Two Cololejeunea from south India

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Abstract. Two taxa of Cololejeunea subgenus Pedinolejeunea are discovered from south India. Cololejeunea cardiocarpa (Mont.) Steph. is being described for the first time from India and Cololejeunea foliicola is proposed as a new taxon. The former is a facultative foliicolous taxon characterized by ovate-triangular leaves with apical finger-like hyaline cells, inflated lobules with 2-celled first tooth and basal hyaline papilla, whereas the latter (Cololejeunea foliicola) is obligatory foliicolous and characterized by oblong leaves with marginal rectangular hyaline cells and variable (ligulate-inflated) divergent lobules. Cololejeunea cardiocarpa is monoecious (paroecious and synoecious) whereas Cololejeunea foliicola is dioecious.

Keywords. Cololejeunea; Hepaticae; Bryophyta.

1. Introduction

The subgenus Pedinolejeunea under the genus Cololejeunea is a diverse group having the largest number (7 taxa) discovered so far from India. The Indian taxa of this subgenus form the following distinct categories where (i) the leaf-lobe is without any specialized marginal cells as in C. furcilobulata (Berrie et Jones) Schuster (Udar et al 1985), (ii) the leaf-lobe possesses marginal flexuose cells as in C. formosana Mizutani and C. sigmoidea Jovet-Ast et Tixier (Udar et al 1987) and (iii) the leaf-lobe has marginal rectangular hyaline cells as in C. himalayensis (Pande et Misra) Schuster (Pande and Misra 1943; Bonner 1977), C. kashyapii Udar et Srivastava (Udar and Srivastava 1985), C. lanciloba Steph. (Stephani 1912–1917) and C. planissima (Mitt.) Abeyw. (Mizutani 1961; Abeywikrama 1959; Stephani 1912–1917). Tixier (1985) considers C. himalayensis as synonym of C. latilobula. However, the former is distinctly different from the latter (with smooth cuticle) in possessing papillose cuticle. In a recent collection from south India two more species of Cololejeunea have been discovered belonging to this subgenus. One is clearly answerable to C. cardiocarpa (Mont.) Steph. which constitutes a new record for India and forms the fourth category characterised by elongated finger-like hyaline cells occurring in clusters at apices of leaf-lobes. C. cardiocarpa was earlier placed in subgenus Platycolea (Schuster 1980) but now Tixier (1985) treats Platycolea as section under the subgenus Pedinolejeunea. The other species falls under the third category and hitherto, differs from all other known taxa of this subgenus and has been described here as C. foliicola sp. nov.

2. Taxonomic description

2.1 Cololejeunea cardiocarpa (Mont.) Steph. (figures 1–20).

Contribution No. 213 [New Series (Bryophyta)].

Plants green, appressed to the substratum. Stem usually 1-3 mm long, 0.5-0.8 mm wide with leaves, branching irregularly pinnate, 0.03-0.04 mm across diameter with 6-cortical cells, 8-20 × 8-25 μm and one medullary cell, 20 × 12 μm; ventral cells of the cortex smaller than other cortical and medullary cells. Rhizoids grouped, hyaline. Leaves loosely imbricate, widely-obliquely spreading; leaf-lobe ovate-triangular, 0.3-0.5 mm long, 0.1-0.3 mm wide; antical margin arched towards the base, postical margin nearly straight; apex narrow with 1-15 elongated finger-like hyaline cells, 24-37 × 8-12 μm or without it; marginal chlorophyllous cells, small, rectangular, 8-12 μm; median cells pentagonal-hexagonal 12-21 × 12-16 μm; basal cells elongated, hexagonal, 24-33 × 12-16 μm; trigones and intermediate nodular thickenings absent, cuticle smooth; leaf-lobule inflated, 0.11-0.21 × 0.02-0.10 mm, with the first tooth 2-celled, hyaline papilla at the base of the first tooth on inner surface, second tooth small of single projected cells, often obsolete; keel broad and arched; stylus 1-2(-3) celled, 16 × 12-53 × 16 μm, with an apical hyaline cell. Gemmae numerous, discoid, 61 × 49-74 × 62 μm, about 26-celled, without mamilllose cells. Paroecious as well as synoecious. Male inflorescence present just below the perianth; bracts in 1-2 pairs, similar to vegetative leaves; 1-2 antheridia per bract and also in the axil of female bracts. Female inflorescence terminal with one-two subfloral innovation which is again floriferous; the lobe of female bract similar to leaf-lobes, 0.3-0.5 × 0.1-0.3 mm, apex with or without hyaline cells; lobule of female bract slightly larger than leaf-lobule, 0.24-0.29 × 0.12-0.14 mm. Perianth obovate-pyriform, 0.63 × 0.38 mm, 5-plicate, with a low dorsal plica and two sharp lateral and two ventral plicae. Mature sporophyte not seen.

Type locality: Cuba; Habitat: Foliicolous, Corticolous; Range: Cuba, Mexico, Brazil, Uganda, Carolina, Belgian Congo, Tanganyika, Virginia, Georgia, Louisiana, Florida, Alabama, Venezuela, Trinidad, Dominic, Guadeloupe, Puerto Rico, Jamaica, Bahamas, Bermuda, Zaire, Shaba, Mississippi, Cameroon, Madagascar, Sierra-Leone, Martinique, Colombia, Galapagas, Burundi, south Africa, Tonga Islands, Society Islands, India (Kerala, Tamil Nadu).


Cololejeunea cardiocarpa (Mont.) Steph., an Afro-American species, is discovered from India thus extending its range of distribution in Palaeotropics. It also provides the first authentic report of this taxon from Asia. The taxon is foliicolous as well as
corticolous over its range in Neotropics and Palaeotropics but the foliicolous habit is more pronounced in India specially on Angiospermic leaves in Tamil Nadu, however, in Kerala it has been found on leaves of *Piper nigrum* also.

The Indian plants are distinctive in having 1–15 finger-like elongated hyaline cells at the leaf-lobe apex (figures 8–10) and female bract-lobe apex (figure 1) but they may be absent also sometimes either due to breakage of these cells or their complete suppression (figure 7). The corticolous population has comparatively well developed inflated lobules and 1–2(3)-celled stylus with an apical hyaline cell (figures 14, 15). The gemmae are present on both the surfaces of leaf-lobe in Indian population (figures 3, 16). However, their presence have been reported on leaf-lobule also (Schuster 1980). The Indian plants show paroecious as well as synoecious sexuality. The autoecious condition, although known, is not observed in Indian population so far. The female inflorescence frequently innovates on both sides thus possessing repeatedly floriferous condition on the same plant (figure 1).

2.2 *Cololejeunea foliicola* sp. nov. (figures 21–49)

Planta pusilla, virido pallida, foliicola; ad substratum appressa. Caules usque ad 6 mm longi, 0.07 mm crassi, cum foliis 0.9–1.5 mm lati. Folia cum margine hyalino, cellulae marginales hyalinae 16–33 x 12–25 μm, cellulae submarginales quadratae rectangulatae 24–41 x 16–25 μm metientes, cellulae basales hexagonales usque ad 41–62 x 16–25 μm. Cuticula levis. Folia oblonga, 0.63–0.81 mm longa, 0.32–0.54 mm lata, lobulus planus divergens parallelus lobo, 0.12–0.33 x 0.02–0.08 mm, lobulus saccatus 0.16–0.18 x 0.12–0.14 mm, leviter saccatus cum doubs dentibus. Papilla hyalina subapicalis. Planta dioica. Androecia terminalia vel intercalaria, bracteis 3–5 jugis. Gynoe西亚 una innovatione. Holotypum: LWU 6515/82, prope Jog Falls (Karnataka) south India, Leg.: R Udar and Party, September 27, 1982.

Plants pale green, appressed to the substratum. Stem usually 6 mm long, 0.9–1.5 mm wide with leaves, branching rare, 0.07 mm across diameter with 5 cortical cells, 13–20 x 10–17 μm and one medullary cell, 10 x 7 μm. Rhizoids grouped, hyaline. Leaves imbricate, widely-obliquely spreading; leaf-lobe oblong, 0.63–0.81 mm long, 0.32–0.54 mm wide; margin bordered by 1–4 rows of hyaline cells; antical margin arched towards the base and far beyond the farther edge of the stem, postical margin also arched; apex rounded, marginal hyaline cells 16–33 x 12–25 μm; chlorophyllous cells rectangulate-polygonal, 16–33 x 12–16 μm; median cells polygonal, 24–41 x 16–25 μm, basal cells elongated, hexagonal, 41–62 x 16–25 μm, with trigones and occasional intermediate nodular thickenings, cuticle smooth; leaf-lobule highly variable, maybe ligulate as well as inflated; ligulate lobule (0.08) 0.12–0.33 x 0.02–0.08 mm, divergent, first tooth large, occupying the upper portion of the lobule, hyaline papilla sub-apical, on proximal side 2–3 cells away from apex, second tooth small, at mid way of lobule, often indistinct; keel narrow and concave; inflated lobule 0.16–0.18 mm wide and 0.12–0.14 mm high, first tooth usually 2-celled, hyaline papilla at proximal base, second tooth small, one celled often indistinct, keel broad and arched; stylus unicellular, hyaline, 16 x 8 μm. Gemmae initials present, mature gemmae not seen. Dioecious. Male inflorescence terminal on a short lateral branch, or intercalary on lateral branch and main axis; bracts in 3–5 pairs, strongly inflated, intercalary bracts similar to vegetative leaves with much inflated lobule; 1–2 antheridia per bract. Female inflorescence terminal on main axis
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or lateral branch, with one subfloral innovation, the lobe of female bract similar to leaf-lobes, 0.45–0.72 × 0.27–0.45 mm, the margin is bordered by hyaline cells, lobule of female bract ligulate, 0.18–0.29 × 0.06–0.10 mm. Perianth not seen. Sporophyte not seen.
Type locality: Jog Falls (India); Habitat: Foliicolous; Range: Endemic to India.

Specimens examined: Holotype: LWU 6515/82, Loc.: Jog Falls (Karnataka) alt. ca. 600 m., Habitat: Foliicolous, Leg.: R Udar and Party, September 27, 1982; LWU 3781/40, LWU 3786/40, LWU 3788/40, LWU 3793/40, LWU 3794/40, LWU 3797/40, LWU 4414/40, LWU 4434/40, Loc.: Jog Falls (Karnataka) alt. ca. 600 m., Habitat: Foliicolous, Leg.: S K Pande, January 5, 1940; LWU 6150/82, LWU 6151/82, LWU 6152/82, LWU 6153/82, LWU 6154/82, LWU 6155/82, LWU 6156/82, LWU 6157/82, LWU 6158/82, LWU 6159/82, Loc.: Jog Falls (Karnataka) alt. ca. 600 m., Habitat: Foliicolous, Leg.: R Udar and Party, September 27, 1982.


Cololejeunea foliicola approaches several African species (Jones 1953) in overall appearance in having hyaline border on leaf-lobe and ligulate lobules but does not fully match any one. Cololejeunea bolombensis (Steph.) Vanden Berghen (1972) is close to C. foliicola but differs in having papillose cuticle, shallow sinus on keel and monoecious sexuality (Jones 1957). This species also approaches C. kiriromensis Tx. due to similar types of divergent ligulate lobules with sub apical hyaline papilla and smooth cuticle but it differs from C. kiriromensis (having larger plants up to 1 cm and orbicular leaves) in having smaller plants up to 6 mm and oblong leaves. The first tooth of inflated lobule is usually 2-celled in C. foliicola but 3–6 celled and much acute in C. kiriromensis (Tixier 1985).

Among Indian species C. foliicola shows close resemblance with C. lanciloba in having variable leaf-lobules and the smooth cuticle but it differs in its sexuality. C. foliicola is dioecious whereas C. lanciloba is monoecious. Among the other Indian species of the subgenus Pedinolejeunea having hyaline border on leaf-lobes except C. lanciloba, C. foliicola can be easily separated in lobule morphology, and nature of cuticle. C. himalayensis differs in papillose cuticle and entire absence of second tooth on both the ligulate and inflated lobules. The lobules are also broad and not divergent. C. planissima differs in much larger size of the lobule and the
presence of second tooth on ligulate as well as inflated lobules. C. kashyapii differs in having papillose cuticle, the presence of hyaline border on leaf-lobule and female bract-lobule. Besides these characters, C. foliicola is dioecious and rest of the taxa are monoeocious.

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