

Type studies on *Pycnolejeunea* (Lejeuneaceae, Hepaticae), III. Two Asiatic species described by Hoffmann

Xiao-Lan He

He, X.-L., Department of Ecology and Systematics and Botanical Museum, P.O. Box 47, FIN-00014 University of Helsinki, Finland

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Pycnolejeunea malaccensis Hoffm. and *P. renneri* Hoffm. are transferred to *Cheilolejeunea* (Spruce) Schiffn. and placed in subgenus *Xenolejeunea* Schust. section *Meyenianae* Thiers. Complete descriptions and illustrations are provided.

Key words: *Cheilolejeunea*, Hepaticae, Lejeuneaceae, *Pycnolejeunea*

Kachroo and Schuster (1961) critically revised the genus *Pycnolejeunea* (Spruce) Schiffn. on the basis of the monograph for Indo-Malaya by Hoffmann (1935). They initially cleared up the confusion made by Hoffmann on the generic delimitation between *Pycnolejeunea* and other genera. Concerning the three new species described by Hoffmann, Kachroo and Schuster transferred *Pycnolejeunea verdoornii* Hoffm. to *Cheilolejeunea* (Spruce) Schiffn., but they maintained *Pycnolejeunea malaccensis* Hoffm. in the genus, and *P. renneri* Hoffm. was not mentioned by them.

In the course of my work on *Pycnolejeunea*, I re-examined the type collections of *Pycnolejeunea malaccensis* and *P. renneri*. It is clear that both species have no affinity to *Pycnolejeunea*. The absence of ocelli in leaf lobes, the hyaline papilla distal to the second lobular tooth, the poorly developed trigones, and the vestigial dorsal keel of the perianth indicate that these two species must be transferred to *Cheilolejeunea*.

***Cheilolejeunea malaccensis* (Hoffm.) X.-L. He, comb. nov.** (Figs. 1, 2a–c)

Basionym: *Pycnolejeunea malaccensis* Hoffm., Ann. Bryol. 8: 118. 1935. — Type: Malaysia. Penang Is. Ad arborum truncos. In horto Waterfall-Gardens, 2–50 m, 1893, Schiffner 2730 (FH-21015!), lectotype, *nov.*; JE!, isolectotype). Singapore. Ad arborum truncos secus vias et in horto botanico. Regio calida, alt. 2–20 m. 4.XI.1893, Schiffner 2795 (FH-21055!), syntype).

Autoicous. Plant rather small, to 1 cm long and 1 mm wide, yellowish brown in dry condition, on bark, loosely creeping or forming appressed mats. Branching *Lejeunea* type, growth habit irregularly pinnate. Stems 60–88 µm in diam., stem cells rectangular, on the ventral side 18–40 µm long and 13–20 µm wide, in cross-section composed of 7 epidermal cells surrounding 9–12 medullary cells, epidermal cell rectangular, 20–38 µm long, 13–25 µm wide, cell walls slightly thickened, medullary cells apparently smaller than epidermal cells, isodiametric; ventral

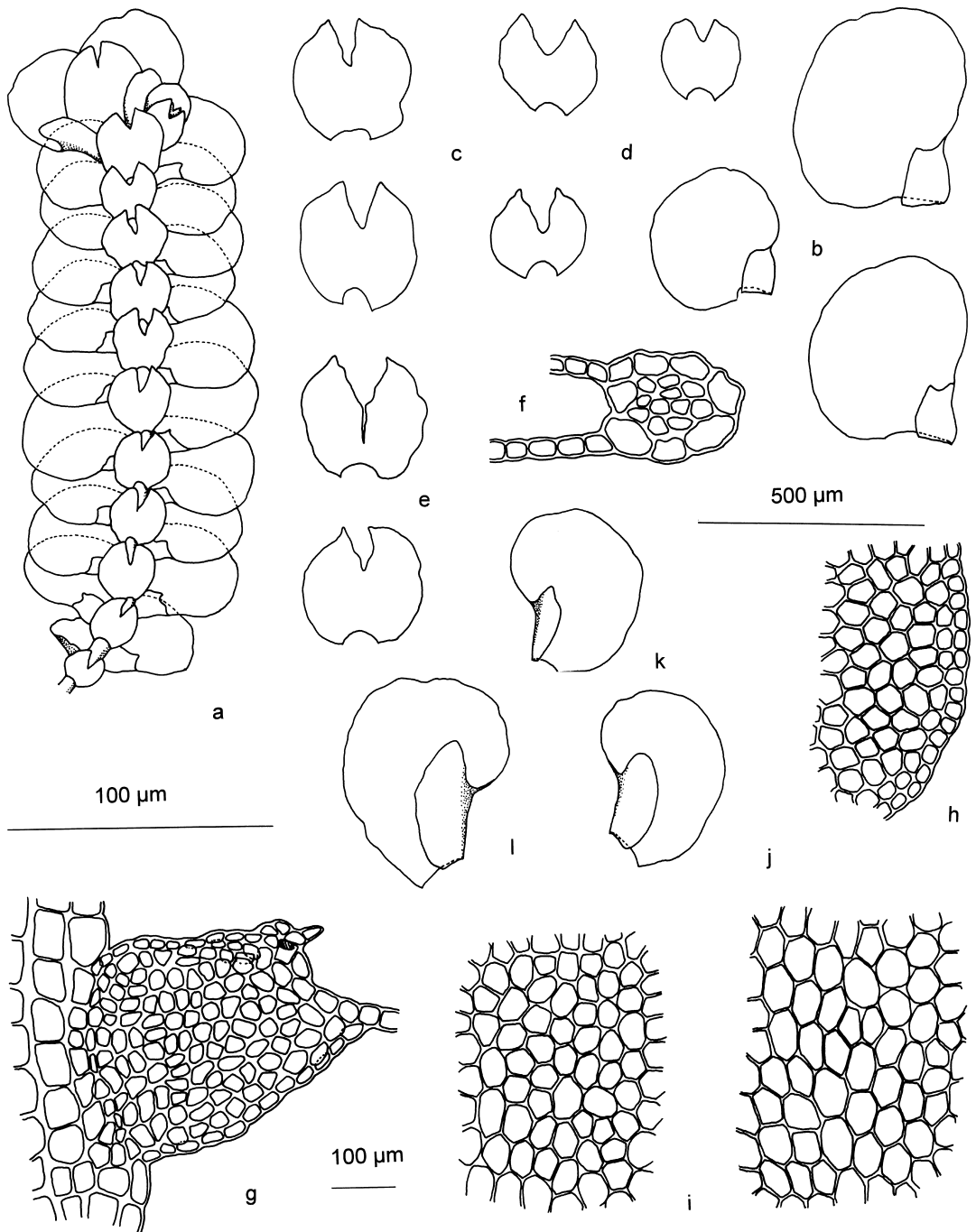


Fig. 1 a–l. *Cheilolejeunea malaccensis* (Hoffm.) X.-L. He (drawn from Schiffner 2730, FH-21015). — a: Habit. — b: Leaves. — c–e: Underleaves. — f: Cross-section of the stem. — g: Leaf lobule and its insertion on dorsal side of stem. — h: Apical leaf margin. — i: Cells from middle portion of leaf. — j: Cells from basal portion of leaf. — k–l: Female bracts. — Use the 500 µm scale for a, the longer 100 µm scale for f–j, and the shorter 100 µm scale for b–e and k–l.

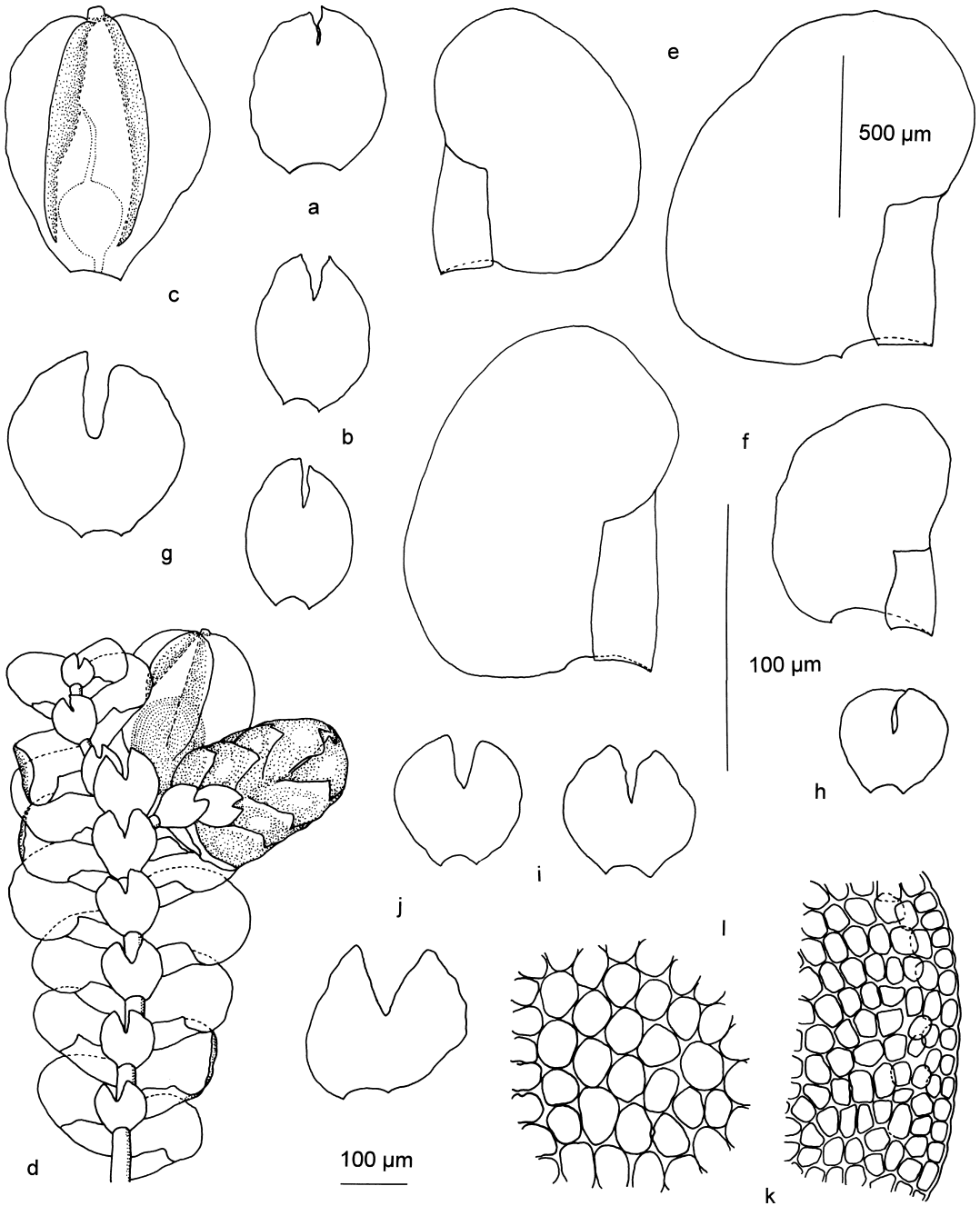


Fig. 2a–c. *Cheilolejeunea malaccensis* (Hoffm.) X.-L. He (drawn from *Schiffner 2730*, FH-21015). d–l. *Cheilolejeunea renneri* (Hoffm.) X.-L. He (drawn from *Renner 322*, JE). — a–b: Female bracteoles. — c: Perianth. — d: Habit. — e–f: Leaves. g–j: Underleaves. — k: Apical leaf margin. — l: Cells from middle portion of leaf. — Use the 500 µm scale for d, the longer 100 µm scale for k and l, and the shorter 100 µm scale for a–c and e–j.

merophytes on stems 2 cells wide. Leaves imbricate, sometimes contiguous, when moist widely spreading to obliquely upward directed, insertion line J-shaped; lobes ovate to suborbicular, 0.63–1.50 mm long and 0.50–1.25 mm wide, dorsal margin broadly arched, ventral margin slightly arched, with a gentle angle near the lobular apex, margins entire, plane, apex obtuse and broadly rounded; lobe cells isodiametric, apical marginal cells 8–15 × 6–13 μm, median cells 20–28 × 15–19 μm, basal cells 21–35 × 15–20 μm, trigones lacking or poorly developed, usually present at the lobe base, intermediate thickenings few or lacking, cuticle smooth; ocelli absent, oil bodies unknown. Lobules rectangular or oblong, slightly inflated, ca. 2 times longer than broad, 0.3–0.5 of lobe length, cells irregularly quadrate, 13–18 μm long, 8–10 μm wide, keels slightly arched, ca. 0.3 of lobe length, without wing, free margin slightly incurved, the first tooth blunt or undefined, the second tooth 1-celled, obtuse, sometimes obsolete, hyaline papilla distal to the second tooth. Underleaves contiguous or occasionally distant, 1.8–3.4 × stem width, rotund, lobed 0.3–0.5 (–0.7) of their length, lobes triangular, usually with a broad V-shaped sinus, leaf base sometimes expanded, margins plane, cuneiform, insertion line usually deeply arched. Rhizoid disc well developed at the underleaf base. Androecia on elongated or short specialized branches, terminal in position, spicate, bracts in 2–4 pairs, with hypostatic lobules, male bracteoles 1–2, restricted to the base of spike, margins plane, entire. Gynoeceia on main shoots or gyrothecal branches, sometimes terminating short branches, innovation single, innovation leaf sequence pycnolejeuneoid; female bracts in one pair, suberect, shorter than vegetative leaves, bract lobe ovate to ovate-oblong, 0.39–0.50 mm long and 0.25–0.40 mm wide, apex obtuse, plane, margins entire, or slightly crenulate with protruding cells; bract lobule 0.56–0.66 of bract length, ovate-oblong, apex obtuse, keel 0.4–0.5 of bract length, without wing; bracteole ovate-oblong, 0.38–0.42 mm long and 0.28–0.33 mm wide, the apex 2-lobed to ca. 0.3 of bracteole length, lobe apices acute, sinus narrow, margins entire, plane. Perianth emergent, usually latipyriform, 0.55–0.86 mm long and 0.43–0.60 mm wide, with 2 ventral keels, dorsal keel reduced, somewhat visible, lateral keels

usually with 1-celled wing, perianth apex truncate, with a short beak. Sporophyte not seen.

In his original description, Hoffmann (1935) mentioned that *Cheilolejeunea malaccensis* was closely related to *Strepsilejeunea hamatifolia* Steph., *S. novae-guineae* Steph. and *S. planifolia* Steph. (= *Cheilolejeunea imbricata* (Nees) Hatt., Mizutani 1961)) in the habit and lobule. However, I did not find any affinity with the above three species, because all three are larger, and have at least a 2-celled second lobular tooth (Stephani 1924, Mizutani 1980).

Distribution: Malaysia and Singapore.

***Cheilolejeunea renneri* (Hoffm.) X.-L. He, *comb. nov.* (Figs. 2d–i, 3)**

Basionym: *Pycnolejeunea renneri* Hoffm., Ann. Bryol. 8: 117. 1935. — Type: Indonesia. Sumatra, Prapat, 1931, Renner 322 (JE!, holotype).

Autoicous. Plant delicate, shoots to 0.8 cm long and 1.0 mm wide, whitish brown in dry condition, on bark, forming appressed mats or loosely creeping. Branching *Lejeunea* type, growth habit irregularly pinnate. Stems 75–95 μm in diam., stem cells quadrate to rectangular, on the ventral side 20–40 μm long and 15–30 μm wide, in cross-section composed of 7–10 epidermal cells surrounding 9–15 medullary cells, epidermal cells rectangular, 16–35 μm long and 10–20 μm wide, cell walls thickened, medullary cells smaller than epidermal cells, isodiametric; ventral merophytes on stems 2–3 cells wide. Leaves imbricate, occasionally contiguous, when moist widely spreading to obliquely upward directed, insertion line J-shaped; lobes ovate, 0.30–0.65 mm long and 0.22–0.50 mm wide, dorsal margin broadly arched, ventral margin slightly arched, with a gentle angle near apex of the lobule, or almost straight on the young leaves, apex obtuse and broadly rounded, margins plane or slightly convex, entire; lobe cells isodiametric, apical marginal cells 7–18 × 5–10 μm, median cells 17–26 × 15–20 μm, basal cells 20–35 × 17–23 μm, trigones present, small to well developed, intermediate thickenings usually few or lacking, cuticle smooth; ocelli absent, oil bodies unknown. Lobules rectangular, almost flattened, 1.3–2.0 × longer than broad, and 0.28–0.43 of lobe length, cells irregularly rectangular or sometimes

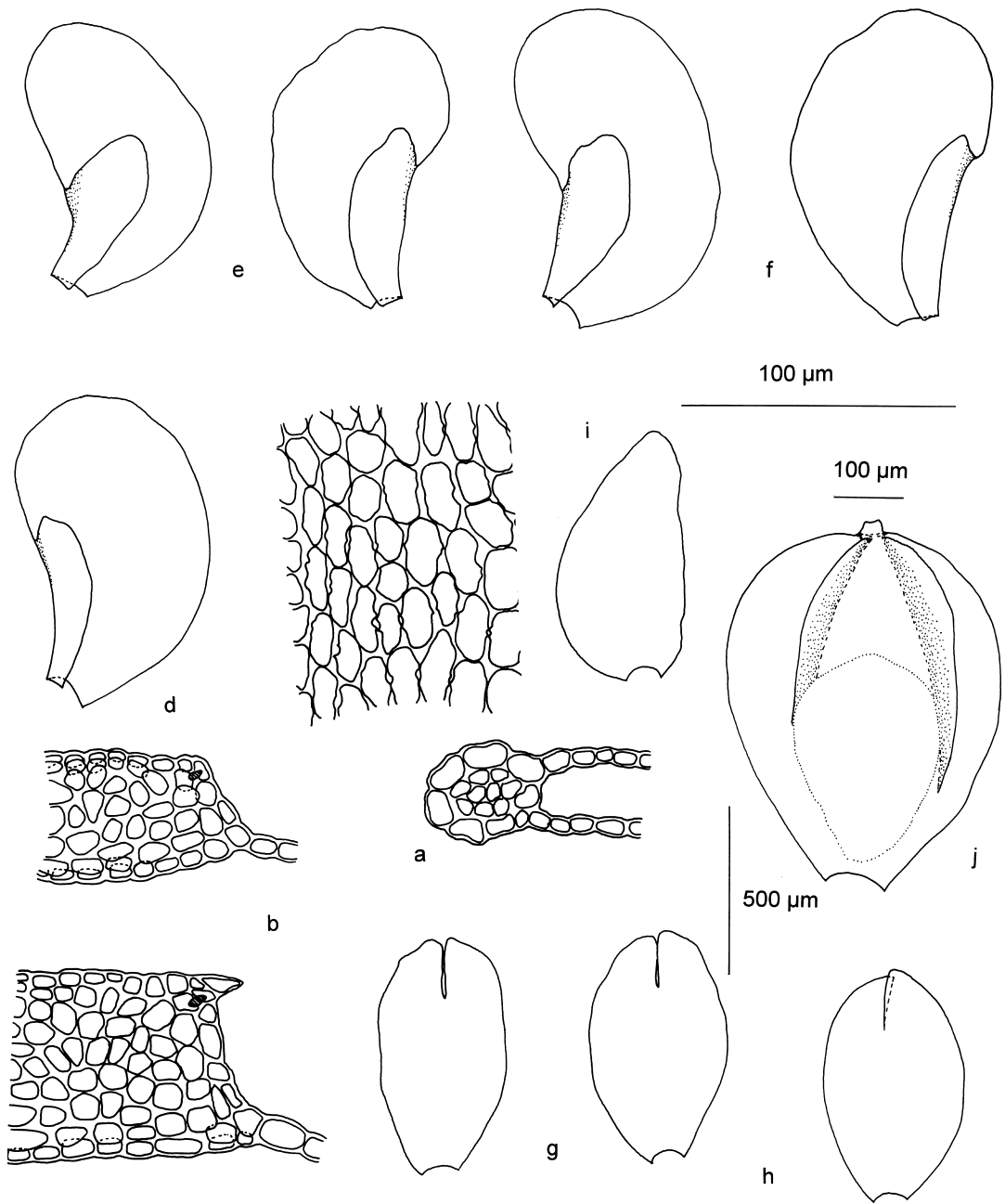


Fig. 3a–j. *Cheilolejeunea renneri* (Hoffm.) X.-L. He (drawn from *Renner 322*, JE). — a: Cross-section of the stem. — b: Lobule apex. — c: Cells from basal portion of leaf. — d–f: Female bracts. — g–h: Female bracteoles. — i: Reduced male bracteole. — j: Perianth. — Use the 500 μm scale for i, the longer 100 μm scale for a–c, and the shorter 100 μm scale for d–h and j.

isodiametric, 12–22 μm long and 9–13 μm wide, keel slightly arched or almost straight, free margin slightly incurved on the proximal side, straight on the distal, lobule apex truncate, the first tooth obsolete or forming a blunt projection, the second tooth usually 1-cell long or obtuse, rarely 2-cells long, hyaline papilla distal to the second tooth. Underleaves imbricate or contiguous, 3.0–3.5 \times stem width, almost rotund, lobed 0.4–0.5 of their length, lobes triangular, sinus narrow or V-shaped, insertion line slightly cuneate. Rhizoid disc well developed, with a bundle of pellucid rhizoids at the base of underleaves. Androecia on short or elongated branches, terminal or intercalary in position, spicate, bracts in 3–8 pairs, with hypostatic lobules, male bracteoles 1–2, rarely with the third, half reduced bracteole at the upper end, bracteoles restricted to the base of spike, margins plane, entire. Gynoecia on main shoots or gyrothecal branches, innovation single, innovation leaf sequence Pycnolejeuneoid, female bracts in one pair, suberect, longer than vegetative leaves, bract lobe oblong, 0.57–0.70 mm long and 0.32–0.39 mm wide, plane, margins entire, bract lobule 0.50–0.65 of bract length, oblong-acuminate or oblong-acute, keel 0.33–0.56 of bract length, without wing; bracteole oblong, 0.49–0.54 mm long and 0.27–0.29 mm wide, apex 2-lobed to ca. 0.2 of bracteole length, lobe apices truncate-rounded, sinus rather narrow, usually lobe apex overlapping, margins entire. Perianth emergent, lati-pyriform, with 2 smooth ventral keels, dorsal keel reduced, perianth apex smoothly truncate, beak short. Sporophyte not seen.

I have observed the variation of the leaf structure of *Cheilolejeunea renneri*: the trigones of young vegetative leaves are usually small or undefined, but sometimes well developed in the mature vegetative leaves and the gyrothecal leaves; and the length of the second lobular tooth varies from 1 cell to 2 cells, or it may occasionally be obscure.

Hoffmann (1935) considered that *Cheilolejeunea renneri* resembled *C. longidens* (Steph.) Kachroo &

Schust. in habit and lobule shape. However, based on my study on the type of *C. longidens*, the latter species is dioicous, the plants are olive-green in dry condition, leaf lobes and underleaves are usually distant, trigones are absent, and lobules are smaller.

Distribution: Indonesia (Sumatra).

Additional specimen examined. — *Cheilolejeunea longidens*: Australia, Queensland. "L. 56" (G-199011, lectotype, designated by Thiers 1992).

Both *Cheilolejeunea malaccensis* and *C. renneri* have a rectangular lobule, which is a notable character of the subgenus *Xenolejeunea* Schust. Moreover, other features of the two species, such as the broader lobule, 1-celled second lobular tooth, truncate lobular apex and pycnolejeuneoid innovation leaf sequence suggest that placing the two species in the subgenus *Xenolejeunea*, section *Meyenianae* Thiers seems appropriate. The two species treated here differ from the other species of the subgenus in the autoicous sexual condition (cf. Thiers 1992).

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