

Studies on Lejeuneaceae Subfam. Ptychanthoideae, V. A Review of the Species from Ceylon

By

S. Rob GRADSTEIN

Institute of Systematic Botany, Heidelberglaan 2, Utrecht, The Netherlands

and

Hiroshi INOUE

Department of Botany, National Science Museum, Tokyo

In the spring of 1966, the junior author (H. INOUE) made a bryophyte collecting trip to Ceylon (now Sri Lanka) with the support of the Japan Society for the Promotion of Science. The collections have served as a basis for reviews of individual liverwort genera or families occurring in Ceylon, e.g. *Frullania* (HATTORI, 1979) and *Plagiochila* (INOUE, 1979). The present paper deals with the species of Lejeuneaceae subfamily Ptychanthoideae, which comprises the more robust members of this large tropical family.

In his catalogue of the liverworts of Ceylon, ABEYWICKRAMA (1959) recorded 18 species of Ptychanthoideae, belonging to the genera *Archilejeunea* (1 sp.), *Brachiolejeunea* (1 sp.), *Lopholejeunea* (2 sp.), *Mastigolejeunea* (2 sp.), *Ptychanthus* (4 spp.), *Ptychocoleus* (5 spp.), *Spruceanthus* (1 sp.), *Thysananthus* (1 sp.), and *Trocholejeunea* (1 sp.). Unfortunately, his catalogue does not provide precise information on specimens or literature on which individual species records for Ceylon were based. Most of the species listed by ABEYWICKRAMA had been treated by VERDOORN (1934) in his monograph of Asiatic Ptychanthoideae. Some are now considered synonyms, however, whereas in other cases some doubts may be cast about the correctness of the identification: Since we have not been able to locate all specimens on which previous Ceylon records of Ptychanthoideae were based, the present review should be considered preliminary.

The INOUE specimens cited here are all kept in the herbarium of the National Science Museum, Tokyo (TNS), while some duplicates are deposited in the herbarium of the Institute of Systematic Botany, Utrecht (U). In addition, a few specimens are cited which were studied in the course of revisionary work on the genera *Acrolejeunea* and *Schifferiolejeunea* (olim *Ptychocoleus*) by GRADSTEIN (cf. 1975). Species marked with an asterisk are new to Ceylon.

We are very much indebted to the directors and curators of the herbaria cited for the loan of specimens. Thanks are also due to Dr. Riclef GROLLE, Jena, for his generous informations and loan of specimens for our study. The field work in 1966 in Ceylon by the junior author (H. INOUE) and the collaboration at the National Science Museum, Tokyo,

were supported by Japan Society for the Promotion of Science, and the junior author is indebted to the support given by a Grant in Aid for the Scientific Research (No. 248016) from the Ministry of Education, Science and Culture.

Acrolejeunea (SPRUCE) SCHIFFN.

**Acrolejeunea emergens* (MITT.) STEPH. in ENGL., Die Pflanzenwelt Ostafrikas C: 65 (1895); GRADSTEIN (1975): 71–79, Pl. IX, X.

Synonym: *Ptychocoleus emergens* (MITT.) STEPH., Spec. Hepat. 5: 24 (1912).

Specimens examined from Ceylon. Without definite loc., THWAITES *s.n.* (NY). Central Prov.: Around Royal Botanic Gardens, Peradeniya, 1500 ft, INOUE 13535 pp. (with *Lopholejeunea subfusca* and *Mastigolejeunea humilis*); Peradeniya, BECCARI 61 (GRO, U). Western Prov.: Negombo, sur les arbres isolés d'une cour, ONRAEDT 76.L.2625 (hb ONRAEDT, hb GROLLE, U).

General distribution. Common and widespread in tropical Africa and tropical America; new to Asia.

The two 19th century collections cited here (THWAITES *s.n.*, BECCARI 61) had previously been identified as *Acrolejeunea fertilis* (REINW. *et al.*) SCHIFFN. (GRADSTEIN, 1975), tentatively because they were said to differ from that species by the lobule, which has only 3–4 teeth and is more ovate in outline. These two specimens are fully identical with the two recent collections cited here, one of which (ONRAEDT 76.L.2625) is sterile and has the specialised flagelliform shoots producing caducous leaves as in *Acrolejeunea emergens*. Thus, it appears that the Ceylon specimens of "*A. fertilis*" actually belong to the Afro-American *A. emergens*. The identification was further confirmed by the structure of the stem in cross section, which in the Ceylon specimens proved to be distinctly asymmetric as in *A. emergens* (dorsal cortical cells distinctly larger than ventral cortical cells). In *A. fertilis*, on the other hand, the cortical cells are quite uniform in size.

The flagelliform shoots are apparently not so common in the Ceylonese populations of this species and they were found to be lacking in fertile plants. In other areas, *A. emergens* produces flagelliform shoots in great quantity in sterile as well as fertile populations.

ABEYWICKRAMA (1959) reported the occurrence on Ceylon of *Ptychocoleus ustulatus* (TAYL.) STEPH., which is a synonym of *Acrolejeunea fertilis*. Since we have not been able to locate the specimen on which this record was based, its identity remains doubtful.

Acrolejeunea pycnoclada (TAYL.) SCHIFFN. in ENGL. & PRANTL, Nat. Pfl.-fam. I, 3: 128 (1893); GRADSTEIN (1975): 108–115, Pl. XVI.

Synonym: *Ptychocoleus pycnocladus* (TAYL.) STEPH., Spec. Hepat. 5: 52 (1912).

Specimens examined from Ceylon. Without definite loc., BECCARI 24 (GRO); *ibid.*, DEW *s.n.* (MANCH). Ratnapura Distr.: Rest House, L. P. WHEELER 12469 (U, US). Nuwara Eliya Distr.: Pidurutaragara, reserved forest, 6100 ft, INOUE 12778 pp (with *Lopholejeunea subfusca*).

General distribution. A wide spread palaeotropical species, ranging from Tahiti through Indo-Malesia westwards to West Africa.

Caudalejeunea (STEPH.) SCHIFFN.

Caudalejeunea reniloba (GOTT.) STEPH., Spec. Hepat. 5: 16 (1912); VERDOORN (1934): 60–62.

Reported by MEIJER (1972) from the Sinharaja Forest Reserve in southern Ceylon, where it was found together with *Ephemeropsis tjibodensis* and several Lejeuneoideae on leaves in everwet rainforest. It is the only epiphyllous representative of Ptychanthoideae found thus far in Ceylon, all other species of this subfamily are usually corticolous. *Caudalejeunea reniloba* is a common and widespread species of tropical Southeast Asia and the Pacific, and is also recorded from Australia. Its westernmost occurrence is on Ceylon.

Lopholejeunea (SPRUCE) SCHIFFN.

Lopholejeunea ceylanica STEPH., Spec. Hepat. 5: 86 (1912); VERDOORN (1934): 85.

Synonym: *Lopholejeunea longiloba* STEPH., fide VERDOORN (1934).

Specimens examined from Ceylon. Nuwara Eliya Distr.: Pattipola, arbre d'une forêt claire, 1850 m.s.m., ONRAEDT 76.L.2439/b, det. GROLLE (hb ONRAEDT, hb GROLLE, u); ibid., à Haweliya, sur un talus ombragé, roche-mère, granit, 1850 m.s.m., ONRAEDT 76.L.3188, det. GROLLE (hb ONRAEDT, hb GROLLE, u).

General distribution. Endemic to Ceylon.

According to VERDOORN (1934), this species is closely related to *Lopholejeunea subfusca*, but we believe it is much more similar and possibly synonymic to *Lopholejeunea fragilis* STEPH. from Africa. Judging from the description and illustrations of *L. fragilis* provided by Van den BERGHEN (1972) it appears that the only difference is in the female bracteole, which is distinctly bifid in *L. ceylanica* whereas in *L. fragilis* it seems to be rounded or weakly emarginate only.

Lopholejeunea subfusca (NEES) SCHIFFN., Bot. Jahrb. 23: 593 (1897); VERDOORN (1934): 78–83; MIZUTANI (1961): 180–181, fig. XII.

Specimens examined from Ceylon. Nuwara Eliya Distr.: Hakgala Botanic Gardens, 6100 ft, INOUE 12853, 12913 (with *Schiffneriolejeunea polycarpa*); ibid., Pidurutaragara, reserved forest, 6100 ft, INOUE 12726, 12776 (with *Acrolejeunea pycnoclada*), 13583. Central Prov.: Between Rangala and Corbet's Gap, reserved forest, 4000 ft, INOUE 13825; ibid., around the Royal Botanic Gardens, Peradeniya, 1500 ft, INOUE 13535 (with *Acrolejeunea emergens* and *Mastigolejeunea humilis*).

General distribution. A widespread, pantropical species.

The Ceylonese specimens are usually autoicous and copiously fertile. The size and shape of the underleaves and the dentation of the margins of the female bracts are rather variable and in some plants the margins of the bracts are almost entire as in the West African *Lopholejeunea gabonensis* V.d. BERGHEN.

Mastigolejeunea (SPRUCE) SCHIFFN.

**Mastigolejeunea auriculata* (WILS.) SCHIFFN. in ENGL. & PRANTL, Nat. Pfl.-fam. I,

3: 129 (1893); EVANS (1902): 129–131, Pl. 17.

Type. U.S.A.: New Orleans, DRUMMOND, Musci (*sic!*) *Americani nr. 170* (BM, holo.; PC).

Synonym: *Mastigolejeunea carinata* (MITT.) STEPH., Spec. Hepat. 4: 759 (1912); Van den BERGHEN (1949): 378–382, Fig. 33=*Phragmicoma carinata* MITT., Trans. Royal Soc. London 5: 398 (1879), *syn. nov.* Type: Rodriguez I., BALFOUR s.n. (NY).

Specimens examined from Ceylon. Central Prov.: Around the Royal Botanic Gardens, Peradeniya, 1500 ft, INOUE 13372, 13536 (with *Mastigolejeunea humilis*), 13545.

General distribution. Widespread in tropical America and tropical Africa; new to Ceylon and probably occurring elsewhere in tropical Asia as well.

Mastigolejeunea auriculata was originally described from tropical America whereas in Africa this species was known as *M. carinata* (MITT.) STEPH. After examination of the type specimens and a series of additional collections, we have come to the conclusion that the two species are identical. *M. auriculata* is closely related to the common Asiatic *M. humilis* (GOTT.) SCHIFFN., which is usually considered to be a morphologically very variable species. According to VERDOORN (1934), MIZUTANI (1961) and KITAGAWA (1971), *M. humilis* includes forms with very long lobule teeth as well as forms in which the lobule tooth is very short or absent. We did not examine type material of *M. humilis*, but according to KITAGAWA (1971) only short teeth are seen in the type. Short lobule teeth are also characteristic for *M. auriculata*, which, however, never produces long teeth.

Among the Ceylon materials of *Mastigolejeunea* we have found both plants with a very short (1–2 cells) lobule tooth (= *M. auriculata*) and plants with a very long (4–6 cells), curved tooth. The following statement by VERDOORN (1934, p. 105) on the variability of *Mastigolejeunea humilis* is significant here: “in bestimmten Teilen des Gebietes (Ceylon!) wachsen ganz verschiedene Formen zusammen . . .”. In one locality the two plants are growing together (INOUE 13536) and are easily distinguished by their very different lobule. In addition, plants with long lobule teeth have perianth keels with small, irregular wing-like outgrowings, whereas in *M. auriculata* perianth keels are quite smooth. We have identified the plants with long lobule teeth as *M. humilis*, following common practice, but further revisionary studies of Asiatic *Mastigolejeunea* are needed to determine the proper name and status of these plants.

Mastigolejeunea humilis (GOTT.) SCHIFFN. in ENGL. & PRANTL, Nat. Pfl.-fam. I, 3: 129 (1893); VERDOORN (1934): 103–107; MIZUTANI (1961): 156–159, Fig. VII.

Specimens examined from Ceylon. Central Prov.: Hantana, tea plantation district, 1900 ft, INOUE, 12524; *ibid.*, around Royal Botanic Gardens, Peradeniya, 1500 ft, INOUE 13321, 13535 (with *Acrolejeunea emergens* and *Lopholejeunea subfusca*), 13536 (with *Mastigolejeunea auriculata*), 13539, 12543 (with *Lopholejeunea subfusca*).

General distribution. Common throughout tropical Asia and Oceania, from Ceylon to Tahiti.

This species is discussed under *Mastigolejeunea auriculata*. The illustration provided by MIZUTANI (1961), based on the Japanese material, shows plants with

a very short lobule tooth, acute leaf lobes and smooth perianth keels, differing considerably from the Ceylonese plants which have a long, curved lobule teeth, rounded leaflobes, and a rudimentarily winged perianth keel.

Mastigolejeunea repleta (TAYL.) EVANS, Mem. Torrey Bot. Club, **8**: 131 (1902); VERDOORN (1934): 107–109.

Synonym: *Mastigolejeunea atypos* (SCHIFFN.) STEPH., Spec. Hepat. **4**: 768 (1912) = *Mastigo-(Trigono-)Lejeunea atypos* SCHIFFN., Forschungsreise Gazelle, **4**: 22 (1890).

This widespread southeast Asiatic species was reported from Ceylon as *Mastigolejeunea atypos* (ABEWICKRAMA, 1959), which is a synonym of *M. repleta* according to KITAGAWA (1973). *M. repleta* is apparently closely related to *M. auriculata* and further studies are needed to clarify their relationship.

Ptychanthus NEES

Ptychanthus striatus (LEHM. et LINDENBG.) NEES, Naturgesch. Eur. Leberm. **3**: 212 (1938); VERDOORN (1934): 115–122; MIZUTANI (1961): 148–149, Fig. V.

Specimens examined from Ceylon. Nuwara Eliya: Moon Plane, around grassland, 6100 ft, INOUE 12880; Pidurutaragara, reserved forest, 6100 ft, INOUE 12727, 12733, 12786, 12787, 13561. Central Prov.: Between Rangala and Corbet's Gap, reserved forest, 4000 ft, INOUE 13221.

General distribution. A widespread palaeotropic species, ranging from Central Africa to the western Pacific. Also common in adjacent warm temperate regions (South Africa, Himalayas, Japan, Australasia).

ABEWICKRAMA (1959) listed three further species of *Ptychanthus* from Ceylon (*P. birmensis* STEPH., *P. effusa* STEPH., and *P. nietneri* STEPH.), but all of these are synonyms of *P. striatus* according to VERDOORN (1934).

Schiffneriolejeunea VERDOORN

Schiffneriolejeunea polycarpa* (NEES) GRADST., Journ. Hattori Bot. Lab. **38: 335 (1974).

Synonyms: *Ptychocoleus polycarpus* (NEES) TREV., Mem. Real. Ist. Lomb. Sci. Math.-Nat., ser. 3, **4**: 405 (1877); EVANS (1908): 162–165, Pl. 7.

Ptychocoleus molleri (MITT.) STEPH., Spec. Hepat. **5**: 29 (1912); Van den BERGHEN (1948): 44–47, Fig. 3.

Specimens examined from Ceylon. Nuwara Eliya: Between Brookside and Mahauva, along roadside, 4500–5500 ft, INOUE 12611, 13615; Pidurutaragara, reserved forest, INOUE 12606; Hakgala Botanic Gardens, 6100 ft, INOUE 12913 (with *Lopholejeunea subfusca*). Central Prov.: Hantana, tea plantation district, 1900 ft, INOUE 12525, 12526, 12598, 12599 (with *Schiffneriolejeunea pulopenangensis*).

General distribution. Common and widespread in tropical America and tropical Africa; new to Asia!

Schiffneriolejeunea polycarpa is most closely related to the common Asiatic *S. pulopenangensis*, which also occurs on Ceylon. The species may even grow together

in the field (cf. INOUE 12599) and are readily distinguished by the following key:

- Lobule with 1–2 rather small, erect teeth, the first tooth largest, 2–3-cells long, becoming broad triangular in robust stem leaves, the second tooth consisting of only one cell or absent; female bracts and bracteoles concave-convoluted, with plane, entire margins and incurved apices, the inner bracteole broadly rounded at apex, entire or minutely bifid.....*S. polycarpa* (NEES) GRADST.
 Lobule with 2–3–(4) elongated, curved teeth, the first and second teeth 3–5 cells long, the other teeth smaller or absent; female bracts and bracteoles more or less concave but not convoluted, with recurved, more or less denticulate margins and straight apices, the inner bracteole bifid to 1/5 (but sometimes entire in Malaysian plants)
 *S. pulopenangensis* (GOTT.) GRADST.

In addition, it should be noted that in *Schiffneriolejeunea pulopenangensis* the leaf lobes tend to be narrower and more elongate. The differences between the two species shall be discussed in greater detail in a forthcoming monographic treatment of the genus (GRADSTEIN, in prep.). Two specimens of *S. polycarpa* (INOUE 12913, 13615) stand out by their almost tubular-involute inner female bracteole, closely enveloping the much shorter perianth. We have never seen such strongly convoluted bracteoles in African or American materials of this species, but a similar condition exists in the African *S. pappeana* (NEES) GRADST., a species also related to *S. polycarpa* but different by the terete, non-plicate perianth, the auriculate underleaves and the dioicous condition.

Schiffneriolejeunea pulopenangensis (GOTT.) GRADST., Journ. Hattori Bot. Lab. **38**: 335 (1974).

Synonym: *Ptychocoleus pulopenangensis* (GOTT.) TREV., Mem. Reale Ist. Lomb. Sci. Math.-Nat. ser. 3, **4**: 405 (1877); VERDOORN (1934): 130–131; KITAGAWA (1969): 40–41, Fig. IV.

Specimens examined from Ceylon. Central Prov.: Hantana, tea plantation district, 1900 ft, INOUE 12599 (with *Schiffneriolejeunea polycarpa*); Peradeniya, with the type of *Ptychocoleus peradeniense* (MITT.) STEPH. (= *Schiffneriolejeunea tumida*!), GARDNER 1474 (NY). Nuwara Eliya Distr.: Haputale, abbaye bénédictyne, ONRAEDT 771 2242 (hb. ONRAEDT, hb. GROLLE, U).

General distribution. Common in southeast Asia from India and Ceylon to the Moluccas.

This species was discussed under *Schiffneriolejeunea polycarpa*.

Schiffneriolejeunea tumida (NEES) GRADST., Journ. Hattori Bot. Lab. **38**: 335 (1974).

Synonyms: *Ptychocoleus tumidus* (NEES) TREV., Mem. Real. Inst. Lomb. Sci. Math.-Nat. ser. 3, **4**: 405 (1877); VERDOORN (1934): 141–143. Type: Malaysia; Pulo-Pinang, A. DELESSERT *s.n.* ex hb MONTAGNE (STR, holo.; G, PC).

Ptychocoleus peradeniense (MITT.) STEPH., Spec. Hepat. **5**: 51 (1912); VERDOORN (1934): 136 = *Lejeunea peradeniense* MITT., Journ. Proc. Linn. Soc. Bot. **5**: 111 (1861), *syn. nov.* Type: Ceylon; Peradeniya, ad arbores, GARDNER 1474 (NY, holo.; BM, FH, K), mixed with *Schiffneriolejeunea pulopenangensis*!

Ptychocoleus cumingianus auct. non (MONT.) TREV.; VERDOORN (1934): 137–139.

Schiffneriolejeunea tumida has been recorded from Ceylon as *Ptychocoleus peradeniensis* (MITT.) STEPH. which is now reduced to a synonym of *S. tumida*, and as *Ptychocoleus cumingianus* (MONT.) TREV., a distinct but poorly understood species which was frequently confused with *S. tumida* by previous authors. *S. tumida* somewhat resembles *S. pulopenangensis* but is readily distinguished by the narrow, inflated lobule with saccate base, inrolled free margin and two triangular teeth of variable size (sometimes minute, of one cell only) near the apex. The taxonomy of *S. tumida* and its allies is dealt with in a separate paper (GRADSTEIN and TERKEN, in prep.).

Schiffneriolejeunea tumida is common and widespread in tropical southeast Asia and Pacific regions, and has recently also been found in the Seychelles (GROLLE, 1978).

Spruceanthus VERDOORN

Spruceanthus marianus (MONT.) MIZUT., Journ. Hattori Bot. Lab. 29: 290 (1966).

Synonym: *Archilejeunea mariana* (GOTT.) STEPH., Spec. Hepat. 4: 729 (1911); VERDOORN (1934): 48-51.

Specimen examined from Ceylon. Nuwara Eliya Distr.: Hakgala Botanic Gardens, 6100 ft, INOUE 12873. Galle Distr.: Hiniduma, arbre de foret ombrophile, alt. 200 m.s.m., ONRAEDT 76.L.3433 (hb. ONRAEDT, U).

General distribution. Widespread in tropical and subtropical Asia and Pacific regions, from India and Ceylon to Hawaii and Tahiti. Recently this species was also found in the Seychelles (GROLLE, 1978), the first African record of this Asiatic genus.

Spruceanthus semirepandus (NEES) VERDOORN, Ann. Bryol. suppl. 4: 153 (1934); MIZUTANI (1961): 161-164, Fig. IX.

Specimens examined from Ceylon. Nuwara Eliya Distr.: Pidurutaragala, reserved forest, 6100 ft, INOUE 12565, 13555.

General distribution. Common in tropical and warm temperate southeast Asia, from Ceylon and Himalayas eastwards to Japan, Borneo and the Philippines.

Trocholejeunea SCHIFFN.

Trocholejeunea infuscata (MITT.) VERDOORN, Ann. Bryol. suppl. 4: 190 (1934).

Synonyms: *Ptychocoleus saccatus* (MITT.) STEPH., Spec. Hepat. 5: 53 (1912).

Trocholejeunea levieri (STEPH.) SCHIFFN., Ann. Bryol. 5: 160, Fig. I (1932).

General distribution. A Himalayan species, recorded from Ceylon by STEPHANI (1912) as *Ptychocoleus saccatus* (MITT.) STEPH.

Trocholejeunea infuscata is closely related to *T. sandvicensis* which also occurs on Ceylon but is easily separated from the latter, even when sterile, by the much larger underleaves with much more deeply arched insertion line.

Trocholejeunea sandvicensis (GOTT.) MIZUT., Misc. Bryol. Lichenol. 2: 169 (1962).

Synonym: *Brachiolejeunea sandvicensis* (GOTT.) EVANS, Trans. Conn. Acad. 10: 419 (1900); MIZUTANI (1961): 167-168, Fig. XI.

Specimens examined from Ceylon. Nuwara Eliya Distr.: Pidurutaragara, reserved

forest, 6100 ft, INOUE 13578; Hakgala Botanic Gardens, 6100 ft, INOUE 12582, 12714, 12719, 13726.

General distribution. A predominantly northern tropical Asiatic species, occurring in India, Ceylon, continental southeast Asia, Taiwan, Japan, Hawaii, and in the central Pacific (Tahiti). The species is apparently absent from Indonesia and neighbouring areas.

Thysananthus LINDENBG.

Thysananthus spathulistipus (REINW., BL. et NEES) LINDENBG. in GOTT. *et al.*, Syn. Hepat.: 287 (1845); VERDOORN (1934): 162–172.

Thysananthus spathulistipus is a common and widespread palaeotropical species, ranging from east Africa to the central Pacific. Its distribution area somewhat resembles that of *Ptychanthus striatus* but the species is apparently lacking in warm temperate regions, e.g. Japan and Australasia. It is apparently the only representative of this large pantropical genus in Ceylon, but we have not seen specimen to confirm the Ceylon record (MITTEN, 1861, as *Lejeunea spathulistipa*; VERDOORN, 1934, also listed Ceylon but not seen specimen).

Concluding Remarks

Seventeen species of Ptychanthoideae are now known from Ceylon, two of which however need confirmation because their occurrence on Ceylon is based on old records only (*Mastigolejeunea repleta*, *Thysananthus spathulistipus*). One species of Ptychanthoideae is endemic (*Lopholejeunea ceylanica*) but its status is somewhat doubtful as it seems to be closely related to the African *L. fragilis* STEPH. Endemism in Ceylonese Ptychanthoideae appears to be much lower than in the liverwort genus *Plagiochila* studied for Ceylon by INOUE (1979) who recognized 17 species, of which seven species are endemic, but it is rather similar to that in the genus *Frullania* studied by HATTORI (1979), who found twelve species on Ceylon, none of which endemic.

All species recorded here were collected in the so-called "wet zone" and "mountain zone", at altitudes ranging from 400 to 2000 m. The vascular flora of this zone shows a great similarity to that of the Malesian rainforests (ABEYWICKRAMA, 1956) and the same seems to be true for bryophytes (see MEIJER, 1972; INOUE, 1979; HATTORI, 1979). In the upper mountain zone, above 1500 m.s.m., Himalayan species become apparent as for instance *Plagiochila firma* MITT. and *P. flexuosa* MITT. The Ptychanthoideae are now represented in Ceylon by the following phytogeographic elements.

Endemic: *Lopholejeunea ceylanica*.

Tropical Asiatic: *Caudalejeunea reniloba*, *Mastigolejeunea humilis*, *M. repleta*, *Schiffneriolejeunea pulopenangensis*, *S. tumida*, *Spruceanthus marianus*, *S. semirepandus*, *Trocholejeunea sandvicensis*.

Himalayan: *Trocholejeunea infuscata*.

Palaeotropical: *Acrolejeunea pycnoclada*, *Ptychanthus striatus*, *Thysananthus spathulistipus*.

Afro-American: *Acrolejeunea emergens*, *Mastigolejeunea auriculata*, *Schiffneriolejeunea polycarpa*.

Pantropical: *Lopholejeunea subfusca*.

Thus, it appears that besides widespread palaeotropical or pantropical species the Malesian element is most strongly represented. Of considerable interest, however, is the presence of three Afro-American species, each new to Ceylon [*Acrolejeunea emergens* was recently also recorded from Ceylon by GROLLE (1978), based on one of the collections cited here]. In each case, they were originally misidentified and confused with Malesian species or described as endemic. We therefore suggest that careful comparisons with African or American species should be carried out for other groups of Ceylon bryophytes, to determine whether the same is true there.

While for the Malesian species Ceylon is usually the westernmost limit of distribution, some Afro-American species of Lejeuneaceae are now shown to have their easternmost extension to this island. GROLLE's analysis of the bryoflora of the Seychelles (GROLLE, 1978) shows a similar situation for those islands. Thus, the floras of the Seychelles and Ceylon seem to be of considerable importance in bryogeography, linking Asiatic and African elements. For a more detailed discussion of the relationships between these two tropical bryofloras we may refer to Pócs (1976).

Literature Cited

- ABEYWICKRAMA, B. A., 1956. The origin and affinities of the flora of Ceylon. *Proc. Eleventh Ann. Sess. Ceylon Ass. Adv. Sci.*, D: 1-23.
- , 1959. The genera of the liverworts of Ceylon. *Ceylon Journ. Sci. (Biol. Sci.)*, 2: 33-81, fig. 1-64.
- EVANS, A. W., 1902. The Lejeuneaceae of the United States and Canada. *Mem. Torrey Bot. Club.*, 8: 113-183, pl. 1-22.
- , 1908. Hepaticae of Puerto Rico, IX. *Brachiolejeunea*, *Ptychocoleus*, *Archilejeunea*, *Leucolejeunea* and *Anoplolejeunea*. *Bull. Torrey Bot. Club.*, 35: 155-179, pl. 6-8.
- GRADSTEIN, S. R., 1975. A taxonomic monograph of the genus *Acrolejeunea* (Hepaticae) with an arrangement of the genera of Ptychanthoideae. *Bryophyt. Biblioth.*, 4: 1-162, pl. I-XXIV.
- GROLLE, R., 1978. Die Lebermoose der Seychellen. *Wiss. Zeitschr. Fried.-Schil. Univ. Jena, Math.-Nat. R.*, 27: 7-17.
- HATTORI, S., 1979. Dr. H. Inoue's collection of *Frullania* taxa (Hepaticae) made in Ceylon. *Journ. Jap. Bot.*, 54: 22-26.
- INOUE, H., 1979. Contributions to the knowledge of the Plagiochilaceae of southeastern Asia, XVIII. A review of the genus *Plagiochila* (Dum.) Dum. in Ceylon. *Journ. Hattori Bot. Lab.*, 48: 193-233, fig. 1-16.
- KITAGAWA, N., 1969. A small collection of Hepaticae from Penang, Malaysia. *Bull. Nara Univ. Educ.*, 18: 27-43, fig. I-IV.
- , 1971. A small collection of Hepaticae from Penang, Malaysia—continued. *Bull. Nara Univ. Educ.*, 20: 7-14.
- , 1973. Miscellaneous notes on little-known species of Hepaticae, 26-50. *Journ. Hattori Bot. Lab.*, 37: 263-273.
- MELJER, W., 1972. The discovery of *Ephemeropsis tjibodensis* Goebel (Ephemeropsidaceae) in the everwet rainforests of Ceylon. *Journ. Hattori Bot. Lab.*, 38: 552-555.

- MIZUTANI, M., 1961. A revision of Japanese Lejeuneaceae. *Journ. Hattori Bot. Lab.*, **24**: 115-302, fig. I-XXXIX.
- PÓCS, T., 1976. Correlations between the tropical African and Asian bryofloras, 1. *Journ. Hattori Bot. Lab.* **41**: 95-106.
- STEPHANI, F., 1912. *Ptychocoleus* Trev., 1876. *Spec. Hepat.*, **5**: 19-60.
- VAN DEN BERGHEN, C., 1948. Note sur le genre *Ptychocoleus* Terv. en Afrique Tropicale. *Bull. Jard. Bot. Bruxelles*, **19**: 37-49.
- , 1949. Contribution a l'étude des especes africaines du genre *Mastigolejeunea* (Spr.) Schiffn. *Bull. Jard. Bot. Bruxelles*, **19**: 371-382, fig. 31-33.
- , 1972. Hepaticae and Anthocerotae. In SYMOENS, J. J. (ed.): *Hydrobiological Survey of the Lake Bengweulu, Luapula river basin*, **3** (1): 1-202, Fig. 1-86.
- VERDOORN, F., 1934. Studien über Asiatische Jubulae. *Ann. Bryot. suppl.*, **4**: I-XII, 1-231, fig. 1-32.