

Two new species of *Cheilolejeunea* (Spruce) Schiffn. (Lejeuneaceae) from Brazil: *C. lacerata* sp. nov. and *C. rupestris* sp. nov.

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SUMMARY

Two new species of *Cheilolejeunea* subgenus *Strepsilejeunea* from the state of Bahia, northeastern Brazil, are described and illustrated: *Cheilolejeunea lacerata* C.Bastos & Gradst. sp. nov. and *Cheilolejeunea rupestris* C.Bastos & Gradst. sp. nov. *Cheilolejeunea lacerata* is distinguished by its lacerated and irregularly dentate antical margin of the leaf lobe. The species is known only from southern Bahia where it occurs in fragments of evergreen rain forest. *Cheilolejeunea rupestris* was collected in 'campos rupestres' in the Chapada Diamantina, growing on rock. The outstanding features of this new species are the broad, four-cells-wide ventral merophytes, the reniform, shallowly bifid underleaves, and the recurved, obtuse to acute leaf apices. The species approaches *C. fragrantissima* (Spruce) Steph. and the two may be sister taxa. The similarity of the two species suggests that the separation between subgen. *Cheilolejeunea* and subgen. *Strepsilejeunea* may be artificial.

KEYWORDS: Brazil, *Cheilolejeunea*, Lejeuneaceae, liverworts, Marchantiophyta, ventral merophyte.

INTRODUCTION

The large pantropical liverwort genus *Cheilolejeunea* (Spruce) Schiffn. (Lejeuneaceae) is represented in Brazil by about 26 species, half of which are of doubtful status (Gradstein & Costa, 2003). In the course of a study of *Cheilolejeunea* in the state of Bahia, northeastern Brazil, two species were detected that are apparently new to science.

DESCRIPTIONS

Cheilolejeunea lacerata C.Bastos & Gradst. sp. nov. (Figs 1 and 2)

TYPE. Brazil, Bahia: Eunápolis, Estação Veracruz, 16°21'06"S, 39°06'47"W, 28 October 1999, C. Bastos & S. B. Vilas Bôas-Bastos 2077 (holotype, ALCB; isotype, GOET); C. Bastos & S. B. Vilas Bôas-Bastos 2086 (paratype, ALCB).

Autoica, marginis foliorum irregulariter erosus vel lacerato, apicis foliorum acutis, cellulis foliorum papillois.

Plants small, 0.7–1.0 mm wide, prostrate, branches *Lejeunea*-type. Stems 80 µm wide, in cross-section with 7–8 cortical cells and 10–12 medullary cells, cortical cells 24–30 × 14–16 µm; ventral merophyte 2 cells wide. Leaves

rather widely spreading, imbricate; lobe ovate, 0.4–0.55 × 0.3–0.4 mm, dorsal margin and apex strongly crenulate or irregularly dentate, teeth small and broad, normally 2 cells long and 2–3 cells wide at base, the teeth usually curved towards the leaf apex, ventral margin straight to slightly arched, entire or crenulate, apex rounded to acute, usually deflexed; dorsal surface rough with mammillose cells, dorsal cell wall thickened; median leaf cells slightly longer than wide, 18–25 × 10–16 µm, trigones large, bulging, tending to become confluent, intermediate thickenings scarce; oil bodies very large, 1–2 per cell, coarsely segmented; ocelli absent; lobule small, 0.14–0.2 × 0.08–0.09 mm, ca 1/3 × leaf length, ovate, inflated, never reduced, free margin involute, apical tooth short and blunt, one-celled, with a distal hyaline papilla, apical margin curved to oblique, keel curved, crenulate with projecting cells. Underleaves obovate to orbicular, 0.2–0.3 mm wide, ca 3 × as wide as the stem, bifid to 1/2, sinus V-shaped, acute to obtuse, lobes obtuse, bases cuneate to rounded, insertion line curved. Autoicous. Androecia on a short-specialized lateral branch, with 2–3 pairs of bracts, lobule strongly inflated, hypostatic, bracteoles present throughout the short spike. Gynoecium terminal on main axis or on short lateral branches, innovation short, sterile, lejeuneoid; bract lobe obovate, 0.5 × 0.3 mm, margins irregularly

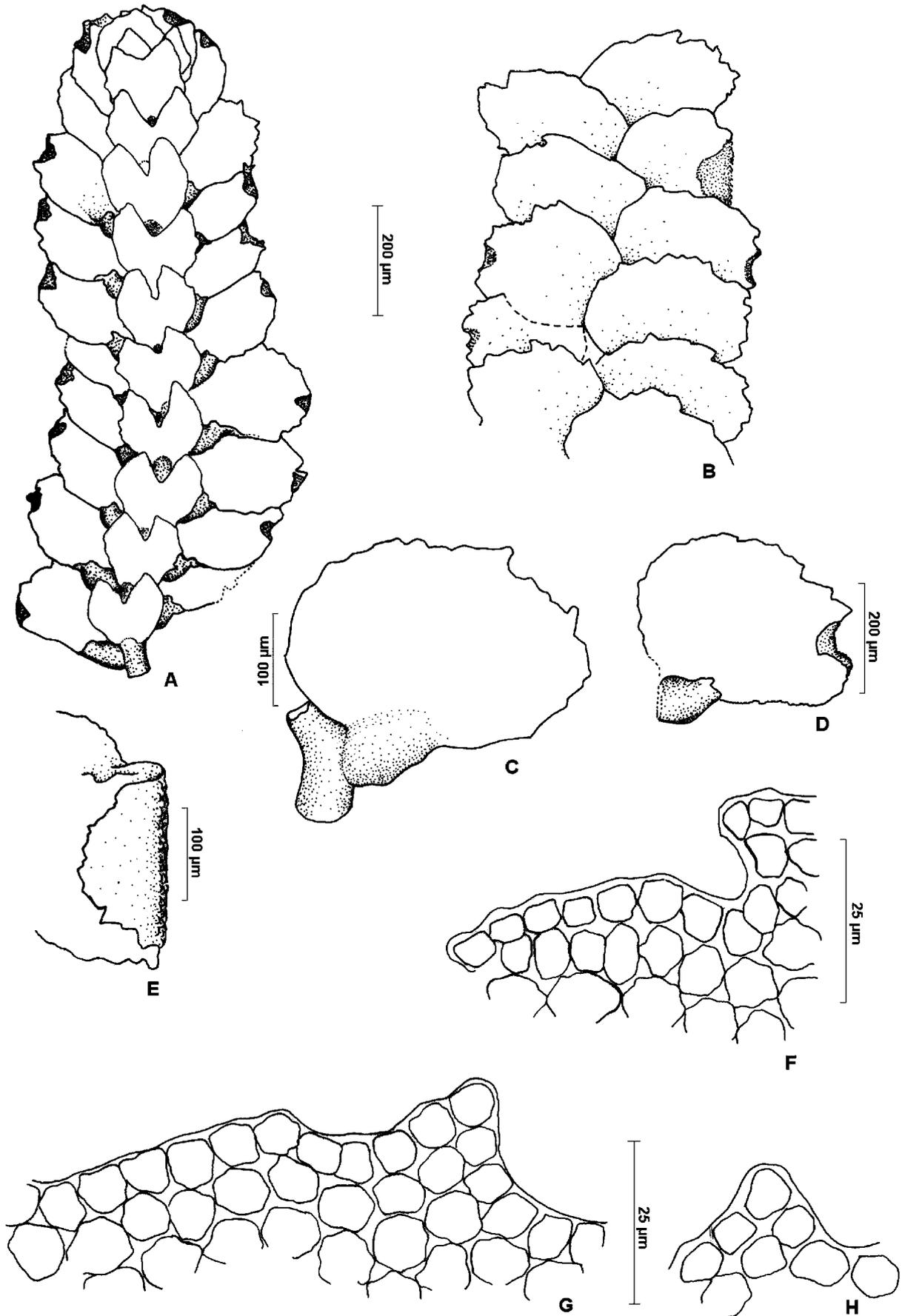


Figure 1. *Cheilolejeunea lacerata* C.Bastos & Gradst.: (A) shoot, ventral view; (B) portion of shoot, dorsal view; (C) leaf, dorsal view; (D) leaf, ventral view; (E) apex of lobe; (F, G, H) portions of dorsal lobe margin showing teeth (all drawings from the holotype).

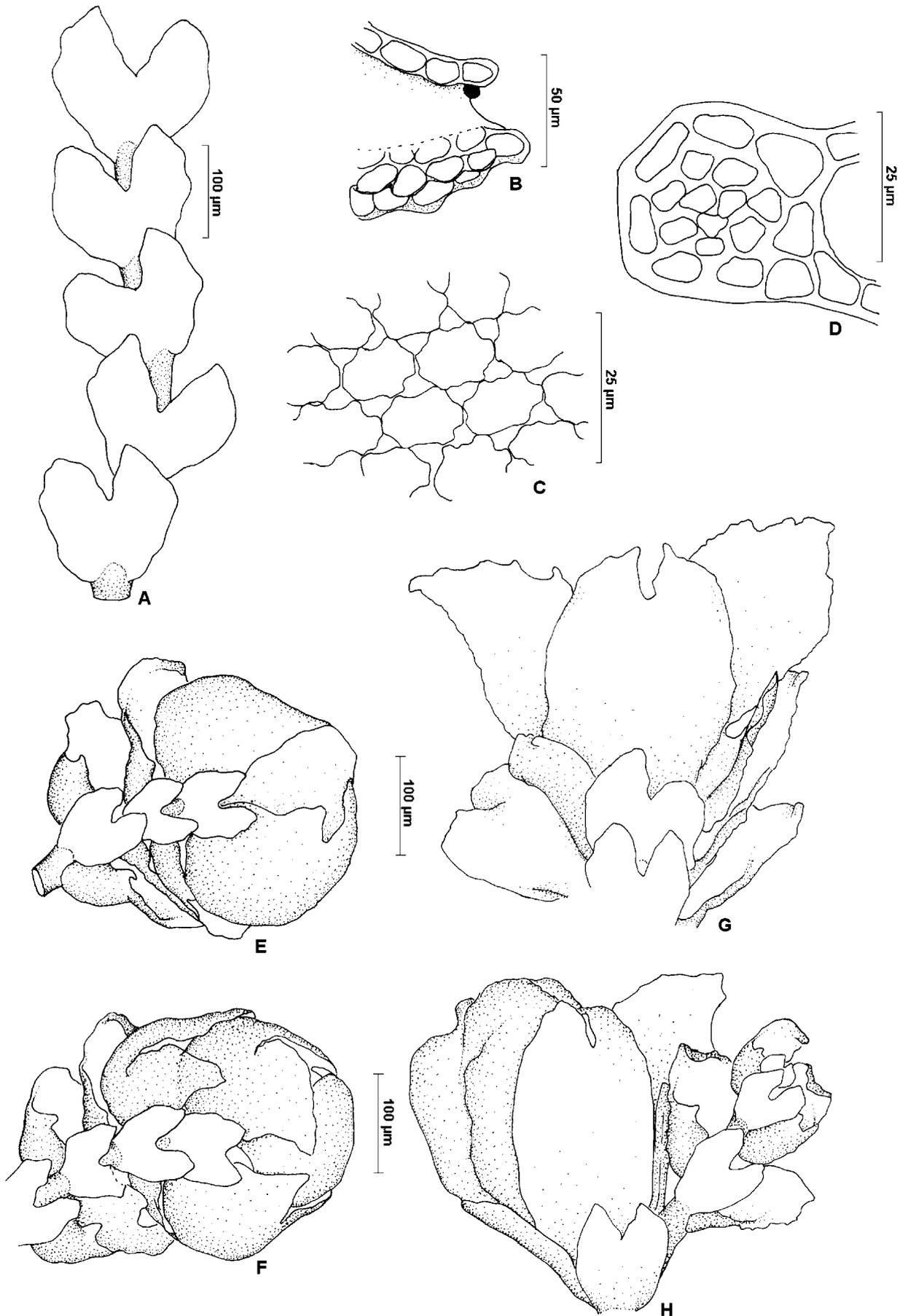


Figure 2. *Cheilolejeunea lacerata* C.Bastos & Gradst.: (A) underleaves; (B) apex of lobule showing distal hyaline papilla; (C) cells of lobe; (D) stem cross-section; (E, F) androecia, ventral view; (G) gynoecium without perianth, ventral view; (H) gynoecium with perianth and lejeuneoid innovation, ventral view (all drawings from the holotype, except D which is from the paratype).

dentate, apex acute, deflexed, bract lobule oblong-obovate, 0.3×0.08 mm, ca $2 \times$ the lobe; bracteole oblong-ovate, 0.4×0.2 mm, bifid to $1/5$, margins entire, sinus acute; perianth obovate, 0.6×0.4 mm, 5-keeled, lateral keels slightly expanded, ventral keels rounded, swollen, beak short.

Additional specimen examined. Brazil, Bahia: Santa Cruz Cabrália, Cara-branca Forest Fragment, $16^{\circ}16'S$, $39^{\circ}07'W$, 9 August 2001, C. Bastos & S.B. Vilas Bôas-Bastos 2818 (ALCB).

Cheilolejeunea rupestris C. Bastos & Gradst. sp. nov. (Fig. 3)

TYPE. Brazil, Bahia: Andaraí, $12^{\circ}48'26''S$, $41^{\circ}19'53''W$, 22 July 1997, P. Labiak s.n. (holotype, SP; isotype, ALCB).

Plantae grandis sterilis; amphigastria caulina majuscula, reniformis; folia oblonga vel oblonga-ovata, apices minute apiculata vel acutus; cortice merophytorum ventralium 4 cellulas lato.

Plants medium-sized, 1.2–1.6 mm wide, brown in herbarium material, branches *Lejeunea*-type. Stems $160 \mu\text{m}$ wide, in cross-section with 11–14 cortical cells and 24–33 medullary cells, cortical cells $30\text{--}46 \times 20\text{--}24 \mu\text{m}$; ventral merophyte 4 cells wide. Leaves widely spreading, imbricate; lobe convex, ovate-oblong, $0.5\text{--}0.85 \times 0.3\text{--}0.4$ mm, dorsal margin slightly arched, entire, ventral margin straight, entire, apex obtuse to acute, deflexed; cells slightly longer than wide, $24\text{--}42 \times 18\text{--}20 \mu\text{m}$, trigones large, swollen, becoming confluent, intermediate thickenings scarce; oil bodies not observed; ocelli absent; lobule ovate, small, up to $1/4 \times$ lobe length, $0.1\text{--}0.16 \times 0.05$ mm, free margin involute, apical tooth short, blunt, with a distal hyaline papilla, keel slightly curved. Underleaves very large, $0.5\text{--}0.7$ mm wide, reniform, laterally narrowly deflexed, imbricate, short-bifid to $1/5$, sinus narrow, acute, bases slightly cuneate, insertion line deeply arched. Androecia and gynoecia not observed.

DISCUSSION

Because of its pointed leaf apex, *Cheilolejeunea lacerata* is a member of *Cheilolejeunea* subgen. *Strepsilejeunea* (Spruce) R.M.Schust. This new species resembles *Cheilolejeunea oncophylla* (Ångstr.) Grolle & E.Reiner in the thickened dorsal cell walls but differs from the latter in the toothed leaf margins and lejeuneoid innovations. In *C. oncophylla*, leaf margins are entire and innovations pycnolejeuneoid.

Toothed leaf margins are otherwise found in *Cheilolejeunea norisiae* G.Dauphin & Gradst., which was recently described from Panama (Dauphin & Gradstein, 2003). The teeth in *C. norisiae* are, however, fewer per leaf and much larger. Moreover, underleaves in the latter species are smaller, distant and more shallowly lobed, the lobules are larger relative to the lobe, the keel is strongly papillose (not papillose in *C. lacerata*) and stands at a sharp angle with the ventral leaf margin, and a pre-apical tooth is present. *Cheilolejeunea lacerata* is known only from southern Bahia where it occurs in fragments of evergreen

rain forest. Possibly, the populations of the new species are relicts of a previously wider range.

Like the previous species, *C. rupestris* has a pointed leaf apex and is a member of the subgenus *Strepsilejeunea*. *Cheilolejeunea rupestris* is easily separated from other neotropical members of this subgenus by the very broad, reniform underleaves and the robust stems with a four-cells-wide ventral merophyte. As shown by Schuster (1955) and many later authors, robust stems with a broad ventral merophyte are mainly found in Lejeuneaceae with undivided underleaves ('holostipous Lejeuneaceae', tribes Ptychantheae and Brachiolejeuneae; Gradstein, Reiner-Drehwald & Schneider, 2003). They are very rare in taxa with bifid underleaves or without underleaves (respectively, 'schizostipous' and 'astipous Lejeuneaceae', i.e. tribes Lejeuneae and Calatholejeuneae; Gradstein *et al.*, 2003). Examples of the latter taxa are *Myriocoleopsis* and *Cololejeunea* subgen. *Chlorolejeunea* among those lacking underleaves (Reiner-Drehwald & Gradstein, 1995), and *Neopotamojeunea* and some species of *Cheilolejeunea*, *Lepidolejeunea*, *Pycnolejeunea* and *Trachylejeunea* among those with bifid underleaves (Gradstein & Costa, 2003). In *Cololejeunea*, *Myriocoleopsis*, *Neopotamojeunea* and *Trachylejeunea* development of robust stems seems to be an adaptation to growth in periodically submerged habitats (Reiner-Drehwald & Gradstein, 1995), in other genera reasons for their development are not clear. Schuster (2001) suggested that the robust stem of Lejeuneaceae is a plesiomorphic character and its occurrence in the more advanced Lejeuneae and Calatholejeuneae is therefore rare.

In the genus *Cheilolejeunea*, the combination of large ventral merophytes and bifid underleaves occurs in the neotropical *C. asperrima* (Steph.) Grolle, *C. decurviloba* (Steph) X.-L. He, *C. revoluta* (Herzog) Gradst. & Grolle, *C. splendens* R.M.Schust. nom. inval., *C. valenciae* (Gott. ex Steph.) X.-L. He, in the African *C. omphalogastris* Pócs, and in some Asiatic species. All of these, except possibly *C. splendens*, are very different from the new *C. rupestris*. *Cheilolejeunea asperrima* differs by its orbicular, auriculate underleaves, *C. decurviloba* by its peculiar, decurved lobules, *C. revoluta* by its rounded leaf apex and underleaves with recurved apical margins, and *C. valenciae* by the deeply bifid, suborbicular underleaves. The African *C. omphalogastris* Pócs is similar to the neotropical *C. asperrima* and may be a synonym of the latter (S.R. Gradstein, unpublished observation). Judging from the fragmentary description, *C. splendens* from Colombia (Schuster, 1992) may be similar to *C. rupestris*. However, the former name was published without Latin diagnosis and proper description, and is therefore invalid (see also Gradstein, Grolle & Schäfer-Verwimp, 1993).

Among other species described from tropical America, *C. rupestris* most closely resembles *C. fragrantissima* (Spruce) R.M.Schust. Differences between the two are the two-cells-wide ventral merophyte, the long acute lobule tooth, and the flat leaves with plane, broadly rounded

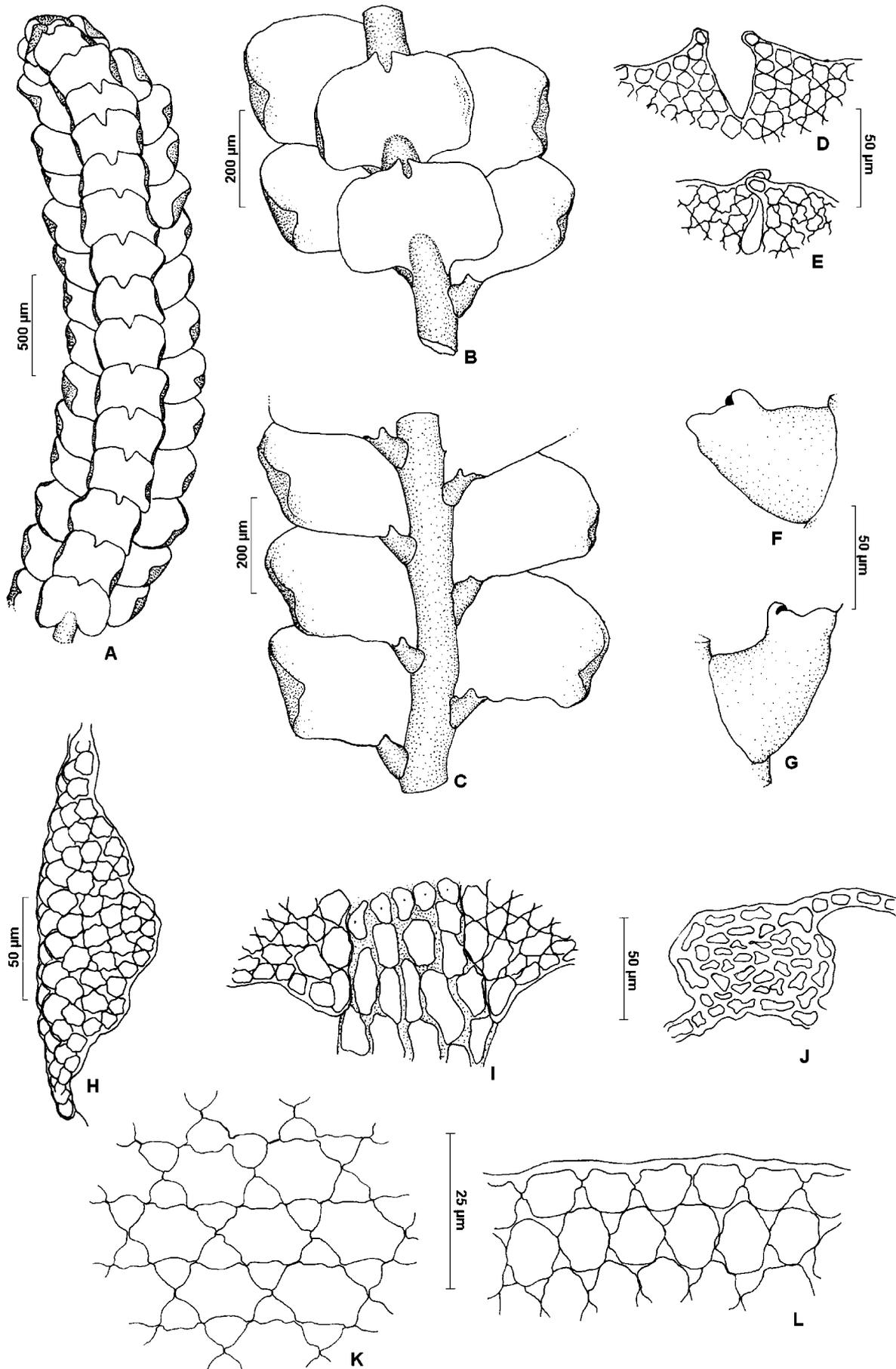


Figure 3. *Cheilolejeunea rupestris* C.Bastos & Gradst.: (A) shoot, ventral view; (B) portion of shoot with underleaves; (C) portion of shoot without underleaves; (D, E) apices of underleaves; (F, G) lobules; (H) apex of lobe; (I) base of underleaf; (J) stem cross-section; (K) cells of lobe; (L) marginal cells of lobe (all drawings from the type).

apices in *C. fragrantissima*. The relationship between the two species needs further study. They may well be sister taxa in spite of the fact that, by their different leaf apices (rounded in *C. fragrantissima*, pointed in *C. rupestris*), the two belong in different subgenera, *C. fragrantissima* in subgen. *Cheilolejeunea* and *C. rupestris* in subgen. *Strepsilejeunea*. The similarity of *C. fragrantissima* and *C. rupestris* suggests that the separation between subgenus *Cheilolejeunea* and subgenus *Strepsilejeunea* may be artificial.

Cheilolejeunea rupestris was collected in 'campos rupestres' in the Chapada Diamantina in the state of Bahia, growing on rock. Although details of the habitat are lacking, it seems that the species was growing in a rather dry, deciduous slope forest at about 400 m.

ACKNOWLEDGEMENTS

We are grateful to Silvana B. Vilas Bôas-Bastos for drawings and to two anonymous referees and the editor for comments and suggestions. The first author expresses his gratitude to the curator of the bryophyte herbarium SP for lending specimens and to Veracel Celulose S.A. for providing access to Estação Veracruz and the Cara-branca Forest Fragment.

TAXONOMIC ADDITIONS AND CHANGES: *Cheilolejeunea lacerata* C. Bastos & Gradst., sp. nov.; *Cheilolejeunea rupestris* C. Bastos & Gradst., sp. nov.

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