.C. Srivast. in Geophytology 19: 34. 1989. *Jungermannia campylophylla* Lehm. & Lindenb. in Nov. Strip. pug. 6: 40. 1834. *Madotheca campylophylla* (Lehm. & Lindenb.) Gottsche, in Gottsche & al., Syn. hepat. 265. 1845. *Madotheca ptychantha* Mitt. in J. Proc. Linn. Soc., Bot. 5: 108. 1861. var. **campylophylla**

Specimen examined: Terricolous, corticolous. India: Eastern Himalaya, Manipur, West Mountain, 24.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1321, 1322, 1223, 1324, 1325, 1326).

Distribution: India [Western Himalaya (Himachal Pradesh, Uttarakhand), Eastern Himalaya (Arunachal Pradesh, Manipur – present study, Meghalaya, Sikkim, West Bengal), Western Ghat (Tamil Nadu)], Nepal, Bhutan, China, Thailand, Myanmar, Vietnam (Hattori, 1966; Shaheen & Srivastava, 1989; Piippo, 1990; Long & Grolle, 1990; Singh, 1996; Lai & al., 2008; Singh & Singh, 2009).

Porella campylophylla (Lehm. & Lindenb.) Trevis. var. **ligulifera** (Taylor) S. Hatt. in J. Hattori Bot. Lab. 32: 333. 1969; F. Shaheen & S.C. Srivast. in Geophytology 19: 36. 1989. *Madotheca ligulifera* Taylor in Lehm., Nov. strip. pug. 8: 10. 1844.

Specimen examined: Terricolous and corticolous. India: Eastern Himalaya, Manipur, Senapati district, Mao, c.1757 m, 14.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1327); Savatvakhong, 22.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1328); Ukhrul district, Sirohi Hill, c.1900 m, 25.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1329, 1330, 1331); Khangkhui forest, 26.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1332, 1333, 1334); Ukhrul district, Makuikhang forest, c.2400 m, 21.03.1984, J. P. Ghosh 58063.

Distribution: India [Western Himalaya (Uttarakhand), Eastern Himalaya (Manipur – present study, Meghalaya, Sikkim), Nepal, China, Thailand (Hattori, 1966; Shaheen & Srivastava, 1989; Piippo, 1990; Singh & Nath, 2007; Singh & al., 2008a; Lai & al., 2008).

Porella madagascariensis (Nees & Mont.) Trevis. in Mem. Reale. Ist. Lombardo Sci. Ser. 3, 4: 407. 1877. *Lejeunea madagascariensis* Nees & Mont., Ann. Sci. Nat. Ser. 2, 5: 6. 1836. *Madotheca nilgheriensis* Mont. in Ann. Sci. Nat. Bot. 17: 15. 1842.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, Senapati district, Mao, c.1757 m, 14.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1335).

Distribution: India [Western Himalaya (Jammu & Kashmir, Himachal Pradesh), Eastern Himalaya (Manipur – present study), Western Ghats (Tamil Nadu)], Sri Lanka, China, Africa (Mitten, 1861; Onraedt, 1981; Piippo, 1990; Singh & Singh, 2009).

Porella perrottetiana (Mont.) Trevis. in Mem. Reale. Ist. Lombardo Sci. Ser. 3, 4: 408. 1877; Udar & F. Shaheen in J. Indian Bot. Soc. 62: 319. 1983. *Madotheca perrottetiana* Mont. in Ann. Sci. Bot. Ser. 2, 17: 15. 1843.

Specimen examined: Terricolous and corticolous. India: Eastern Himalaya, Manipur, Khamelock Hill, 21.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1337, 1338); West Mountain, 24.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1339, 1340); Ukhrul district, Makuikhang forest, c.2400 m, 24.03.1984, J. P. Ghosh 58065.

Distribution: India [Western Himalaya (Uttarakhand), Eastern Himalaya (Manipur – present study, West Bengal), Western Ghats (Tamil Nadu)], Sri Lanka, Nepal, Bhutan, China, Myanmar, Japan, Philippines (Onraedt, 1981; Udar & Shaheen, 1983a; Tan & Engel, 1986; Long & Grolle, 1990; Piippo, 1990; Yamada & Iwatsuki, 2006).

Porella plumosa (Mitt.) Inoue in Bull. Natl. Sci. Mus. Tokyo 9: 385. 1966; Udar & F. Shaheen in Misc. Bryol. Lichenol. 9: 196. 1983. *Madotheca plumosa* Mitt. in J. Proc. Linn. Soc., Bot. 5: 108. 1861. var. **plumosa**

Specimen examined: Corticolous. India: Eastern Himalaya, Manipur, Ukhrul district, Sirohi Hill, c.1900 m, 25.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1341, 1523B).

Distribution: India [Western Himalaya (Himachal Pradesh, Uttarakhand), Eastern Himalaya (Arunachal Pradesh, Manipur – present study, Meghalaya), Western Ghats (Tamil Nadu)], Pakistan, Nepal, China, Myanmar, Philippines, Thailand, Vietnam (Udar & Shaheen, 1983b; Tan & Engel, 1986; Piippo, 1990; Singh, 1996; Lai & al., 2008; Singh & Singh, 2009).

JUBULACEAE

Frullania acutiloba Mitt. J. Proc. Linn. Soc., Bot. 5: 120. 1861; V. Nath & A. K. Asthana in J. Hattori. Bot. Lab. 85: 72. 1998.

Specimen examined: Corticolous. India: Eastern Himalaya, Manipur, West Mountain, 24.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1342, 1343).

Distribution: India [Eastern Himalaya (Manipur – present study, Meghalaya), Western Ghats (Tamil Nadu)], Sri Lanka, China, Indonesia (Hattori, 1973; Onraedt, 1981; Piippo, 1990; Nath & Asthana, 1998; Singh & al., 2008b).

Frullania arecae (Spreng.) Gottsche, Mex. Leverm. 236. 1863; Yuzawa in J. Hattori Bot. Lab. 70. 264. 1991. *Jungermannia arecae* Spreng. in Neue Entdeck. Pflanzenk. 2: 99. 1821. *Frullania wallichiana* Mitt. in J. Proc. Linn. Soc., Bot. 5: 118. 1861. var. **arecae**

Specimen examined: Corticolous. India: Eastern Himalaya, Manipur, Khangkhui forest, 26.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1344).

Distribution: India [Eastern Himalaya (Manipur – present study, Meghalaya, Sikkim, West Bengal), Western Ghats (Tamil Nadu)], Nepal, Bhutan, China, Thailand, Pacific Island, Australia, Africa, North America (Mitten, 1861; Chopra, 1943; Hattori, 1966; Hattori & Thaithong, 1978a; Piippo, 1990; Long & Grolle, 1990; Yuzawa, 1991; Grolle, 1995; Wigginton & Grolle, 1996; Singh & Nath, 2007; Singh & al., 2008a; Singh & al., 2008b; Verma & Srivastava, 2008; Lai & al., 2008).

Frullania ericoides (Nees) Mont. in Ann. Sci. Nat. Bot. (ser. 2) 12: 51. 1839; Sim-Sim in Cryptogamie. Bryol. 20: 128. 1999; A. P. Singh & al. in Taiwania 53: 62. 2008. *Jungermannia ericoides* Nees in Mastius Fl. Brasil. 1: 346. 1833. *Frullania rotundiloba* Steph., Sp. hepat. 4: 679. 1911. *Frullania squarrosa* (Reinw. & al.) Dumort., Recueil observ. Jungerm. 13. 1835.

Specimen examined: Corticolous. India: Eastern Himalaya, Manipur, Ukhrul district, Sirohi Hill, c.1900 m, 20.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1345, 1346, 1347).

Distribution. India [Western Himalaya (Uttarakhand), Eastern Himalaya (Assam, Manipur – present study, Meghalaya, Sikkim, West Bengal), Western Ghats (Kerala)], Nepal, Bhutan, Sri Lanka, China, Thailand, Korea, Japan, Pacific Island, Australia, Africa, (Mitten, 1861; Chopra, 1943; Hattori, 1971; Hattori & Thaithong, 1978a; Long, 1979; Onraedt, 1981; Long & Grolle, 1990; Piippo, 1990; Grolle, 1995; Wigginton & Grolle, 1996; Nair & al., 2005; McCarthy, 2006; Song & Yamada, 2006; Yamada & Iwatsuki, 2006; Singh & Nath, 2007; Singh & al., 2008a; Singh & al., 2008b; Verma & Srivastava, 2008; Lai & al., 2008).

Frullania muscicola Steph. in Hedwigia 33: 146; A. P. Singh & al. in Taiwania 53: 70. 2008; Sushil K. Singh & D. K. Singh, Hepaticae and Anthocerotae of Great Himalayan National Park and its environs (HP), India 212. 2009.

Specimen examined: Terricolous, and corticolous. India: Eastern Himalaya, Manipur, Senapati district, near Mao, c.1757 m, 13.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1348); 14.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1525); Tadubi forest, 13.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1349A); Ukhrul district, Ukhrul, 20.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1350, 1351); West Mountain, 24.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1352, 1353, 1354).

Distribution: India [Western Himalaya (Himachal Pradesh, Uttarakhand), Eastern Himalaya (Arunachal Pradesh, Assam, Manipur – present study, Meghalaya, Sikkim), Central India (Madhya Pradesh), Western Ghats (Tamil Nadu)], Nepal, China, Thailand, Korea, Japan, C.I.S (Hattori, 1966, 1975; Piippo, 1990; Singh, 1996; Nath & Asthana, 1998; Song & Yamada, 2006; Yamada & Iwatsuki, 2006; Singh & al., 2008b; Lai & al., 2008; Singh & Singh, 2009).

Frullania nepalensis (Spreng.) Lehm. & Lindenb., 4: 19. 1832; S.Hatt. in Hara, Flora of Eastern Himalaya 526. 1966; A.P.Singh & al. in Taiwan 53: 63. 2008. *Jungermannia nepalensis* Spreng. in Syst. Veget. 4: 324. 1827. *Frullania grevilleana* Taylor in Gottsche & al., Syn. hepat. 421. 1845. *Frullania laxipinnata* Steph., Sp. hepat. 4: 457. 1910.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, West Mountain, 24.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1355, 1356A, 1357A); Ukhrul district, Ukhrul, c.1850 m, 24.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1358A); Ukhrul district, Sirohi Hill, c.1900 m, 25.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1254C, 1359, 1360).

Distribution: India [Eastern Himalaya (Manipur – present study, Meghalaya, Sikkim, West Bengal)], Nepal, Bhutan, China, Thailand, Korea, Japan (Hattori & Thaithong, 1978a; Long, 1979; Long & Grolle, 1990; Piippo, 1990; Yuzawa & Koike, 1994; Yamada & Iwatsuki, 2006; Singh & Nath, 2007; Singh & al., 2008a; Singh & al., 2008b; Lai & al., 2008).

Frullania physantha Mitt. in J. Proc. Linn. Soc., Bot. 5: 121. 1861; V.Nath & Udar in Proc. Indian natn. Sci. Acad. B50 (2): 229. 1984; A.P.Singh & al. in Taiwan 53: 73. 2008.

Specimen examined: Corticolous. India: Eastern Himalaya, Manipur, Tadubi forest, 14.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1361); West Mountain, 24.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1362A); Keibul, 02.03.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1363).

Distribution: India [Eastern Himalaya (Arunachal Pradesh, Manipur – present study, Meghalaya, Sikkim, West Bengal)], Nepal, Bhutan, China, North Vietnam (Hattori & Thaithong, 1978a; Piippo, 1990; Yuzawa & Koike, 1994; Singh, 1996; Singh & Nath, 2007; Singh & al., 2008a, 2008b).

Frullania tamarisci (L.) Dumort., Recueil observ. Jungerm. 13. 1835; A.P.Singh & al. in Taiwan 53: 60. 2008. *Jungermannia tamarisci* L., Sp. pl. 2: 1134. 1753. subsp. **tamarisci**

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, Ukhrul district, Sirohi Hill, 20.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1364).

Distribution: India [Eastern Himalaya (Arunachal Pradesh, Manipur – present study, Meghalaya, West Bengal), Western Ghats (Kerala, Tamil Nadu)], China, Sri Lanka, Malaysia, Thailand, Korea, Japan, Europe, Africa (Hattori, 1966; Onraedt, 1981; Piippo, 1990; Schuster, 1992; Wigginton & Grolle, 1996; Nath & Asthana, 1998; Nair & al., 2005; Singh & al., 2008b; Lai & al., 2008; Dey & al., 2009).

Frullania tuyamae S.Hatt. & Thaithong in J. Jap. Bot. 53: 175. 1978; J.Lal in Bull. Bot. Surv. India 21: 81. 1979.

Ukhrul, 1876 m, J. Lal & B.D. Kar 97 (CAL) (fide Lal, loc.cit.).

Distribution: India [Eastern Himalaya (Manipur)], Laos (Hattori & Thaithong, 1978b; Lal, 1979a).

Jubula pennsylvanica (Steph.) A.Evans in Rhodora 7: 55. 1905; W.R.Guerke in Bryophyt. Biblioth. 17: 79. 1978; R.M.Schust., Hepat. & Anthocerot. of North America 5: 275. 1992. *Frullania pennsylvanica* Steph. in Hedwigia 22: 147. 1883. subsp. **pennsylvanica**

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, Ukhrul district, Sirohi Hill, c.1900 m, 25.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1461B); Hongava Hill, 27.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1300A).

Distribution: India [Eastern Himalaya (Manipur – present study, Sikkim)], North America (Guerke, 1978; Schuster, 1992; Dey & al., unpubl.).

LEJEUNEACEAE

Cheilolejeunea giraldiana (C.Massal.) Mizut. in J. Hattori Bot. Lab. 27: 141. 1964; S.Hatt. in Hara, Flora of Eastern Himalaya 529. 1966; G.Asthana & al. in Lindbergia 20: 139. 1995 "1996". *Euosmolejeunea giraldiana* C.Massal. in Mem. Accad. Agric. Verona 37: 34. 1897.

Specimen examined: Corticolous. India: Eastern Himalaya, Manipur, Khamelock Hill, 21.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1365).

Distribution: India [Eastern Himalaya (Manipur – present study, Meghalaya, Sikkim, West Bengal)], Nepal China, Philippines, Japan (Hattori, 1966; Mizutani, 1982; Tan & Engel, 1986; Asthana & al., 1995; Singh & Nath, 2007).

Cheilolejeunea trapezia (Nees) Kachroo & R.M.Schust. in J. Linn. Soc. London, Bot. 56: 509. 1961. *Jungermannia trapezia* Nees, Enum. Pl. Crypt. Jav.: 41. 1830. *Cheilolejeunea imbricata* (Nees) S.Hatt. in Misc. Bryol. Lichenol. 1: 1. 1957; Asthana & al. in Lindbergia 20: 137. 1995 "1996".

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, Ukhrul district, Liton, 20.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1366).

Distribution: India [Eastern Himalaya (Arunachal Pradesh, Manipur – present study, Meghalaya, Sikkim, West Bengal), Western Ghats (Karnataka, Kerala, Tamil Nadu)], Bhutan, Nepal, Sri Lanka, China, Thailand, Philippines, Indonesia, Japan, Korea, Samoa, New Guinea, Australia (Onraedt, 1981; Piippo, 1990; Long & Grolle, 1990; Asthana & al., 1995; Zhu & Long, 2003; McCarthy, 2006; Yamada & Iwatsuki, 2006; Singh & Nath, 2007; Singh & al., 2008a; Verma & Srivastava, 2008; Dey & al., 2009).

Cololejeunea haskarliana (Lehm. & Lindenb.) Schiffn., Consp. Hepat. Arch. Ind. 244. 1898; R.L.Zhu & M.L.So in Beih. Nova Hedwigia 121: 321. 2001; G.Asthana & S.C.Srivast. in Bryophyt. Biblioth. 60: 60. 2003. *Lejeunea haskarliana* Lehm. & Lindenb. in Lehm., Nov. strip. pug. 8: 26. 1844. *Lejeunea venusta* Sande Lac., Syn. Hep. Jav. 64. 1856. *Leptocolea hispidissima* Steph. in Leaf. Philipp. Bot. 6: 2287. 1914.

Specimen examined: Foliicolous. India: Eastern Himalaya, Manipur, Ukhrul district, Tushen, 21.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1367).

Distribution: India [Eastern Himalaya (Arunachal Pradesh, Manipur – present study), Western Ghats (Karnataka, Tamil Nadu)], Bhutan, Sri Lanka, China, Indonesia, Japan, Malaysia, Cambodia, New Caledonia, Philippines, Vietnam, Africa (Pandé & Misra, 1943; Onraedt, 1981; Tixier, 1985; Mizutani, 1986; Tan & Engel, 1986; Long & Grolle, 1990; Piippo, 1990; Grolle, 1995; Zhu, 1995; Zhu & So, 2001; Asthana & Srivastava, 2003; Yamada & Iwatsuki, 2006; Dey & al., 2009).

Cololejeunea lanciloba Steph. in Hedwigia 34: 250.1895. *Leptocolea lanciloba* (Steph.) A.Evans in Bull. Torrey Bot. Club 38: 268. 1911.

Specimen examined: Foliicolous. India: Eastern Himalaya, Manipur, Ukhrul district, Tushen, 21.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1368A, 1369A, 1370, 1371C, 1372, 1373, 1374, 1375, 1376, 1377, 1378, 1379); Ukhrul district, Sirohi Hill, c.1900 m, 25.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1380, 1381, 1382).

Distribution: India [Eastern Himalaya (Manipur – present study, Meghalaya), Andaman & Nicobar Islands (Nicobar)], Bangladesh, Sri Lanka, China, Indonesia, Japan, Malaysia, Cambodia, New Caledonia, Polynesia, Philippines, Thailand, Hawaii, Australia, Africa (Mizutani, 1961, 1975, 1984a; Onraedt, 1981; Tixier, 1985; Tan & Engel, 1986; Piippo, 1990; Zhu & So, 2001; Asthana & Srivastava, 2003; McCarthy, 2006; Yamada & Iwatsuki, 2006; Singh & Nath, 2007; Lai & al., 2008).

Cololejeunea latilobula (Herzog) Tixier in Bryophyt. Biblioth. 27: 156. 1985; G.Asthana & S.C.Srivast. in Bryophyt. Biblioth. 60: 36. 2003. *Leptocolea latilobula* Herzog in Handel-Mazzetti, Symb. Sin. 5: 54. 1930. *Leptocolea himalayensis* Pandé & Misra in Proc. Nat. Acad. Sci. 13: 28. 1943. *Cololejeunea himalayensis* (Pandé & Misra) R.M.Schust. in Beih. Nova Hedwigia 9: 177. 1963.

Specimen examined: Corticolous and foliicolous. India: Eastern Himalaya, Manipur, Senapati district, Tadubi forest, 13.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1349B); Ukhrul district, Tushen, 21.02.1978, J.

Lal & B. D. Kar, s.n. (acc. no. 1383A, 1384, 1385, 1386, 1387, 1388, 1389, 1390B, 1391B, 1392); Hongva forest, 27.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1526C).

Distribution: India [Eastern Himalaya (Arunachal Pradesh, Sikkim, West Bengal, Manipur, Meghalaya), Western Himalaya (Uttarakhand), Western Ghats (Karnataka, Kerala, Tamil Nadu), Central India (Madhya Pradesh)], China, Myanmar, Vietnam, Africa (Piippo, 1990; Grolle, 1995; Wigginton & Grolle, 1996; Zhu & So, 2001; Asthana & Srivastava, 2003; Singh & al., 2008a; Dey & al., 2009).

Cololejeunea longifolia (Mitt.) Benedix ex Mizut. in J. Hattori Bot. Lab. 26: 184. 1963; R.L.Zhu & M.L.So in Beih. Nova Hedwigia 121: 308. 2001; G.Asthana & S.C.Srivast. in Bryophyt. Biblioth. 60: 52. 2003. *Lejeunea longifolia* Mitt. in J. Proc. Linn. Soc., Bot. 5: 117. 1861. *Physocolea longifolia* (Mitt.) Steph., Sp. hepat. 5: 898. 1916. *Lejeunea diversifolia* Mitt. in J. Proc. Linn. Soc., Bot. 5: 118. 1861. *Physocolea diversifolia* (Mitt.) Steph., Sp. hepat. 5: 892. 1916.

Specimen examined: Foliicolous. India: Eastern Himalaya, Manipur, Ukhrul district, Tushen, 21.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1369B, 1393, 1394, 1371A, 1395, 1396, 1391C); Ukhrul district, Sirohi Hill, c.1900 m, 25.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1397B).

Distribution: India [Eastern Himalaya (Arunachal Pradesh, Manipur – present study, Sikkim, West Bengal), Andaman & Nicobar Islands (Andaman Islands)], Nepal, Bhutan, Bangladesh, Sri Lanka, China, Japan, Korea, Malaysia, New Guinea, Philippines, Thailand, New Caledonia (Tan & Engel, 1986; Piippo, 1990; Long & Grolle, 1990; Zhu & So, 2001; Asthana & Srivastava, 2003; Zhu & Long, 2003; Yamada & Iwatsuki, 2006; Lai & al., 2008; Dey & al., 2009).

Cololejeunea planissima (Mitt.) Abeyw. in Ceylon J. Sci., Bio. Sci. 2: 73. 1959; R.L.Zhu & M.L.So in Beih. Nova Hedwigia 121: 279. 2001; G.Asthana & S.C.Srivast. in Bryophyt. Biblioth. 60: 42. 2003. *Lejeunea planissima* Mitt. in J. Proc. Linn. Soc., Bot. 5: 117. 1861. *Physocolea trianguliloba* Steph., Sp. hepat. 5: 907. 1916.

Kanchipur, c.1000 m, A. Kumar & U.S. Awasthi 3593/79, 3594/79 (LWU) (fide Asthana & Srivastava, loc.cit.).

Distribution: India [Eastern Himalaya (Arunachal Pradesh, Assam, Manipur, Meghalaya), Western Ghats (Karnataka, Kerala, Tamil Nadu)], Bhutan, Sri Lanka, China, Thailand, Japan, Korea, Indonesia, Malaysia, Micronesia, Vietnam, Cambodia, Laos, Africa, (Onraedt, 1981; Mizutani, 1984a; Piippo, 1990; Zhu & So, 2001; Asthana & Srivastava, 2003; Zhu & Long, 2003; Yamada & Iwatsuki, 2006; Song & Yamada, 2006; Singh & Nath, 2007; Lai & al., 2008).

Cololejeunea pseudofloccosa (Horik.) Benedix in Feddes Repert. Beih. 134: 36. 1953; G.Asthana & S.C.Srivast. in Bryophyt. Biblioth. 60: 70. 2003. *Leptocolea pseudofloccosa* Horik. in J. Sci. Hiroshima Univ., Ser.B, Div. 2, Bot. 1: 87. 1932. *Taeniolejeunea pseudofloccosa* (Horik.) S.Hatt. in J. Jap. Bot. 17: 465. 1941.

Specimen examined: Foliicolous. India: Eastern Himalaya, Manipur, Ukhrul district, Tushen, 21.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1391A).

Distribution: India [Eastern Himalaya (Arunachal Pradesh, Manipur – present study, Meghalaya, Sikkim, West Bengal), Western Ghats (Tamil Nadu)], Bhutan, Nepal, Sri Lanka, China, Japan, Indonesia, Malaysia, Philippines, Vietnam, Cambodia, Laos, Australia (Onraedt, 1981; Mizutani, 1984b; Tan & Engel, 1986; Piippo, 1990; Zhu, 1995; Zhu & So, 2001; Asthana & Srivastava, 2003; McCarthy, 2006; Yamada & Iwatsuki, 2006; Singh & Nath, 2007).

Cololejeunea trichomanis (Gottsche) Steph. in Hedwigia 34: 252. 1895; G.Asthana & S.C.Srivast. in Bryophyt. Biblioth. 60: 54. 2003. *Lejeunea trichomanis* Gottsche in Abh. Naturw. Ver. Bremen 7: 362. 1882. *Physocolea trichomanis* (Gottsche) Steph., Sp. hepat. 5: 912. 1916. *Lejeunea goebelii* Gottsche in Goebel, Ann. Jard. Bot. Buitenzorg 7: 49. 1887. *Cololejeunea goebelii* (Gottsche ex Schiffn.) Schiffn. in Bot. Jahrb. Syst. 23: 581. 1897. *Cololejeunea pandei* Udar & G.Srivast. in J. Bryol. 12: 227. 1982.

Specimen examined: Foliicolous. India: Eastern Himalaya, Manipur, Ukhrul district, Tushen, 21.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1391C).

Distribution: India [Eastern Himalaya (Arunachal Pradesh, Assam, Manipur – present study, Sikkim, West Bengal), Western Ghats (Karnataka)], Nepal, China, Japan, Korea, Indonesia, Malaysia, Philippines, Vietnam, Thailand, Cambodia, Laos, Australia (Tan & Engel, 1986; Piippo, 1990; Zhu & So, 2001; Asthana & Srivastava, 2003; McCarthy, 2006; Yamada & Iwatsuki, 2006; Lai & al., 2008; Dey & al., 2009).

Cololejeunea udarii G.Asthana & S.C.Srivast. in Bryophyt. Biblioth. 60: 40. 2003.

Specimen examined: Foliicolous. India: Eastern Himalaya, Manipur, Ukhrul district, Tushen, 21.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1369C, 1398, 1399, 1400).

Distribution: India [Eastern Himalaya (Arunachal Pradesh, Assam, Manipur – present study), Western Ghats (Karnataka, Tamil Nadu)] (Asthana & Srivastava, 2003).

Drepanolejeunea erecta (Steph.) Mizut. in J. Hattori Bot. Lab. 40: 442. 1976; Udar & U.S.Awasthi in J. Hattori Bot. Lab. 53: 422. 1982; R.L.Zhu & M.L.So in Beih. Nova Hedwigia 121: 183. 2001. *Leptolejeunea erecta* Steph. in Bull. Soc. Roy. Bot. Belgique 38: 44. 1899. *Drepanolejeunea japonica* Horik. in J. Sci. Hiroshima Univ., Ser. B, Div. 2, Bot. 1: 202. 1933. *Drepanolejeunea monophthalma* (Herzog) Mizut. in J. Hattori Bot. Lab. 29: 291. 1966. *Strepsilejeunea monophthalma* Herzog in Handel-Mazzetti, Symb. Sin. 5: 47. 1930. *Harpalejeunea monophthalma* (Herzog) R.M.Schust. in Beih. Nova Hedwigia 9: 113. 1963. *Strepsilejeunea denticulata* Kamim., Contr. Fl. Hepat. Shikoku. 115. 1952.

Specimen examined: Corticolous and foliicolous. India: Eastern Himalaya, Manipur, Ukhrul district, Sirohi Hill, c.1900 m, 21.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1397C); Ukhrul district, Sirohi Hill, 25.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1401).

Distribution: India [Eastern Himalaya (Arunachal Pradesh, Assam, Manipur – present study, Meghalaya, Sikkim, West Bengal)], Bhutan, Nepal, China, Japan, Laos, Vietnam (Udar & Awasthi, 1982a; Long & Grolle, 1990; Piippo, 1990; Zhu & So, 2001; Zhu & Long, 2003; Yamada & Iwatsuki, 2006; Singh & Nath, 2007; Singh & al., 2008a; Dey & al., 2009).

Drepanolejeunea herzogii R.L.Zhu & M.L.So in Beih. Nova Hedwigia 121: 181. 2001. *Strepsilejeunea ocellata* Herzog in Memoranda Soc. Fauna Fl. Fenn. 26: 57. 1950.

Specimen examined: Foliicolous. India: Eastern Himalaya, Manipur, Ukhrul district, Tushen, 21.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1402, 1403A).

Distribution: India [Eastern Himalaya (Arunachal Pradesh, Manipur – present study, Sikkim, West Bengal)], Nepal, China (Herzog, 1950; Zhu & So, 2001; Zhu & Long, 2003; Dey & al., 2009).

Drepanolejeunea yunnanensis (P.C.Chen) Grolle & R.L.Zhu in Nova Hedwigia 70: 388. 2000. *Rhaphidolejeunea yunnanensis* P.C.Chen in Feddes Repert. 58: 44. 1955. *Leptolejeunea yunnanensis* (P.C.Chen) R.M.Schust. in Beih. Nova Hedwigia 9: 115. 1963.

Specimen examined: Foliicolous. India: Eastern Himalaya, Manipur, Ukhrul district, Tushen, 21.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1403B, 1404, 1405, 1406A).

Distribution: India [Eastern Himalaya (Arunachal Pradesh, Manipur – present study, West Bengal), Western Ghats (Karnataka)], China, Japan (Udar & Awasthi, 1984; Singh, 1996; Grolle & Zhu, 2000; Zhu & So, 2001).

Lejeunea alata Gottsche in Gottsche, Lindenb. & Nees, Syn. hepat. 406. 1845; R.L.Zhu & M.L.So in Beih. Nova Hedwigia 121: 137. 2001; M.Dey & D.K.Singh in Geophytology 37: 43. 2008.

Specimen examined: Corticolous and Terricolous. India: Eastern Himalaya, Manipur, Tadubi forest, 14.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1407A); West Mountain, 24.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1408).

Distribution: India [Eastern Himalaya (Arunachal Pradesh, Manipur – present study, Sikkim, West Bengal)], China, Indonesia, Malaysia, Papua New Guinea, Polynesia, Samoa, Vietnam, Africa (Mizutani, 1970; Pócs & al., 1994; Grolle, 1995; Wigginton & Grolle, 1996; Zhu & So, 2001; Dey & Singh, 2008; Dey & al., 2009).

Lejeunea anisophylla Mont. in Ann. Sci. Nat., Bot., Sér. 2. 19: 263. 1843; R.L.Zhu & M.L.So in Beih. Nova Hedwigia 121: 156. 2001. *Lejeunea boninensis* Horik. in J. Sci. Hiroshima Univ., Ser. B, Div. 2, Bot. 1: 24. 1931. *Lejeunea borneensis* Steph., Sp. hepat. 5: 769. 1915. *Microlejeunea catanduana* Steph. in Hedwigia 35: 113. 1896. *Rectolejeunea obliqua* Herzog in J. Hattori Bot. Lab. 14: 49. 1955.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, Khamelock Hill, 18.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1409).

Distribution: India [Eastern Himalaya (Arunachal Pradesh, Manipur – present study, Meghalaya, Sikkim)], Sri Lanka, China, Japan, Indonesia, Malaysia, Thailand, Micronesia, Hawaii, Papua New Guinea, New Caledonia, Philippines, Tahiti, Tonga, Samoa, Vietnam, Australia (Onraedt, 1981; Tan & Engel, 1986; Piippo, 1990; Yamada & Iwatsuki, 2006; Zhu & So, 2001; Singh & Nath, 2007; Lai & al., 2008; Dey & al., 2009).

Lejeunea flava (Sw.) Nees, Naturgesch. Eur. Leberm. 3: 277. 1838; R.L.Zhu & M.L.So in Beih. Nova Hedwigia 121: 143. 2001; Sushil K.Singh & D.K.Singh in Geophytology 32: 115. 2004. *Jungermannia flava* Sw., Prodr. 144. 1788. *Taxilejeunea crassiretis* Herzog in Handel-Mazetti, Symb. Sin. 5: 51. 1930.

Specimen examined: Corticolous and foliicolous. India: Eastern Himalaya, Manipur, Ukhrul district, Tushen, 21.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1369D, 1383B, 1390A); Hongva forest, 27.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1526B).

Distribution: India [Eastern Himalaya (Arunachal Pradesh, Assam, Manipur – present study, Meghalaya, Sikkim, West Bengal), Western Himalaya (Himachal Pradesh), Western Ghats (Karnataka, Tamil Nadu)], Nepal, Bhutan, Sri Lanka, China, Indonesia, Thailand, Philippines, Japan, Korea, New Zealand, Jamaica, North & South America, Europe, Africa, Australia (Mizutani, 1971; Schuster, 1980; Onraedt, 1981; Tan & Engel, 1986; Piippo, 1990; Long & Grolle, 1990; Grolle, 1995; Wigginton & Grolle, 1996; Singh & Singh, 2004; McCarthy, 2006; Yamada & Iwatsuki, 2006; Song & Yamada, 2006; Singh & Nath, 2007; Verma & Srivastava, 2008; Singh & al., 2008a; Lai & al., 2008; Dey & al., 2009).

Lejeunea neelgherriana Gottsche in Gottsche & al., Syn. hepat. 354. 1845; R.L.Zhu & M.L.So in Ann. Bot. Fenn. 37: 149. 2000.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, Ukhrul district, Sirohi Hill, 25.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1410, 1523C).

Distribution: India [Eastern Himalaya (Manipur – present study, Sikkim, West Bengal), Western Ghats (Tamil nadu)], Nepal, Bhutan, Sri Lanka, China, Japan, Korea (Yamada & Iwatsuki, 2006; Zhu & So, 2000).

Lejeunea obscura Mitt. in J. Proc. Linn. Soc., Bot. 5: 112. 1861; R.L.Zhu & M.L.So in Beih. Nova Hedwigia 121: 139. 2001. *Hygrolejeunea obscura* (Mitt.) Steph., Sp. hepat. 5: 565. 1914. *Taxilejeunea obscura* (Mitt.) Eifrig in Ann. Bryol. 9: 93. 1937 “1936”.

Specimen examined: Terricolous, corticolous and foliicolous. India: Eastern Himalaya, Manipur, on way to Kangpoki forest, 15.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1411); Waka forest, 17.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1371B, 1412, 1413); Ukhrul district, Tushen, 21.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1371B); West Mountain, 24.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1414, 1415); Hongava forest, 27.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1416); Churachandpur district, Churachandpur, c.831 m, 01.03.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1417).

Distribution: India [Eastern Himalaya (Arunachal Pradesh, Manipur – present study, Sikkim, West Bengal)], Nepal, Bhutan, Sri Lanka, China, Indonesia (Mitten, 1861; Onraedt, 1981; Zhu & So, 2001; Zhu & Long, 2003; Singh & al., 2008a; Dey & al., 2009).

Lejeunea princeps (Steph.) Mizut. in J. Hattori Bot. Lab. 34: 454. 1971. *Hygrolejeunea princeps* Steph., Sp. hepat. 5: 568. 1914. *Lejeunea flexuosa* Mitt. in J. Proc. Linn. Soc., Bot. 5: 114. 1861.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, West Mountain, 24.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1418); Khangkui forest, 26.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1419).

Distribution: India [Eastern Himalaya (Assam, Manipur – present study, Sikkim, West Bengal)], Nepal (Mitten, 1861; Mizutani, 1963, 1971; Singh & Nath, 2007; Singh & al., 2008a).

Lejeunea punctiformis Taylor in London J. Bot. 5: 398. 1846; R.L.Zhu & M.L.So in Beih. Nova Hedwigia 121: 128. 2001. *Microlejeunea punctiformis* (Taylor) Steph. in Hedwigia 29: 90. 1890.

Specimen examined: Terricolous and corticolous. India: Eastern Himalaya, Manipur, Waka forest, 17.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1420, 1421); Khamelock Hill, 18.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1422).

Distribution: India [Eastern Himalaya (Arunachal Pradesh, Manipur – present study, Meghalaya, Sikkim, West Bengal), Western Ghats (Tamil Nadu)], Nepal, Bhutan, Sri Lanka, China, Japan, Thailand, Vietnam, Australia (Mizutani, 1961; Long & Grolle, 1990; Zhu & So, 2001; Zhu & Long, 2003; McCarthy, 2006; Singh & Nath, 2007; Verma & Srivastava, 2008; Singh & al., 2008a; Lai & al., 2008; Dey & al., 2009).

Lejeunea tuberculosa Steph., Sp. hepat. 5: 790. 1915; Mizut. in J. Hattori Bot. Lab. 34: 451. 1971; R.L.Zhu & M.L.So in Beih. Nova Hedwigia 121: 152. 2001.

Specimen examined: Terricolous, corticolous and foliicolous. India: Eastern Himalaya, Manipur, Senapati district, near Mao, c.1757 m, 13.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1423), Tadubi forest, 14.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1424); Liton, 19.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1425, 1426); Ukhrul district, Tushen, 21.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1368B); West Mountain, 24.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1427).

Distribution: India [Eastern Himalaya (Arunachal Pradesh, Assam, Manipur – present study, Meghalaya, Sikkim, West Bengal), Western Himalaya (Uttarakhand), Western Ghats (Kerala, Tamil Nadu)], Nepal, Bhutan, China, Indonesia, Philippines, Thailand, Africa (Mizutani, 1971; Tan & Engel, 1986; Long & Grolle, 1990; So & Zhu, 1998; Zhu & So, 1999, 2001; Nair & al., 2005; Singh & Nath, 2007; Verma & Srivastava, 2008; Singh & al., 2008a; Lai & al., 2008; Dey & al., 2009).

Leptolejeunea balansae Steph. in Hedwigia 35: 105. 1896; U.S. Awasthi in J. Indian bot. Soc. 65: 119. 1986; R.L. Zhu & M.L. So in Beih. Nova Hedwigia 121: 209. 2001.

Specimen examined: Foliicolous. India: Eastern Himalaya, Manipur, Ukhrul district, Tushen, 21.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1406B).

Distribution: India [Eastern Himalaya (Arunachal Pradesh, Manipur – present study, Sikkim, West Bengal), Western Ghats (Tamil Nadu), Andaman & Nicobar Islands (Andaman Islands)], Cambodia, China, Indonesia, Laos, Malaysia, Thailand, Vietnam (Awasthi, 1986; Piippo, 1990; Zhu & So, 2001; Daniels & Daniel, 2004; Singh & al., 2008a; Lai & al., 2008; Dey & al., 2009).

Leptolejeunea elliptica (Lehm. & Lindenb.) Schiffn. in Engler & Prantl, Nat. Pflanzenfam. 1(3): 126. 1893; R.L. Zhu & M.L. So in Beih. Nova Hedwigia 121: 209. 2001. *Jungermannia elliptica* Lehm. & Lindenb., Nov. strip. pug. 5: 13. 1833. *Leptolejeunea subacuta* Steph. ex A. Evans in Proc. Wash. Acad. Arts Sci. 8: 149. 1906.

Specimen examined: Foliicolous. India: Eastern Himalaya, Manipur, Ukhrul district, Tushen, 21.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1428).

Distribution: India [Eastern Himalaya (Arunachal Pradesh, Assam, Manipur – present study, Meghalaya, Sikkim, West Bengal), Western Ghats (Karnataka, Tamil Nadu), Andaman & Nicobar Islands (Andaman Islands)], Nepal, Bhutan, Sri Lanka, China, Japan, Indonesia, Philippines, Thailand, Molucca, Australia, Africa, North America (Onraedt, 1981; Awasthi, 1986; Tan & Engel, 1986; Piippo, 1990; Long & Grolle, 1990; Grolle, 1995; Singh, 1996; Zhu & So, 2001; Lal, 2003; Yamada & Iwatsuki, 2006; McCarthy, 2006; Singh & al., 2008a; Lai & al., 2008; Dey & al., 2009).

Lopholejeunea nigricans (Lindenb.) Schiffn. in Consp. Hepat. Arch. Ind. 293. 1898; R.L.Zhu & Gradst. in Syst. Bot. Monog. 74: 44. 2005. *Lejeunea nigricans* Lindenb. in Gottsche & al., Syn. hepat. 316. 1845. *Lopholejeunea javanica* (Nees) Schiffn. in Engler & Prantl, Nat. Pflanzenfam. 1(3): 129. 1893. *Lopholejeunea abortiva* (Mitt.) Steph., Sp. hepat. 5: 70. 1912. *Lopholejeunea sikkimensis* Steph., Sp. hepat. 5: 87. 1912. *Lopholejeunea abortiva* var. *doliiformis* U.S.Awasthi & al. in Geophytology

29: 41. 2000 ("1999"). *Lopholejeunea kashyapii* U.S.Awasthi & al. in Geophytology 29: 48. 2000 ("1999"). *Lopholejeunea sikkimensis* var. *dentata* U.S.Awasthi & al. in Geophytology 29: 56. 2000 ("1999").

Specimen examined: Corticolous. India: Eastern Himalaya, Manipur, West Mountain, 24.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1429).

Distribution: India [Wester Himalaya (Uttarakhand), Eastern Himalaya (Assam, Manipur, Meghalaya, Sikkim, West Bengal), Central india (Madhya Pradesh), Western Ghats (Karnataka, Kerala, Tamil Nadu)], Bangladesh, Bhutan, Nepal, China, Japan, Indonesia, Malaysia, Myanmar, Philippines, Papua New Guinea, Thailand, Vietnam, Yemen, Cambodia, Fiji, New Caledonia, Samoa, Tahiti, Africa, North, Central & South America, Australia (Tan & Engel, 1986; Long & Grolle, 1990; Piippo, 1990; Awasthi & al. 2000; Zhu & Gradstein, 2005; Yamada & Iwatsuki, 2006; McCarthy, 2006; Singh & al., 2008a; Lai & al., 2008).

Mastigolejeunea auriculata (Wilson) Schiffn. in Engler & Prantl, Nat. Pflanzenfam. 1(3): 129. 1895. *Jungermannia auriculata* Wilson in Drumm., Musci Amer. Exsic. no. 170. 1841. *Mastigolejeunea humilis* (Gottsche) Schiffn. in Engler & Prantl, Nat. Pflanzenfam. 1(3): 129. 1895.

Specimen examined: Corticolous. India: Eastern Himalaya, Manipur, Ukhrul district, Liton, 20.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1430); Ukhrul district, Tushen, 21.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1431B, 1432B).

Distribution: India [Eastern Himalaya (Manipur – present study, Meghalaya), Western Ghats (Kerala), Andaman & Nicobar Islands (Andaman Islands)], Nepal, Bhutan, Sri Lanka, Indonesia, Philippines, Thailand, Japan, Australia (Onraedt, 1981; Awasthi & Udar, 1984; Tan & Engel, 1986; Piippo, 1990; Long & Grolle, 1990; Joshi, 2001; Yamada & Iwatsuki, 2006; McCarthy, 2006; Singh & Nath, 2007; Lai & al., 2008).

Ptychanthus striatus (Lehm. & Lindenb.) Nees in Naturgesch. eur. Leberm. 3: 212. 1838; U.S.Awasthi & S.C.Srivast. in Geophytology 17: 12. 1987. *Jungermannia striata* Lehm. & Lindenb. in Lehm., Nov. stirp. pug. 4: 16. 1832. *Ptychanthus argutus* Steph., Sp. hepat. 4: 742. 1912. *Ptychanthus effusus* Steph., Sp. hepat. 4: 746. 1912. *Ptychanthus perrotteti* Steph., Sp. hepat. 4: 750. 1912. *Ptychanthus pyriformis* Steph., Sp. hepat. 4: 751. 1912. *Ptycholejeunea pyriformis* Steph. in Hedwigia 35: 122. 1896. *Brachiolejeunea andamana* Steph., Sp. hepat. 5: 130. 1912.

Specimen examined: Terricolous and corticolous. India: Eastern Himalaya, Manipur, Senapati district, near Mao, c.1757 m, 13.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1433, 1434); Mao, c.1757 m, 14.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1435, 1449, 1450); Ukhrul district, Liton, 19.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1264B); Ukhrul district, Sirohi Hill, c.1900 m, 20.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1442, 1443); Ukhrul district, Tushen, 21.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1440B, 1441, 1444, 1445, 1446, 1447); West Mountain, 24.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1356B, 1357B, 1358B, 1447, 1448); Khangkhui forest, 26.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1437); Hongva forest, 27.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1438, 1439); Tamenglong district, K.T. Road, 09.03.1984, J.P. Ghosh 58036; Ukhrul, 20.03.1984, J.P. Ghosh 58061.

Distribution: India [Eastern Himalaya (Arunachal Pradesh, Manipur – present study, Meghalaya, Sikkim, West Bengal), Western Himalaya (Himachal Pradesh, Uttarakhand), Central India (Madhya Pradesh), Western Ghats (Maharashtra, Karnataka, Kerala, Tamil Nadu), Andaman & Nicobar Islands], Bhutan, Nepal, Sri Lanka, China, Myanmar, Philippines, Indonesia, Japan, Malaysia, Thailand, Samoa, New Guinea, New Zealand, Australia, Africa (Onraedt, 1981; Tan & Engel, 1986; Awasthi & Srivastava, 1987; Piippo, 1990; Long & Grolle, 1990; Grolle, 1995; Wigginton & Grolle, 1996; Singh, 1996; Zhu & Long, 2003; Yamada & Iwatsuki, 2006; McCarthy, 2006; Singh & Singh, 2007b; Singh & Nath, 2007; Verma & Srivastava, 2008; Singh & al., 2008a; Lai & al., 2008).

Spruceanthus semirepandus (Nees) Verd. in Ann. Bryol. Suppl. 4: 153. 1934; Udar & U.S.Awasthi in J. Indian Bot. Soc. 61: 184. 1982. *Jungermannia semirepanda* Nees, Hepat. Jav. 39. 1830.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, West Mountain, 24.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1451).

Distribution: India [Eastern Himalaya (Arunachal Pradesh, Manipur – present study, Meghalaya, Sikkim, West Bengal), Western Himalaya (Himachal Pradesh, Uttarakhand), Central India (Madhya Pradesh), Western Ghats (Kerala, Tamil Nadu), Sri Lanka, Nepal, Bhutan, China, Philippines, Indonesia, Thailand, Japan, Australia (Chopra, 1943; Hattori, 1966; Onraedt, 1981; Udar & Awasthi, 1982b; Onraedt, 1985; Tan & Engel, 1986; Piippo, 1990; Long & Grolle, 1990; Singh, 1996; Yamada & Iwatsuki, 2006; McCarthy, 2006; Singh & Nath, 2007; Singh & al., 2008a; Lai & al., 2008).

Trocholejeunea infusata (Mitt.) Verd. in Ann. Bryol. Suppl. 4: 190. 1934; S.Hatt. in Hara, Flora of Eastern Himalaya 533. 1966. *Lejeunea infusata* Mitt. in J. Proc. Linn. Soc. Bot. 5: 111. 1861.

Specimen examined: Terricolous and Corticolous. India: Eastern Himalaya, Manipur, Senapati district, Mao, c.1757 m, 14.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1452); West Mountain, 24.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1453).

Distribution: India [Eastern Himalaya (Manipur – present study, Meghalaya, Sikkim, West Bengal), Western Himalaya (Himachal Pradesh)], Sri Lanka, Nepal, Bhutan, China, Myanmar, Philippines, Thailand (Mitten, 1861; Hattori, 1966; Awasthi & Srivastava, 1988; Tan & Engel, 1986; Long & Grolle, 1990; Piippo, 1990; Singh & Singh, 2007b; Singh & al., 2008a; Lai & al., 2008).

Trocholejeunea sandvicensis (Gottsche) Mizut. in Misc. Bryol. Lichenol. 2: 169. 1962; U.S.Awasthi & S.C.Srivast. in Proc. Indian Acad. Sci. (Plant Sci.) 98: 7. 1988; Mizut. in J. Hattori Bot. Lab. 66: 275. 1989. *Phragmicoma sandvicensis* Gottsche in Ann. Sci. Nat., Bot., Ser. 4, 8: 344. 1857. *Brachiolejeunea sandvicensis* (Gottsche) A.Evans in Trans. Connecticut Acad. Arts 10: 419. 1900. *Lejeunea sandvicensis* (Gottsche) A.Evans in Trans. Connecticut Acad. Arts 8: 253. 1892. *Mastigolejeunea sandvicensis* (Gottsche) Steph. in Bull. Herb. Boissier 5: 842. 1897.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, Tadubi forest, 14.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1407B).

Distribution: India [Eastern Himalaya (Arunachal Pradesh, Manipur – present study, Sikkim), Western Himalaya (Himachal Pradesh, Uttarakhand), Western Ghats (Tamil Nadu)], Bhutan, Nepal, Sri Lanka, Pakistan, China, Hawaii, Thailand, Vietnam, Korea, Japan, Malaysia (Onraedt, 1981; Awasthi & Srivastava, 1988; Mizutani, 1989; Piippo, 1990; Long & Grolle, 1990; Zhu & So, 2001; Zhu & Long, 2003; Yamada & Iwatsuki, 2006; Song & Yamada, 2006; Singh & al., 2008a; Lai & al., 2008; Singh & Singh, 2009; Dey & al., 2009).

Tuzibeanthus chinensis (Steph.) Mizut. in J. Hattori Bot. Lab. 24: 151. 1961; U.S.Awasthi & S.C.Srivast. in Geophytology 17: 17. 1987. *Ptychanthus chinensis* Steph., Sp. hepat. 4: 744. 1912.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, Churachandpur district, Churachandpur, c.831 m, 01.03.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1454).

Distribution: India [Western Himalaya (Himachal Pradesh, Uttarakhand), Eastern Himalaya (Manipur – present study), Bhutan, China, Myanmar, Thailand, Japan (Awasthi & Srivastava, 1987; Piippo, 1990; Long & Grolle, 1990; Yamada & Iwatsuki, 2006; Lai & al., 2008; Singh & Singh, 2009).

PELLIACEAE

Pellia epiphylla (L.) Corda in Opiz (ed.), Beitr. Zur Naturg. 12. 654. 1829; R.S.Chopra in J. Indian Bot. Soc. 22: 241. 1943. *Jungermannia epiphylla* L., Sp. pl. 2: 1135. 1753.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, Ukhrul district, Sirohi Hill, c.1900 m, 20.02.1978, J. Lal & B. D. Kar, s.n. (acc. no 1455).

Distribution: India [Western Himalaya (Himachal Pradesh), Eastern Himalaya (Arunachal Pradesh, Manipur – present study, Meghalaya, Sikkim, West Bengal)], Bhutan, China, Japan, North America, Macronesia, U.S.S.R., Europe (Kashyap, 1932; Chopra, 1943; Long & Grolle, 1990; Piippo, 1990; Schuster, 1992; Singh, 1996; Yamada & Iwatsuki, 2006; Singh & Nath, 2007; Singh & al., 2008a).

ANEURACEAE

Aneura maxima (Schiffn.) Steph., Spec. hepat. 1: 270. 1899. *Riccardia maxima* Schiffn. in Kaiserl. Akad. Wiss-Wien. Math.-Naturwiss Kl. Denkschr. 67: 178. 1898. *Aneura pellioides* (Horik.) Inoue in J.

Hattori Bot Lab. 25: 209. 1962. *Riccardia pellioides* Horik. in Bot. Mag., Tokyo 51: 429. 1937.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, West Mountain, 24.02.1978, J. Lal & B. D. Kar, s.n. (acc. no 1455, 1456).

Distribution: India [Eastern Himalaya (Manipur – present study, Sikkim, West Bengal), Western Ghats (Tamil Nadu)], China, Japan, Australia (Srivastava & Udar, 1976; Piippo, 1990; McCarthy, 2006; Yamada & Iwatsuki, 2006).

Riccardia levieri Schiffn. in Oesterr. Bot. Z. 49: 130. 1899; S.C.Srivast. & Udar in Biol. Mem. 1: 132. 1976.

Specimen examined: Terricolous, and corticolous. India: Eastern Himalaya, Manipur, 1881 – 1882, G. Watt 7112; Senapati district, near Mao, c.1757 m, 13.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1458).

Distribution: India [Western Himalaya (Himachal Pradesh, Uttarakhand), Eastern Himalaya (Manipur – present study, West Bengal), Western Ghats (Karnataka, Tamil Nadu), Central India (Madhya Pradesh)], Bhutan (Srivastava & Udar, 1976; Singh & Singh, 2009).

Riccardia sikkimensis (Steph.) Pandé & K.P.Srivast. in J. Indian Bot. Soc. 37: 417. 1958; S.C.Srivast. & Udar in Biol. Mem. 1: 135. 1976. *Aneura sikkimensis* Steph., Sp. hepat. 6: 42. 1917.

Specimen examined: Terricolous, and corticolous. India: Eastern Himalaya, Manipur, Senapati district, near Mao, c.1757 m, 13.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1459).

Distribution: India [Western Himalaya, Eastern Himalaya (Arunachal Pradesh, Manipur – present study, Meghalaya, Sikkim, West Bengal)] (Srivastava & Udar, 1976; Singh, 1996; Singh & Nath, 2007; Singh & al., 2008a).

Riccardia tenuicostata Schiffn. in Kaiserl. Akad. Wiss. Wien, Math.- Naturwiss Kl., Denkschr. 67: 166. 1898; S.C.Srivast. & Udar in Biol. Mem. 1: 128. 1976.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, Ukhrul district, Sirohi Hill, 25.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1460); Savatvakhong, 22.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1269B).

Distribution: India [Western Himalaya (Uttarakhand), Eastern Himalaya (Arunachal Pradesh, Manipur – present study, Meghalaya, Sikkim, West Bengal), Western Ghats (Tamil Nadu)], Indonesia, Malaysia (Srivastava & Udar, 1976; Srivastava, 1978; Singh, 1996; Singh & Nath, 2007; Singh & al., 2008a).

METZGERIACEAE

Apometzgeria pubescens (Schrack) Kuwah. in Rev. Bryol. Lichenol. 34: 212. 1966; S.C.Srivast. & Udar in New Botanist, Int. Quart. J. Pl. Sci. Res. 2: 5. 1975. *Jungermannia pubescens* Schrank, Prim. Fl. Schles 231. 1792. var. ***pubescens***.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, Ukhrul district, Sirohi Hill, 25.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1461A, 1523A); Hongva Hill, 27.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1462).

Distribution: India [Western Himalaya (Himachal Pradesh, Jammu & Kashmir, Uttarakhand) Eastern Himalaya (Manipur – present study, Sikkim, West Bengal)], Nepal, Bhutan, China, Thailand, Japan, Korea, Europe, North and South America (Kashyap, 1929, 1932; Kuwahara, 1966; Srivastava & Udar, 1975; Long, 1979; Long & Grolle, 1990; Piippo, 1990; Song & Yamada, 2006; Yamada & Iwatsuki, 2006; Singh & al., 2008a; Lai & al., 2008).

Metzgeria conjugata Lindb. in Acta Soc. Sci. Fenn. 10: 495. 1875; D.Singh & D.K.Singh in Geophytology 37: 47. 2008.

Specimen examined: Corticolous. India: Eastern Himalaya, Manipur, Senapati district, Mao, c.1757 m, 14.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1463); Ukhrul district, Tushen, 21.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1432A, 1440A); Hongva forest, 27.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1526A).

Distribution: India [Western Himalaya (Jammu & Kashmir), Eastern Himalaya (Arunachal Pradesh, Manipur – present study, Sikkim)], China, Europe, Australia, Africa, North and South America (Piippo, 1990;

Schuster, 1992; Grolle, 1995; Paton, 1999; McCarthy, 2006; Singh & al., 2007; Singh & Singh, 2008; Dey & al., 2009).

Metzgeria furcata (L.) Dumort., Recueil observ. Jungerm.: 26. 1835. *Jungermannia furcata* L., Sp. pl. 1136. 1753. *Metzgeria crispula* Herzog in Ann. Bryol. 12: 72. 1939. *Metzgeria decipiens* (C.Massal.) Schiffn. in Engler, Forschungr. Gazelle 4 (4), Bot. 43. '1889' 1890. *M. furcata* var. *decipiens* C.Massal. in Nuovo Giorn. Bot. Ital. 17: 256. 1885. var. **furcata**.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, Ukhrul district, Hongva forest, 27.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1522).

Distribution: India [Eastern Himalaya (Arunachal Pradesh, Manipur – present study, Assam, Sikkim, West Bengal), Western Himalaya (Uttarakhand), Western Ghats (Tamil Nadu)], Nepal, Bhutan, Sri Lanka, China, Japan, Korea, Philippines, Thailand, Indonesia, Hawaii, New Guinea, New Caledonia, Europe, Africa, North and South America, Australia, New Zealand (Kuwahara, 1966, 1978, 1986; Srivastava & Udar, 1975; Onraedt, 1981; Tan & Engel, 1986; Piippo, 1990; Long & Grolle, 1990; Schuster, 1992; Grolle, 1995; So, 2003; McCarthy, 2006; Yamada & Iwatsuki, 2006; Song & Yamada, 2006; Singh & al., 2007; Verma & Srivastava, 2008; Lai & al., 2008; Dey & al., 2009).

Note: Lal (1979b, 2003) reported *Metzgeria nilgiriensis* Udar & S.C.Srivast. from Manipur. However, examination of the specimens deposited in CAL revealed them to belong to *Metzgeria furcata*.

Metzgeria leptoneura Spruce in Trans. & Proc. Bot. Soc. Edinburgh. 15: 555. 1885; M.L.So in J. Hattori Bot. Lab. 94: 176. 2003. *Metzgeria hamata* Lindb. in Acta Soc. Founa Fl. Fenn. 1: 25. 1877; S.C.Srivast. & Udar in New Botanist, Int. Quart. J. Pl. Sci. Res. 2: 38. 1975.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, Senapati district, Mao, c.1757 m, 14.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1464); Ukhrul district, Sirohi Hill, c.1900 m, 25.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1521A).

Distribution: India [Western Himalaya (Himachal Pradesh, Uttarakhand), Eastern Himalaya (Manipur – present study, Meghalaya, Sikkim, West Bengal)], Nepal, Bhutan, Sri Lanka, China, Indonesia, Korea, Japan, Malaysia, Philippines, Thailand, Australia, Africa (Chopra, 1943; Hattori, 1966; Srivastava & Udar, 1975; Long, 1979; Tan & Engel, 1986; Long & Grolle, 1990; Piippo, 1990; Grolle, 1995; Wigginton & Grolle, 1996; So, 2003; McCarthy, 2006; Song & Yamada, 2006; Yamada & Iwatsuki, 2006; Singh & al., 2008a; Lai & al., 2008).

Metzgeria lindbergii Schiffn. in Denkschr. Kaiserl. Akad. Wiss., Math.-Naturwiss. Kl. 67: 182. 1898; M.L.So in J. Hattori Bot. Lab. 94: 176. 2003. *Metzgeria conjugata* Lindb. var. *japonica* S.Hatt in J. Hattori Bot. Lab. 15: 80. 1955. *Metzgeria conjugata* Lindb. subsp. *japonica* (S.Hatt.) Kuwah. in J. Hattori Bot. Lab. 20: 135. 1958.

Specimen examined: Corticolous. India: Eastern Himalaya, Manipur, Senapati district, Mao, c.1757 m, 14.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1465).

Distribution: India [Western Himalaya (Himachal Pradesh, Uttarakhand), Eastern Himalaya (Assam, Manipur–present study, Sikkim, West Bengal)], Nepal, Bhutan, Sri Lanka, China, Japan, Korea, Indonesia, Malaysia, Thailand, Philippines, Australia (Srivastava & Udar, 1975; Onraedt, 1981; Tan & Engel, 1986; Piippo, 1990; Long & Grolle, 1990; So, 2003; McCarthy, 2006; Yamada & Iwatsuki, 2006; Song & Yamada, 2006; Singh & al., 2007; Singh & al., 2008a; Lai & al., 2008).

TARGIONIACEAE

Targionia hypophylla L., Sp. pl. 2: 1136. 1753; Udar & A.Gupta in Geophytology 11: 83. 1981.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, Ukhrul district, Sirohi Hill, 25.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1466).

Distribution: India [Western Himalaya (Himachal Pradesh, Uttarakhand), Eastern Himalaya (Arunachal Pradesh, Manipur – present study, Meghalaya, Sikkim, West Bengal), Central India (Madhya Pradesh), Punjab & West Rajasthan (Rajasthan)], Nepal, Bhutan, China, Japan, Thailand, Australia, North & South America

(Kashyap, 1929; Chopra, 1943; Hattori, 1966; Long & Grolle, 1990; Piippo, 1990; Schuster, 1992; Singh, 1996; Mearns, 2006; Yamada & Iwatsuki, 2006; Asthana & Nath, 2007; Singh & al., 2008a; Lai & al., 2008).

CONOCEPHALACEAE

Conocephalum conicum (L.) Dumort., Comment. bot. 115. 1822; Sushil K. Singh & D.K. Singh, Hepaticae and Anthocerotae of Great Himalayan National Park and its environs (HP), India 313. 2009. *Marchantia conica* L., Sp. pl. 2: 1138. 1753.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, on way to Kangpoki, 15.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1467, 1468, 1469, 1470); Ukhrul district, Sirohi Hill, 25.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1471, 1472, 1473).

Distribution: India [Western Himalaya (Himachal Pradesh, Jammu & Kashmir, Uttarakhand), Eastern Himalaya (Arunachal Pradesh, Manipur – present study, Sikkim, West Bengal)], Nepal, Bhutan, China, Korea, Japan, CIS, Europe, North Africa, Macronesia, North America (Kashyap, 1929; Chopra, 1943; Hattori, 1971; Long & Grolle, 1990; Piippo, 1990; Singh, 1996; Song & Yamada, 2006; Yamada & Iwatsuki, 2006; Singh & al., 2008a; Singh & Singh, 2009).

AYTONIACEAE

Asterella blumeana (Nees) Kachroo in J. Univ. Gauhati 3: 130. 1952; D.G. Long in Bryophyt. Biblioth. 63: 183. 2006. *Fimbriaria blumeana* Nees in Gottsche, Lindenb. & Ness, Syn. hepat. 564. 1846.

Imphal, D.B. Deb, s.n. (fide Kachroo & Deb, 1954).

Distribution: India [Western Himalaya (Himachal Pradesh, Uttarakhand), Eastern Himalaya (Assam, Manipur, Meghalaya)], Indonesia (Kachroo & Deb, 1954; Long, 2006; Singh & Nath, 2007).

Asterella khasyana (Griff.) Pandé & al. in J. Hattori Bot. Lab. 11: 8. 1954; D.G. Long in Bryophyt. Biblioth. 63: 169. 2006. *Octoskepos khasyanum* Griff., Not. pl. asiat 2: 343. 1849. *Asterella butleri* (Steph.) Kachroo in J. Indian Bot. Soc. 56: 74. 1977. *Asterella papulosa* (Steph.) Pandé & al. in J. Hattori Bot. Lab. 11: 8. 1954. *Asterella blumeana* auct. plur. non (Nees) Kachroo in J. Hattori Bot. Lab. 12: 36. 1954.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, Senapati district, Mao, c.1757 m, 14.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1474).

Distribution: India [Western Himalaya (Himachal Pradesh, Uttarakhand), Eastern Himalaya (Assam, Manipur, Meghalaya, Sikkim, West Bengal), Punjab & West Rajasthan (Rajasthan), Central India (Madhya Pradesh), Western Ghats (Maharashtra, Karnataka, Tamil Nadu)], Pakistan, Nepal, Bhutan, China, Thailand, Indonesia, Philippines (Long & Grolle, 1990; Piippo, 1990; Nair & al., 2005; Long, 2006; Singh & al., 2008a; Lai & al., 2008; Singh & Singh, 2009).

Asterella wallichiana (Lehm. & Lindenb.) Pandé & al. ex Grolle, Ergebnisse der Forschungs-Unternehmens Nepal Himalaya 1: 262. 1966; D.G. Long in Bryophyt. Biblioth. 63: 144. 2006. *Fimbriaria wallichiana* Lehm. & Lindenb., Nov. Stirp. pug. 4: 4. 1832. *Asterella angusta* (Steph.) Mahab. & Bhate in J. Univ. Bombay 13: 5. 1945. *Asterella maculata* (Steph.) Pandé & al. in J. Hattori Bot. Lab. 11: 8. 1954. *Asterella golanii* (Steph.) Pandé & al. in J. Hattori Bot. Lab. 11: 8. 1954. *Asterella indica* (Steph.) Pandé & al. in J. Hattori Bot. Lab. 11: 8. 1954. *Asterella mescarana* (Steph.) Pandé & al. in J. Hattori Bot. Lab. 11: 8. 1954. *Asterella mysorensis* (R.S. Chopra) Pandé & al. in J. Hattori Bot. Lab. 11: 9. 1954; *Asterella sanguinea* (Lehm. & Lindenb.) Kachroo in J. Hattori Bot. Lab. 19: 4. 1958; Kachroo & D.B. Deb in J. Univ. Gauhati 5: 120. 1954.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, Senapati district, Mao, c.1757 m, 14.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1475).

Distribution: India [Western Himalaya (Himachal Pradesh, Uttarakhand), Eastern Himalaya (Assam, Manipur, Sikkim, West Bengal), Central India (Madhya Pradesh), Gangetic Plains (Uttar Pradesh), Western Ghats (Maharashtra, Karnataka, Kerala, Tamil Nadu)], Pakistan, Nepal, Bhutan, Bangladesh, China, Myanmar, Thailand, Philippines, Indonesia, Japan, Papua New Guinea (Chopra, 1943; Kachroo & Deb, 1954; Long, 2006; Asthana & Nath, 2007; Singh & Singh, 2007c; Singh & al., 2008a; Lai & al., 2008).

Plagiochasma appendiculatum Lehm. & Lindenb., Nov. stirp. pug. 4: 14. 1832; Kachroo & D.B.Deb in J. Univ. Gauhati 5: 120. 1954; Sushil K.Singh & D.K.Singh, Hepaticae and Anthocerotae of Great Himalayan National Park and its environs (HP), India 342. 2009.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, Senapati district, Mao, c.1757 m, 14.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1476).

Distribution: India [Western Himalaya (Himachal Pradesh, Uttarakhand), Eastern Himalaya (Arunachal Pradesh, Assam, Manipur, Meghalaya, Sikkim, West Bengal), Punjab & West Rajasthan (Punjab, Rajasthan), Gangetic Plains (Uttar Pradesh), Central India (Madhya Pradesh), Western Ghats (Maharashtra, Tamil Nadu)], Afghanistan, Pakistan, Nepal, Bhutan, Bangladesh, China, Myanmar, Indonesia, Philippines, Vietnam, Europe, Africa (Chopra, 1943; Kashyap, 1929; Kachroo & Deb, 1954; Tan & Engel, 1986; Long & Grolle, 1990; Piippo, 1990; Singh, 1996; Wigginton & Grolle, 1996; Singh & al., 2008a; Singh & Singh, 2009).

Reboulia hemisphaerica (L.) Raddi, Opusc. Sci. 2: 357. 1818; Sushil K.Singh & D.K.Singh, Hepaticae and Anthocerotae of Great Himalayan National Park and its environs (HP), India 355. 2009. *Marchantia hemisphaerica* L., Sp. pl. 2: 1138. 1753; *Reboulia hemisphaerica* (L.) Raddi var. *pangiensis* Kashyap, Liverw. W. Himal 1: 74. 1929. Kachroo & D.B.Deb in J. Univ. Gauhati 5: 120. 1954.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, Senapati district, Mao, c.1757 m, 14.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1477, 1478, 1479, 1480, 1481); On way to Kangpoki, 15.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1482).

Distribution: India [Western Himalaya (Himachal Pradesh, Jammu & Kashmir, Uttarakhand), Eastern Himalaya (Arunachal Pradesh, Manipur, Meghalaya, Sikkim, West Bengal), Punjab & West Rajasthan (, Rajasthan), Gangetic Plains (Uttar Pradesh), Central India (Madhya Pradesh), Western Ghats (Karnataka, Tamil Nadu)], Afghanistan, Pakistan, Nepal, Bhutan, Sri Lanka, China, Indonesia, Japan, Turkey, Syria, Iran, C.I.S., New Guinea, Macronesia, Europe, Australia, New Zealand, Africa, North & South America (Kachroo & Deb, 1954; Hattori, 1966; Onraedt, 1981; Long & Grolle, 1990; Piippo, 1990; Schuster, 1992; Singh, 1996; Paton, 1999; Yamada & Iwatsuki, 2006; McCarthy, 2006; Singh & al., 2008a; Singh & Singh, 2009).

MARCHANTIACEAE

Dumortiera hirsuta (Sw.) Nees in Nova Acta Phys.-Med. Acad. Caes. Leop.-Carol. Nat. Cur. 12: 410. 1824; Sushil K.Singh & D.K.Singh, Hepaticae and Anthocerotae of Great Himalayan National Park and its environs (HP), India 377. 2009. *Marchantia hirsuta* Sw., Prodr. 145. 1788.

Specimen examined: Terricolous, and corticolous. India: Eastern Himalaya, Manipur, Senapati district, near Mao, c.1757 m, 13.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1483); Waka forest, 17.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1484, 1485, 1486); Liton, 19.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1487, 1488A); Ukhrul district, Sirohi Hill, c.1900 m, 20.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1489, 1490); Ukhrul district, Tushen, 21.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1489, 1490, 1491, 1492, 1493, 1494, 1527); West Imphal district, Jiribam, 05.03.1984, J. P. Ghosh 58018; Tamenglong district, 10.03.1984, J. P. Ghosh 58039.

Distribution: India [Western Himalaya (Himachal Pradesh, Uttarakhand), Eastern Himalaya (Arunachal Pradesh, Assam, Manipur – present study, Meghalaya, Sikkim, West Bengal), Central India (Madhya Pradesh), Western Ghats (Tamil Nadu)], Nepal, Bhutan, Sri Lanka, China, Korea, Japan, Indonesia, Thailand, Polynesia, Philippines, Samoa, Australia, Africa, Europe, North & South America (Kashyap, 1929; Hattori, 1966, 1975; Grolle & Schultze-Motel, 1972; Onraedt, 1981; Tan & Engel, 1986; Srivastava & Sharma, 1987; Long & Grolle, 1990; Piippo, 1990; Singh, 1996; Paton, 1999; Schuster, 1992; Singh, 1996; Wigginton & Grolle, 1996; McCarthy, 2006; Song & Yamada, 2006; Yamada & Iwatsuki, 2006; Asthana & Nath, 2007; Singh & al., 2008a; Lai & al., 2008; Singh & Singh, 2009).

Marchantia linearis Lehm. & Lindenb. in Lehmann, Nov. stirp. pug. 4: 8. 1832; Kachroo & D.B.Deb in J. Univ. Gauhati 5: 119. 1954; V.B.Singh in Bull. Lucknow Natl. Bot. Gard. 125: 13. 1966.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, Waka forest, 17.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1497); Bhutang khola, 06.03.1984, J. P. Ghosh 58027, 58028, 58032; Tamenglong district, on way to Dhillong, 13.03.1984, J. P. Ghosh, 58071, 58073.

Distribution: India [Eastern Himalaya (Assam, Manipur, Meghalaya, Sikkim, West Bengal), Central India (Madhya Pradesh), Punjab & West Rajasthan (Punjab), Western Ghats (Kerala)], Pakistan, Nepal, Indonesia (Mitten, 1861; Chopra, 1943; Kachroo & Deb, 1954; Singh, 1966; Nair & al., 2005; Asthana & Nath, 2007; Singh & al., 2008a).

Marchantia paleacea Bertol. in Opusc. Sci. 1: 242. 1817; Sushil K.Singh & D.K.Singh, Hepaticae and Anthocerotae of Great Himalayan National Park and its environs (HP), India 381. 2009. *Marchantia nepalensis* Lehm. & Lindenb. in Lehmann, Nov. stirp. pug. 4: 10. 1832; Kachroo & D.B.Deb in J. Univ. Gauhati 5: 119. 1954. *Marchantia nitida* Lehm. & Lindenb. in Lehmann, Nov. stirp. pug. 4: 11. 1832. subsp. **paleacea**.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, Kankui forest, 18.03.1984, J. P. Ghosh 58044.

Distribution: India [Western Himalaya (Jammu & Kashmir, Himachal Pradesh, Uttarakhand), Eastern Himalaya (Assam, Manipur, Meghalaya, Sikkim, West Bengal), Gangetic Plain (West Bengal), Central India (Madhya Pradesh), Western Ghats (Tamil Nadu)], Pakistan, Nepal, Bhutan, China, Japan, Philippines, Indonesia, Korea, Polynesia, Melanesia, Macronesia, Africa, Europe, North & South America (Mitten, 1861; Kashyap, 1929; Chopra, 1943; Kachroo & Deb, 1954; Hattori, 1966; Singh, 1966; Tan & Engel, 1986; Bischler, 1989; Long & Grolle, 1990; Piippo, 1990; Paton, 1999; Schuster, 1992; Wigginton & Grolle, 1996; Yamada & Iwatsuki, 2006; Singh & al., 2008a; Singh & Singh, 2009).

Marchantia subintegra Mitt. in J. Proc. Linn. Soc., Bot. 5: 125. 1861; V.B.Singh in Natl. Bot. Gard. Bull. 125: 23. 1966. *Marchantia papulosa* Amakawa in Hara, Flora of Eastern Himalaya 535. 1966.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, Tamenglong district, on way to Dhillong, 13.03.1984, J. P. Ghosh 58076.

Distribution: India [Eastern Himalaya (Arunchal Pradesh, Assam, Manipur – present study, Sikkim, West Bengal), Nepal, Bhutan (Mitten, 1861; Chopra, 1943; Singh, 1966; Hattori, 1966, 1975; Bischler, 1989; Long & Grolle, 1990; Singh & al., 2008a).

MONOSOLENIACEAE

Monosolenium tenerum Griff., Ic. Pl. Asiat. 2, Pl. 75. B. f. l; Not. Pl. Asiat. 2: 341. 1849; Sushil K.Singh & D.K.Singh in Curr. Sci. 92: 1483. 2007.

Imphal, S.L. Hora, s.n. (fide Kashyap, 1923).

Distribution: India [Western Himalaya (Himachal Pradesh, Uttarakhand), Eastern Himalaya (Assam, Manipur)], China, Thailand, Japan, Hawaii (Kashyap, 1923; Piippo, 1990; Yamada & Iwatsuki, 2006; Singh & Singh, 2007; Singh & Singh, 2007c; Lai & al., 2008).

RICCIACEAE

Riccia billardieri Mont. & Nees, Syn. hepat. 602. 1846; Udar in Curr. Sci 26: 20. 1955; Pandé & Udar in J. Indian Bot. Soc. 36: 570. 1957; K.P.Srivast. in Bull. Lucknow Natl. Bot. Gard. 104: 27. 1964.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, Bhutang khola, 06.03.1984, J. P. Ghosh 58024.

Distribution: India [Western Himalaya (Uttarakhand), Eastern Himalaya (Assam, Manipur – present study, Sikkim, West Bengal), Central India (Madhya Pradesh), Gangetic plains (Uttar Pradesh), Punjab & West Rajasthan (Rajasthan), Western Ghats (Karnataka)], Indonesia, Thailand, Vietnam, Australia (Meijer, 1958; Srivastava, 1964; Tan & Engel, 1986; McCarthy, 2006; Lai & al., 2008; Dey & al., 2009).

Riccia frostii Austin in Bull. Torrey Bot. Club. 6: 17. 1875; K.P.Srivast. in Bull. Lucknow Natl. Bot. Gard. 104: 51. 1964. *Riccia sanguinea* Kashyap in J. Bombay Nat. Hist. Soc. 24: 349. 1916.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, Waka forest, 17.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1506).

Distribution: India [Western Himalaya, Eastern Himalaya (Assam, Manipur, Sikkim), Gangetic plains (West Bengal, Uttar Pradesh), Punjab & West Rajasthan (Rajasthan), Western Ghats (Tamil Nadu)], China, Vietnam (Srivastava, 1964; Piippo, 1990; Singh & al., 2008a).

Ricciocarpos natans (L.) Corda in Opiz (ed.), Beitr. Zur Naturg. 12: 651. 1829; D.B. Deb in Sci. & Cult. 19: 353. 1954; K.P. Srivast. in Natl. Bot. Gard. Bull. 104: 57. 1964. *Riccia natans* L. Syst. nat. ed. 10: 1339. 1759.

Loktak lake, D.B. Deb, s.n. (fide Deb, loc.cit.).

Distribution: India [Western Himalaya, Western Himalaya (Jammu & Kashmir, Uttarakhand), Eastern Himalaya (Arunachal Pradesh, Assam, Manipur, Meghalaya), Gangetic plains (West Bengal), Punjab & West Rajasthan (Punjab)], Pakistan, China, Japan, Philippines, Thailand, Europe, Africa, Australia, North and South America (Biswas & Calder, 1936; Deb, 1954; Tan & Engel, 1986; Piippo, 1990; Singh, 1996; Kumar & al., 2005; McCarthy, 2006; Yamada & Iwatsuki, 2006; Lai & al., 2008):

ANTHOCEROTACEAE

Anthoceros bharadwajii Udar & A.K. Asthana in Proc. Indian Natl. Sci Acad., B 51: 484. 1985; A.K. Asthana & S.C. Srivast. in Bryophyt. Biblioth. 42: 41. 1991.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, Savatvakhong, 22.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1269A); Savatvakhong, 22.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1507); Bhutang khola, 06.03.1984, J. P. Ghosh 58021, 58025, 58026.

Distribution: India [Western Himalaya (Himachal Pradesh, Uttarakhand), Eastern Himalaya (Arunachal Pradesh, Manipur, Meghalaya, West Bengal), Western Ghats (Karnataka, Kerala, Maharashtra)] (Asthana & Srivastava, 1991; Singh & Singh, 2009).

Anthoceros erectus Kashyap in New Phytol. 14: 9. 1915; A.K. Asthana & S.C. Srivast. in Bryophyt. Biblioth. 42: 37. 1991. *Anthoceros stephanii* (Steph.) L.P. Khanna in J. Indian Bot. Soc. 15: 235. 1936.

Ukhrul, A. Kumar and U.S. Awasthi 3675/79, 3681/79 (LWU) (fide Asthana & Srivastava, loc.cit.).

Distribution: India [Western Himalaya (Himachal Pradesh, Uttarakhand), Eastern Himalaya (Manipur), Western Ghats (Kerala, Tamil Nadu)] (Asthana & Srivastava, 1991).

Anthoceros punctatus L., Sp. hepat. 2: 1139. 1753; Kachroo in Sci. & Cult. 18: 284. 1952; A.K. Asthana & S.C. Srivast. in Bryophyt. Biblioth. 42: 46. 1991.

Manipur, (fide Chopra, 1943; Kachroo, 1952).

Distribution: India [Western Himalaya (Khadamba), Eastern Himalaya (Manipur)], China, Japan, Europe, Africa, New Caledonia North & South America (Kachroo, 1952; Piippo, 1990; Asthana & Srivastava, 1991; Yamada & Iwatsuki, 2006).

Folioceros assamicus D.C. Bhardwaj in Geophytology 1: 10. 1971; A.K. Asthana & S.C. Srivast. in Bryophyt. Biblioth. 42: 67. 1991.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, Senapati district, Mao, c.1757 m, 14.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1511).

Distribution: India [Eastern Himalaya (Assam, Manipur – present study, Meghalaya)], Thailand (Asthana & Srivastava, 1991; Asthana & Nath, 2002; Lai & al., 2008).

Phaeoceros carolinianus (Michx.) Prosk. in Bull. Torrey Bot. Club. 78: 347. 1951. *Anthoceros carolinianus* Michx., Flora bor.-americ. 2: 280. 1803. *Anthoceros jackii* Steph., Sp. hepat. 6: 427. 1923. *Phaeoceros laevis* (L.) Prosk subsp. *carolinianus* (Michx.) Prosk. in Rapp. & Comm. VIII Congr. Int. Bot. Paris 14-16: 69. 1954; A.K. Asthana & S.C. Srivast. in Bryophyt. Biblioth. 42: 125. 1991. *Anthoceros gollani* Steph., Sp. hepat. 5: 987. 1916. *Phaeoceros tenax* (Steph.) Udar & D.K. Singh in Geophytology 11: 257. 1981. *Phaeoceros cataractarum* (Steph.) Udar & D.K. Singh in Geophytology 11: 257. 1981. *Phaeoceros lamellisporous* (Steph.) Udar & D.K. Singh in Geophytology 11: 257. 1981.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, West Mountain, 24.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1512); Churachandpur district, Churachandpur, c.831 m, 01.03.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1513).

Distribution: India [Western Himalaya (Himachal Pradesh, Uttarakhand), Eastern Himalaya (Arunachal Pradesh, Manipur, Meghalaya, Sikkim, West Bengal), Punjab & West Rajasthan (Rajasthan), Central India (Madhya Pradesh), Western Ghats (Tamil Nadu)], Nepal, Bhutan, Sri Lanka, China, Myanmar, Philippines, Thailand, Japan, Korea, Melanesia, Macronesia, Polynesia, Australia, Europe, Africa, North & South America (Onraedt, 1981; Tan & Engel, 1986; Piippo, 1990; Long & Grolle, 1990; Asthana & Srivastava, 1991; Schuster, 1992; Singh, 1996; Paton, 1999; Yamada & Iwatsuki, 2006; McCarthy, 2006; Song & Yamada, 2006; Singh & al., 2008a; Lai & al., 2008; Singh & Singh, 2009).

Phaeoceros kashyapii A.K.Asthana & S.C.Srivast. in Bryophyt. Biblioth. 42: 129. 1991.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, Waka forest, 17.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1514).

Distribution: India [Western Himalaya (Uttarakhand), Eastern Himalaya (Manipur – present study)] (Asthana & Srivastava, 1991).

Phaeoceros laevis (L.) Prosk. in Bull. Torrey Bot. Club 78: 347. 1951. *Anthoceros laevis* L., Sp. pl. 2: 1139. 1753; Kachroo & D.B.Deb in J. Univ. Gauhati 5: 119. 1954. *Anthoceros indicus* Steph. Spec. hepat. 5: 1002. 1916. *Anthoceros longii* Steph. Spec. hepat. 5: 1003. 1916. *Phaeoceros butleri* (Steph.) Udar & D.K.Singh in Geophytology 11: 257. 1981. *Phaeoceros laevis* (L.) Prosk subsp. *laevis* Prosk. in Rap. & Comm. VIII Congr. Int. Bot. Paris 14-16: 69. 1954; A.K.Asthana & S.C.Srivast. in Bryophyt. Biblioth. 42: 122. 1991.

Specimen examined: Terricolous. India: Eastern Himalaya, Manipur, on way to Kangpoki, 15.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1516); Waka forest, 17.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1517, 1518); Ukhrul district, Sirohi Hill, c.1900 m, 20.02.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1519); Churachandpur district, Churachandpur, c.831 m, 01.03.1978, J. Lal & B. D. Kar, s.n. (acc. no. 1520).

Distribution: India [Western Himalaya (Himachal Pradesh, Uttarakhand), Eastern Himalaya (Arunachal Pradesh, Manipur, Meghalaya, Sikkim, West Bengal), Punjab & West Rajasthan (Rajasthan), Western Ghats (Karnataka, Kerala, Maharashtra, Tamil Nadu), Central India (Madhya Pradesh)], Nepal, Pakistan, China, Japan, Philippines, Turkey, C.I.S., Australia, Europe, North America (Kachroo & Deb, 1954; Piippo, 1990; Asthana & Srivastava, 1991; Schuster, 1992; Singh, 1996; Yamada & Iwatsuki, 2006; McCarthy, 2006; Asthana & Nath, 2007; Singh & al., 2008a; Singh & Singh, 2009).

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REFERENCES

- AMAKAWA, T. 1960. Family Jungermanniaceae of Japan II. *J. Hattori Bot. Lab.* 22: 1 – 90.
- AMAKAWA, T. 1970. New or little known Asiatic species of the family Jungermanniaceae, VI. *J. Hattori Bot. Lab.* 33: 153 – 160.
- AMAKAWA, T. 1972. New or little known Asiatic species of the family Jungermanniaceae, VII. *J. Hattori Bot. Lab.* 35: 382 – 390.
- ASTHANA, A.K. AND V. NATH. 2002. SEM study of the sporoderm pattern of the hornwort *Folioceros assamicus* Bharad. *J. Bryol.* 24: 318 – 321.
- ASTHANA, A.K. AND V. NATH. 2007. Hepatics and Anthocerotales (Bryophyta) of Tamia and Patalkot valley (district Chhindwara), Madhya Pradesh. *J. Bombay Nat. Hist. Soc.* 104: 275 – 287. 2007.
- ASTHANA, A.K. AND S.C. SRIVASTAVA. 1991. Indian Hornworts. *Bryophyt. Biblioth.* 42: 1 – 158.
- ASTHANA, G. AND S.C. SRIVASTAVA. 2003. Indian *Cololejeunea*. A taxonomic study. *Bryophyt. Biblioth.* 60: 1 – 155.

- ASTHANA, G., S.C. SRIVASTAVA AND A.K. ASTHANA. 1995. The genus *Cheilolejeunea* in India. *Lindbergia* 20: 125 – 143.
- AWASTHI, U.S. 1986. The genus *Leptolejeunea* (Spruce) Steph. in India. *J. Indian Bot. Soc.* 65: 117 – 123.
- AWASTHI, U.S. AND S.C. SRIVASTAVA. 1987. *Ptychanthus* Nees and *Tuzibeanthus* Hatt. in India. *Geophytology*. 17: 12 – 20.
- AWASTHI, U.S. AND S.C. SRIVASTAVA. 1988. Status of *Brachiolejeunea* (Spruce) Schiffn. in India. *Proc. Indian Acad. Sci. Pl. Sci.* 98: 1 – 12.
- AWASTHI, U.S., S.C. SRIVASTAVA AND D. SHARMA. 2000. *Lopholejeunea* (Spruce) Schiffn. in India. *Geophytology* 29: 35 – 60.
- AWASTHI, U.S. AND R. UDAR. 1984. The genus *Mastigolejeunea* (Spruce) Schiffn. in India. *Proc. Indian Acad. Sci. Pl. Sci.* 93: 485 – 494.
- BISCHLER-CAUSSE, H. 1989. *Marchantia* L. The Asiatic and Oceanic taxa. *Bryophyt. Biblioth.* 38: 1 – 317.
- BISWAS, K. AND C.C. CALDER. 1936. Handbook of Common Water and Marsh Plants of India and Burma. Health Bulletin No. 24, Malaria Bureau No. 11. Delhi.
- CHOPRA, R.S. 1938. Notes on Indian Hepatics to Sikkim Himalaya and Bengal. *Proc. Indian Acad. Sci.* 8B: 427 – 439.
- CHOPRA, R.S. 1943. A Census of Indian Hepatics. *J. Indian Bot. Soc.* 22: 237 – 259.
- DANIELS, A.E.D. AND P. DANIEL. 2004. *Leptolejeunea balansae* Steph. (Hepaticae: Jungermanniales) – A new record of bryoflora from the Indian mainland. *J. Bombay Nat. Hist. Soc.* 101: 333 – 334.
- DEB, D.B. 1954. On the occurrence of *Riccia natans* Corda from the Eastern Himalayas. *Sci. & Cult.* 19: 353 – 354.
- DEY, M. AND D.K. SINGH. 2008. *Lejeunea alata* Gottsche (Lejeuneaceae) – a new record for Indian bryoflora from Arunachal Pradesh. *Geophytology* 37: 43 – 45.
- DEY, M., D. SINGH AND D.K. SINGH. 2009. Some new and noteworthy records of hepaticae from Eastern Himalaya, India. *Indian J. Forest.* 32: 669 – 684.
- DEY, M., D. SINGH AND D.K. SINGH. 2010. *Jubula pennsylvanica* (Hepaticae: Jubulaceae) new to Asia. *Taiwania* (in press).
- GROLLE, R. 1995. The Hepaticae and Anthocerotae of the East African Islands. An Annotated Catalogue. *Bryophyt. Biblioth.* 48: 1 – 178.
- GROLLE, R. AND W. SCHULTZE-MOTEL. 1972. Vorlaufiges verzeichnis der lebermoose von Samoa. *J. Hattori Bot. Lab.* 36: 75–89.
- GROLLE, R. AND R.L. ZHU. 2000. A study of *Drepanolejeunea* subg. *Rhaphidolejeunea* (Herzog) Grolle & R.L. Zhu, stat. nov. (Hepaticae, Lejeuneaceae) in China with notes on its species elsewhere. *Nova Hedwigia* 70: 373 – 395.
- GUERKE, W.R. 1978. A monograph of the genus *Jubula* Dumortier. *Bryophyt. Biblioth.* 17: 1 – 118. 1978.
- HATTORI, S. 1966. Anthocerotae and Hepaticae. In: Hara, H. (ed.) The Flora of Eastern Himalaya. University of Tokyo Press, Japan: 501 – 536.
- HATTORI, S. 1971. Hepaticae. in Hara, H. (ed.) The Flora of Eastern Himalaya. Second report. University of Tokyo Press, Japan: 222 – 240.
- HATTORI, S. 1973. Notes on Asiatic species of the genus *Frullania*, Hepaticae, III. *J. Hattori Bot. Lab.* 37: 85 – 120. 1973.
- HATTORI, S. 1975. Hepaticae. in Ohasi, H. (ed.) The Flora of Eastern Himalaya. Third report. University of Tokyo Press, Japan: 206 – 242.
- HATTORI, S. AND O. THAITHONG. 1978a. Mrs. Ruth D. Svihla's *Frullania* collections in India, Burma, and Singapore. *Bull. Nat. Sci. Mus. Tokyo Ser. B (Bot.)* 4: 65 – 69.
- HATTORI, S. AND O. THAITHONG. 1978b. A *Frullania* collection made by Dr. T. Tuyama in Laos. *J. Jap. Bot.* 53: 172 – 177.
- HERZOG, T. 1939. Zwei Bryophyten-sammlungen aus dem Sikkim-Himalaya. *Ann. Bryol.* 12: 71 – 97.
- HERZOG, T. 1950. Miscellanea bryologica II. Palaeotropica. *Mem. Soc. Fauna Flora Fenn.* 26: 37 – 66.
- JOSHI, D.Y. 2001. A floristic analysis of the liverworts from Andaman Islands, India. In: Nath, V. and A.K. Asthana (eds.), Perspectives in Indian Bryology. Bishen Singh Mahendra Pal Singh, Dehra Dun, India: 135 – 148.
- JUSLEN, A. 2006. Revision of Asian *Herbertus* (Herbertaceae, Marchantiophyta). *Ann. Bot. Fenn.* 43: 409 – 436.

- KACHROO, P. 1952. Distribution of liverworts in Assam. *Sci. & Cult.* 18: 284 – 285.
- KACHROO, P. AND D.B. DEB. 1954.. Notes on Assam Hepaticae II. On a small collection of Hepaticae from Manipur. *J. Univ. Gauhati* 5: 119 – 120.
- KASHYAP, S.R. 1923. A long-lost liverwort. *J. Indian Bot. Soc.* 3: 181.
- KASHYAP, S.R. 1929. Liverworts of the Western Himalayas and the Panjab Plain. I. The University of the Panjab, Lahore.
- KASHYAP, S.R. 1932. Liverworts of the Western Himalayas and the Panjab Plain. II. The University of the Panjab, Lahore.
- KITAGAWA, N. 1966. A revision of the family Lophoziaceae of Japan and its adjacent regions. *J. Hattori Bot. Lab.* 29: 101 – 149.
- KUMAR, A. AND R. UDAR. 1985. The genus *Jamesoniella* (Spruce) Schiffn. in India. *Geophytology* 15: 1 – 6.
- KUMAR, S. J. LAL AND P. GUPTA. 2005. *Ricciocarpos* Corda (Hepaticae) from Maldah district, West Bengal: A new generic record for Gangetic plain. *Bull. Bot. Surv. India* 47: 131 – 132.
- KUWAHARA, Y. 1965. A short survey of the Himalayan Metzgeriaceae. *J. Hattori Bot. Lab.* 28: 292 – 298.
- KUWAHARA, Y. 1966. The Family Metzgeriaceae in North and South East Asia, Pacific Oceania, Australia and New Zealand. *Rev. Bryol. Lichénol.* 34: 191 – 239.
- KUWAHARA, Y. 1978. A recent collection of New Guinean *Metzgeria*. *Lindbergia* 4: 289 – 295.
- KUWAHARA, Y. 1986. The metzgeriaceae of the Neotropics. *Bryophyt. Biblioth.* 28: 1-254.
- LAI, M.J., R.L. ZHU AND S. CHANTANAORRAPINT. 2008. Liverworts and hornworts of Thailand: an updated checklist and bryofloristic accounts. *Ann. Bot. Fenn.* 45: 321 – 341.
- LAL, J. 1979a. *Frullania tuyamae* Hatt. & Thait. (Hepaticae) from Manipur (Eastern India) – New to India. *Bull. Bot. Surv. India* 21: 81 – 83.
- LAL, J. 1979b. Epiphyllous bryophytes of Manipur I. Metzgeriaceae. *Proc. Indian Sci. Congress*: 42 – 43.
- LAL, J. 2003. Studies in Epiphyllous liverworts of India – Its present position. *Bull. Bot. Surv. India* 45: 179 – 186.
- LONG, D.G. 1979. Hepaticae from Bhutan, East Himalaya. *Lindbergia*. 5: 54 – 63.
- LONG, D.G. 2005. Notes on Himalayan Hepaticae 2: New records and extensions of range for some Himalayan leafy liverworts. *Cryptogamie, Bryol.* 26: 97 – 107.
- LONG, D.G. 2006. Revision of the genus *Asterella* P. Beauv. in Eurasia. *Bryophyt. Biblioth.* 63: 1 – 299.
- LONG, D.G. AND R. GROLLE. 1990. Hepaticae of Bhutan II. *J. Hattori Bot. Lab.* 68: 381 – 440.
- MCCARTHY, P.M. 2006. *Checklist of Australian Liverworts and Hornworts*. Australian Biological Resources Study, Canberra. http://www.anbg.gov.au/abrs/liverwortlist/liverworts_intro.html.
- MEIJER, W. 1958. Notes on species of *Riccia* from the Malaysian region. *J. Hattori Bot. Lab.* 20: 107 – 118.
- MILLER, H.A. 1965. A review of *Herberta* in the tropical Pacific and Asia. *J. Hattori Bot. Lab.* 28: 299 – 412.
- MITTEN, W. 1861. Hepaticae Indiae Orientalis, An enumeration of the Hepaticae of East Indies. *J. Proc. Linn. Soc., Bot.* 5: 89 – 128.
- MIZUTANI, M. 1961. A revision of Japanese Lejeuneaceae. *J. Hattori Bot. Lab.* 24: 115 – 302.
- MIZUTANI, M. 1963. On some Indian species of the family Lejeuneaceae described by W. Mitten. *J. Hattori Bot. Lab.* 26: 171 – 184.
- MIZUTANI, M. 1970. Lejeuneaceae, subfamilies Lejeuneoideae and Cololejeuneoideae from Sabah (North Borneo). *J. Hattori Bot. Lab.* 33: 225 – 265.
- MIZUTANI, M. 1971. *Lejeunea* from the Himalayan region. *J. Hattori Bot. Lab.* 34: 445 – 457.
- MIZUTANI, M. 1975. Epiphyllous species of Lejeuneaceae from the Philippines. *J. Hattori Bot. Lab.* 39: 255 – 262.
- MIZUTANI, M. 1982. Notes on the Lejeuneaceae. 6. Japanese species of the genus *Chielolejeunea*. *J. Hattori Bot. Lab.* 51: 151 – 173.
- MIZUTANI, M. 1984a. Notes on the Lejeuneaceae. 9. *Cololejeunea lanciloba* and its related species in Japan. *J. Hattori Bot. Lab.* 57: 427 – 442.

- MIZUTANI, M. 1984b. Notes on the Lejeuneaceae. 8. Japanese species of the subgenus *Taeniolejeunea* of the genus *Cololejeunea*. *J. Hattori Bot. Lab.* 57: 153 – 170.
- MIZUTANI, M. 1986. Notes on the Lejeuneaceae. 11. *Cololejeunea spinosa* and its related species in Japan. *J. Hattori Bot. Lab.* 60: 439 – 450.
- MIZUTANI, M. 1989. Notes of the Lejeuneaceae. 15. Three species of the genus *Trocholejeunea*. *J. Hattori Bot. Lab.* 66: 271 – 281.
- NAIR, M.C., K.P. RAJESH AND P.V. MADHUSOODANAN. 2005. Bryophytes of Wayanad in Western Ghats. Malabar Natural History Society, Kerala.
- NATH, V. AND A.K. ASTHANA. 1998. Diversity and distribution of genus *Frullania* Raddi in South India. *J. Hattori Bot. Lab.* 85: 63 – 82.
- NATH, V., S. SHARMA AND A.K. ASTHANA. 2002. *Anastrophyllum joregenseni* Schiffn. from Western Himalayas. *Geophytology* 30: 111 – 112.
- ONRAEDT, M. 1981. Bryophytes récoltées a Sri Lanka (Ceylan) V. *J. Hattori Bot. Lab.* 50: 191 – 216.
- ONRAEDT, M. 1985. Bryophytes de Sri Lanka VII. Lejeuneaceae Holostipae. *Cryptog. Bryol. Lichénol.* 6: 151 – 175.
- PANDE, S.K. AND R.N. MISRA. 1943. Studies in Indian Hepaticae II. On the epiphyllous liverworts of India and Ceylon (i). *J. Indian Bot. Soc.* 22: 159 – 169.
- PATON, J.A. 1999. The liverwort flora of the British Isles. Harley Books, Colchester.
- PIIPPO, S. 1990. Annotated catalogue of Chinese Hepaticae and Anthocerotae. *J. Hattori Bot. Lab.* 68: 1 – 192.
- PIIPPO, S., HE, X.L. AND T. KOPONEN. 1997. Hepatics from northwestern Sichuan, China, with a checklist of Sichuan hepatics. *Ann. Bot. Fenn.* 34: 51 – 63.
- PÓCS, T., S. PIIPPO, AND M. MIZUTANI. 1994. Bryophyte flora of the Huon Peninsula, Papua New Guinea. LXV. Preliminary contributions on Lejeuneaceae (Hepaticae) 1. *Ann. Bot. Fenn.* 31: 179 – 190.
- RAWAT, K.K. AND S.C. SRIVASTAVA. 2007. Genus *Plagiochila* in Eastern Himalaya (India). Bishen Singh Mahendra Pal Singh, Dehra Dun.
- SCHILL, D. AND D.G. LONG. 2003. A revision of *Anastrophyllum* (Spruce) Steph. (Jungermanniales, Lophoziaceae) in the Himalayan region and western China. *J. Hattori Bot. Lab.* 94: 115 – 157.
- SCHUSTER, R.M. 1969. The Hepaticae and Anthocerotae of North America. II. Columbia University Press, New York.
- SCHUSTER, R.M. 1974. The Hepaticae and Anthocerotae of North America. III. Columbia University Press, New York.
- SCHUSTER, R.M. 1980. The Hepaticae and Anthocerotae of North America. IV. Columbia University Press, New York.
- SCHUSTER, R.M. 1992. The Hepaticae and Anthocerotae of North America. V. Field Museum of Natural History, Chicago.
- SHAHEEN, F. AND S.C. SRIVASTAVA. 1989. *Porella campylophylla* (Lehm. & Lindenb.) Trev. complex in India. *Geophytology* 19: 34 – 48.
- SHARMA, D. AND S.C. SRIVASTAVA. 1993. Indian Lepidoziineae – (A taxonomic revision). *Bryoph. Biblioth.* 47: 1 – 353.
- SINGH, A.P. AND V. NATH. 2007. Hepaticae of Khasi and Jaintia Hills: Eastern Himalayas. Bishen Singh Mahendra Pal Singh, Dehra Dun.
- SINGH, A.P., D. KUMAR AND V. NATH. 2008b. Studies on the Genera *Frullania* Raddi and *Jubula* Dum. from Meghalaya (India): Eastern Himalayas. *Taiwania* 53: 51 – 84.
- SINGH, D., M. DEY AND D.K. SINGH. 2007. Diversity in epiphyllous taxa of genus *Metzgeria* Raddi from Eastern Himalaya with a note on three new records of genus from India. *Proc. Nat. Acad. Sci. India* 77B: 375 – 386.
- SINGH, D. AND D.K. SINGH. 2008. A note on *Metzgeria conjugata* Lindb. (Hepaticae: Metzgeriaceae) from India. *Geophytology* 37: 47 – 49.
- SINGH, D.K. 1996. Hepaticae (Bryophyta). In: Hajra, P.K. (ed.), A contribution to the flora of Namdapha Arunachal Pradesh. Botanical Survey of India, New Delhi: 46 – 67.
- SINGH, D.K., D. SINGH AND M. DEY. 2008a. A Catalogue of the Hepaticae and Anthocerotae of Sikkim. In: Mohamed, H., B. B. Baki, A. Nasrullah-Boyce and P. K. Y. Lee (eds), Bryology in the New Millennium. University of Malaya, Kuala Lumpur, Malaysia: 93 – 135.

- SINGH, D.K. AND S.K. SINGH. 2007. Hide and seek of *Monosolenium tenerum* Griff. (Hepaticae: Monosoleniaceae) in Indian bryoflora. *Curr. Sci.* 92: 1483 – 1485.
- SINGH, S.K. AND D.K. SINGH. 2003. *Heteroscyphus orbiculatus* Srivast. et Srivast.: new to Himalayan bryoflora. *Indian J. Forest.* 26: 317 – 319.
- SINGH, S.K. AND D.K. SINGH. 2004. *Lejeunea flava* (Swartz) Nees - An addition to the bryoflora of western Himalaya. *Geophytology* 32: 115 – 117.
- SINGH, S.K. AND D.K. SINGH. 2007a. Contribution to the bryoflora of Great Himalayan National Park, Kullu, Himachal Pradesh V: Genus *Plagiochila* (Dumort.) Dumort. (Plagiochilaceae). *Indian J. Forest.* 30: 101 – 112.
- SINGH, S.K. AND D.K. SINGH. 2007b. Some new and noteworthy records of Hepaticae and Anthocerotae from Western Himalaya, India. *Cryptogamie, Bryologie* 28: 253 – 265.
- SINGH, S.K. AND D.K. SINGH. 2007c. A preliminary census of Hepaticae and Anthocerotae of Doon valley. *Bull. Bot. Surv. India* 49: 1 – 14.
- SINGH, S.K. AND D.K. SINGH. 2009. Hepaticae and Anthocerotae of Great Himalayan National Park and its environs (HP), India. Botanical Survey of India, Dehra Dun.
- SINGH, V.B. 1966. Bryophytes of India-II. *Marchantia*-I. *Bull. Lucknow Natl. Bot. Gard.* 125: 1 – 25.
- SO, M.L. 2001. *Plagiochila* (Hepaticae, Plagiochilaceae) in China. *Syst. Bot. Monog.* 60: 1 – 214.
- SO, M.L. 2003. The genus *Metzgeria* (Hepaticae) in Asia. *J. Hattori Bot. Lab.* 94: 159 – 177.
- SO, M.L. AND R. GROLLE. 2000. Studies on *Plagiochila* section *Plagiochila* in Asia. *J. Bryol.* 22: 17 – 28.
- SO, M.L. AND R.L. ZHU. 1998. On six species of the genus *Lejeunea* in China, including one new species. *Bryologist* 101: 137 – 143.
- SONG, J.S. AND K. YAMADA. 2006. Hepatic flora from Jeju (Cheju) Island, Korea. *J. Hattori Bot. Lab.* 100: 443 – 450.
- SRIVASTAVA, A. AND S.C. SRIVASTAVA. 2002. Indian Geocalycaceae (Hepaticae) (A Taxonomic Study). Bishen Singh Mahendra Pal Singh, Dehradun.
- SRIVASTAVA, K.P. 1964. Bryophytes of India-I. Ricciaceae. *Bull. Lucknow Natl. Bot. Gard.* 104: 1 – 103.
- SRIVASTAVA, S.C. 1978. *Riccardia tenuicostata* new to Eastern Himalaya. *Bryologist* 81: 168 – 170.
- SRIVASTAVA, S.C. AND R. DIXIT. 1996. Species of *Plagiochila* (Dum.) Dum. (Plagiochilaceae) from Lilam in Kumaon, Western Himalayas, India. *Geophytology* 25: 91 – 103.
- SRIVASTAVA, S.C. AND D. SHARMA. 1987. Morpho-taxonomic study of Indian *Dumortiera*. *Yushania* 4: 1 – 6.
- SRIVASTAVA, S.C. AND R. UDAR. 1975. Taxonomy of the Indian Metzgeriaceae. A monographic study. *New Botanist, Int. Quart. J. Pl. Sci. Res.* 2: 1 – 57.
- SRIVASTAVA, S.C. AND R. UDAR. 1976. Indian Aneuraceae – a monographic study. *Biol. Mem.* 1: 121 – 154.
- TAN, B.C. AND J.J. ENGEL. 1986. An annotated checklist of Philippine Hepaticae. *J. Hattori Bot. Lab.* 60: 283 – 355.
- TIXIER, P. 1985. Contribution à la Connaissance des Cololejeunoideae. *Bryophyt. Biblioth.* 27: 1 – 439.
- UDAR, R. AND U.S. AWASTHI. 1982a. The genus *Drepanolejeunea* St. in India. *J. Hattori Bot. Lab.* 53: 419 – 437.
- UDAR, R. AND U.S. AWASTHI. 1982b. The genus *Spruceanthus* Verd. in India. *J. Indian Bot. Soc.* 61: 183 – 180.
- UDAR, R. AND U.S. AWASTHI. 1984. The genus *Rhaphidolejeunea* Hork. in India. *Yushania* 1: 15 – 17.
- UDAR, R. AND A. KUMAR. 1981. Genus *Notoscyphus* Mitt. in India. *J. Hattori Bot. Lab.* 49: 247 – 260.
- UDAR, R. AND A. KUMAR. 1982. Studies in East Himalayan Hepaticae – II: The genus *Chandonanthus* Mitten. *Geophytology* 12: 59 – 64.
- UDAR, R. AND D. KUMAR. 1976. Genus *Cephalozia* in Eastern Himalayas. *Geophytology* 6: 35 – 45.
- UDAR, R. AND D. KUMAR. 1984a. Epiphyllous taxa of *Radula* Dumort. from India. *Geophytology* 14: 161 – 170.
- UDAR, R. AND D. KUMAR. 1984b. The genus *Radula* in Western Himalayas. *Biol. Mem.* 9: 73 – 86.
- UDAR, R. AND F. SHAHEEN. 1983a. Morpho-taxonomy of *Porella perrottetiana* (Mont.) Trev. from South India. *J. Indian Bot. Soc.* 62: 319 – 325.

- UDAR, R. AND F. SHAHEEN. 1983b. Fertile plants of *Porella plumosa* (Mitt.) Inoue from India and their affinities with *P. hattorii* Udar et Shaheen. *Misc. Bryol. Lichenol.* 9: 196 – 198.
- UDAR, R. AND D.K. SINGH. 1977. Studies in East Himalayan Hepaticae I. The genus *Trichocolea* Dumort. *Geophytology*, 7: 65 – 72.
- VÀÒA, J. 1972. Miscellaneous notes on the Asiatic Jungermannioideae II. *J. Hattori Bot. Lab.* 36: 57 – 74.
- VÀÒA, J. 1974. Miscellaneous notes on the Asiatic Jungermannioideae. III. *J. Hattori Bot. Lab.* 38: 275 – 282.
- VÀÒA J. AND D.G. LONG. 2009. Jungermanniaceae of the Sino-Himalayan region. *Nova Hedwigia* 89: 485–517.
- VERMA, P.K. AND S.C. SRIVASTAVA. 2008. Diversity and distribution of epiphytic liverworts (Hepaticae) in Nilgiri hills (Tamil Nadu). *Proc. Nat. Acad. Sci. India* 78B: 253 – 264.
- WIGGINGTON, M.J. AND R. GROLLE. 1996. Catalogue of the Hepaticae and Anthocerotae of Sub-Saharan Africa. *Bryophyt. Biblioth.* 50: 1 – 267.
- YAMADA, K. 1979. A revision of Asian taxa of *Radula*, Hepaticae. *J. Hattori Bot. Lab.* 45: 201 – 322.
- YAMADA, K AND Z. IWATSUKI. 2006. Catalog of the Hepatics of Japan. *J. Hattori Bot. Lab.* 99: 1 – 106.
- YUZAWA, Y. 1991. A monograph of subgen. *Chonantheria* of gen. *Frullania* (Hepaticae) of the world. *J. Hattori Bot. Lab.* 70: 181 – 291.
- YUZAWA, Y. AND N. KOIKE. 1994. A *Frullania* (Hepaticae) collection made by Dr. M. Higuchi in Nepal. *J. Hattori Bot. Lab.* 75: 193 – 199.
- ZHU, R.L. 1995. Notes on some species of the genus *Cololejeunea* (Lejeuneaceae, Hepaticae) in China. *J. Hattori Bot. Lab.* 78: 83 – 109.
- ZHU, R. L. AND S.R. GRADSTEIN. 2005. Monograph of *Lopholejeunea* (Lejeuneaceae, Hepaticae) in Asia. *Syst. Bot. Monog.* 74: 1 – 95.
- ZHU, R. L. AND D.G. LONG. 2003. Lejeuneaceae (Hepaticae) from several recent collections from the Himalaya. *J. Hattori Bot. Lab.* 93: 101 – 115.
- ZHU, R. L. AND M.L. SO. 1999. Additions of Lejeuneaceae taxa to the hepatic flora of Yunnan, China. *Ann. Bot. Fenn.* 36: 219 – 229.
- ZHU, R. L. AND M.L. SO. 2000. Notes on the taxonomy and distribution of *Lejeunea neelgherriana* and *Tuyamaella serraticarpa* (Hepaticae, Lejeuneaceae). *Ann. Bot. Fenn.* 37: 149 – 153.
- ZHU, R. L. AND M.L. SO. 2001. Epiphyllous liverworts of China. *Beih. Nova Hedwigia* 121: 1 – 418.

मणिपुर के लिवरवर्ट्स एवं हार्नवर्ट्स का संक्षिप्त वनस्पतिजातीय वर्णन

देवेन्द्र सिंह, मोनालिसा दे एवं डी.के. सिंह

सार संक्षेप

प्रस्तुत वनस्पतिजात में मणिपुर से लिवरवर्ट्स के 46 वंश एवं 20 कुलों की 111 जातियाँ एवं एक प्रभेद तथा हार्नवर्ट्स कुल में 3 वंशों की सात जातियाँ सम्मिलित हैं। इनमें से 92 वर्गकों (91 जाति एवं एक प्रभेद) का मणिपुर राज्य से पहली बार अभिलेख किया गया है। बजानिया ओरिएंटेलिस (स्टिफानी) परिहार हिमालय क्षेत्र के लिए नया रिकॉर्ड है जबकि पूर्वी हिमालय हरितोदिभ्दीय-भौगोलिक (ब्रायोज्योग्राफिकल) क्षेत्र के लिए पोरेला मैडागास्करिएंसिस (वीस एवं माँटेन) ट्रेविसान एवं फियोसिरॉस कश्यपाई ए.के. अस्थना एवं एस.सी. श्रीवास्तव नये हैं।