

A new epiphyllous species of *Cololejeunea* (Lejeuneaceae) from India

Geeta ASTHANA* & Amrita SHUKLA

Department of Botany, University of Lucknow, Lucknow 226007, India

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Abstract - A new epiphyllous species of *Cololejeunea* (Spruce) Schiffn., *C. epiphylla* sp. nov. has been discovered from Karnataka, South India, which is illustrated and described here. The taxon belongs to the subgenus *Pedinolejeunea* and is mainly characterized by monoecious sexuality, ovate-oblong leaves without marginal hyaline cells, thin walled leaf-cells, smooth cuticle, ligulate leaf-lobule that are usually curved towards the axis along with the apical hyaline papilla and 2-3 celled stylus.

Hepaticae / Lejeuneaceae / Epiphyllous / *Cololejeunea epiphylla* / new species

INTRODUCTION

The genus *Cololejeunea* (Spruce) Schiffn. is represented by 32 taxa belonging to 6 subgenera in India (Asthana & Srivastava, 2003; Singh *et al.*, 2006, Dey *et al.*, 2008). Among these the subgenus *Pedinolejeunea* shows a maximum representation of 11 taxa which may have: (i) the leaf-lobe without any specialized marginal cells as in *C. furcilibulata* (Berrie *et Jones*) Schuster, or (ii) the leaf-lobes with marginal flexuose cells as in *C. ceratilobula* (Chen) Schuster and *C. sigmoidea* Jovet-Ast *et Tixier*, or (iii) the leaf-lobes with marginal rectangular hyaline cells as in *C. latilobula* (Herzog) Tixier, *C. producta* (Mitt.) Hatt., *C. kashyapii* Udar *et Srivastava*, *C. udarii* Srivastava *et Srivastava*, *C. lanciloba* Steph., *C. follicola* Srivastava *et Srivastava* and *C. planissima* (Mitt.) Abeyw., and (iv) the leaf-lobes with elongated finger like hyaline cells at the apex of leaf-lobe present in clusters as in *C. cardiocarpa* (Chen) Schuster (Udar & Srivastava, 1985; Udar *et al.*, 1985, 1987; Srivastava & Srivastava, 1989).

During the investigation of collection from Karnataka, South India, some interesting epiphyllous plants of *Cololejeunea* were discovered which are quite distinct from all other known Indian species belonging to the subgenus *Pedinolejeunea*. After critical evaluation, the plants are considered to represent a new species - *Cololejeunea epiphylla*, sp. nov., the taxonomical details of which are provided below.

* Correspondence and reprints: drgasthana@yahoo.com

DESCRIPTION

Cololejeunea epiphylla G. Asthana et A. Shukla, sp. nov.

Figs 1-31

Planta parva, epiphylla, substrato appressa, caules usque ad 3.5-8.7 mm longi, 0.06-0.08 mm crassi, cum foliis 1.5-1.6 mm lata, folia ovata, 0.6-0.8 mm longa, 0.45-0.49 mm lata, margine integra sine cellulae hyalina, lobulus ligulatus, cauli parallelus, papilla hyalina sphaerica, ad cacumen lobuli, stylus breviter, ciliatus, bi - tri cellularis. Monoica, androecia terminalia, bracteis, 3-5 jugis, gynocia 1-2 latere innovata, perianthium obovatum.

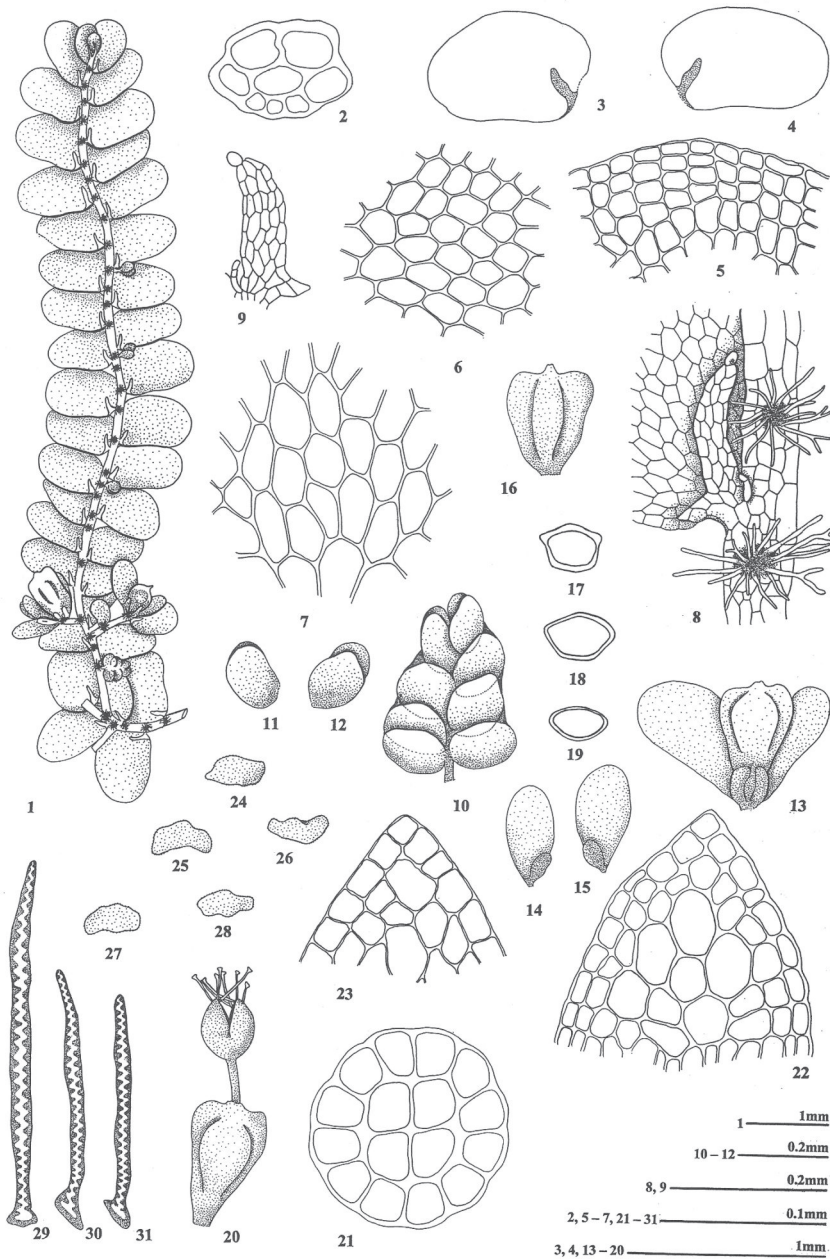
Holotype: India, Karnataka, Shimoga, Megarvalli (18 km from Agumbe), alt. ca 650 m, epiphyllous, 10 November, 2006, G. Asthana & party, 19762/06 (LWU).

Plants light green, 3.5-8.7 mm long, 1.5-1.6 mm wide with leaves, irregularly branched. Stem 0.06-0.08 μm in diameter, transverse section with 5-(7) cortical cells, 9-26 \times 7-21 μm and single medullary cell, 26-28 \times 15-19 μm , the ventral merophytes smaller than the cortical and medullary cells. Rhizoids numerous, hyaline. Leaves imbricate, leaf-lobe ovate, 0.60-0.82 \times 0.45-0.49 mm, margin entire, apex rounded, leaf-cells thin walled, trigones indistinct, apical cells quadrate - rectangular 11-18 \times 7-11 μm , median cells subquadrate 15-26 \times 11-15 μm , basal cells elongated and polygonal 26-37 \times 11-22 μm . Cuticle smooth. Leaf-lobule ligulate, parallel to the axis, 0.16-0.18 \times 0.03-0.05 mm, the apical portion of the lobule curved towards the axis, hyaline papilla apical, stylus 2-3 celled. Monoecious. Androecia capitate, present on a short lateral branch, male bracts 3-5 pairs, rounded at apex, 0.10-0.18 \times 0.07-0.10 mm, bract-lobule as long as bract-lobe. Gynocia on short lateral branch with 1 or 2 subfloral innovations, female bracts obovate, 0.43-0.63 \times 0.16-0.32 mm, margin entire, apex rounded, female bract-lobules 0.15-2.0 \times 0.06-0.08 mm. Perianth obovate, compressed, 0.63-0.75 \times 0.27-0.30 mm, 5-plicate, 2 lateral plicae sharp, dorsal and ventral plicae low and indistinct. Seta with 12 + 4 rows of cells. Capsule dehiscence 4-valved, capsule wall hyaline, two layered with indistinct thickenings. Spores irregularly elongated, 22-45 \times 7-11 μm , hyaline. Elaters elongated, hyaline, 130-200 \times 9-13 μm , with sinuate thickenings, attached to capsule wall through their narrow end.

Habitat: Epiphyllous, growing on angiosperm leaves in association with *Cololejeunea furcilibulata* (Berrie et Jones) Schuster and *C. trichomanis* (Gottsche) Steph.

DISCUSSION

The *Cololejeunea epiphylla* G. Asthana et A. Shukla is mainly characterized by the absence of hyaline border on the leaf lobe (Figs 1, 3, 4), narrow and ligulate leaf-lobule with the apex curved towards the axis (Figs 8, 9), apical hyaline papilla, 2-3 celled stylus (Figs 8, 9), monoecious sexuality and the epiphyllous plants. The sporophytic details of the species are typical of *Cololejeunea* like, having 12 + 4 seta anatomy, bi-layered capsule wall, 4-valved dehiscence of the capsule, fixed elaters to the capsule with their narrow end and irregularly elongated spores (Figs 20-31). The taxon is quite distinct from all the known Indian species of *Cololejeunea* belonging to subgenus *Pedinolejeunea*. The



Figs 1-31 – *Cololejeunea epiphylla* G. Asthana et A. Shukla. **1.** A plant (ventral view). **2.** Cross-section of the stem. **3-4.** Leaves. **5.** Apical leaf-cells. **6.** Median leaf-cells. **7.** Basal leaf-cells. **8-9.** Leaf-lobules with stylus. **10.** Androecium. **11,12.** Male bracts. **13.** Gynoecium. **14-15.** Female bracts. **16.** Perianth. **17-19.** Cross-section of perianth. **20.** Perianth with dehisced capsule. **21.** Cross-section of seta. **22.** Outer layer of capsule wall. **23.** Inner layer of capsule wall. **24-28.** Spores. **29-31.** Elaters.

species shows resemblance with *C. furcilibulata* (Berrie *et* Jones) Schust. in the absence of any specialized marginal cells on the leaf-lobe (Figs 1, 3, 4), but the leaf-lobule morphology distinctly differentiate both the species as it is with biciliate apex in case of *C. furcilibulata* (see Udari *et al.*, 1985). It can be distinguished from other Indian species (*C. latilobula* (Herzog) Tixier, *C. producta* (Mitt.) Hatt., *C. kashyapii* Udari *et* Srivastava, *C. udarii* Srivastava *et* Srivastava, *C. lanciloba* Steph., *C. follicola* Srivastava *et* Srivastava and *C. planissima* (Mitt.) Abeyw.) having rectangulate hyaline cells at leaf-lobe margin by the absence of hyaline border on the leaf-lobe (see Asthana & Srivastava, 2003).

Besides, the new taxon shows somewhat resemblance with *C. chitagongensis* P. Tx. (Tixier, 1985) in having leaves without hyaline border, ligulate leaf-lobule and stylus, but distinctly differs from the latter in having large (3.5-8.7 × 1.5-1.6 mm) epiphyllous plants, leaf with comparatively narrower leaf-lobule (0.16-0.18 × 0.03-0.05 mm) with the apex curved towards the axis, 2-3 celled stylus, monoecious sexuality, narrowly obovate perianth (0.63-0.75 × 0.27-0.30 mm) and larger female bracts (0.43-0.63 × 0.16-0.32 mm) covering the perianth, in contrast to small (5 × 1.2 mm) corticolous plants, leaf with comparatively wider leaf-lobule (0.8 × 0.15 mm) with the apex not curved towards the axis, 4-celled stylus, dioecious (?) sexuality, broadly obovate perianth (0.6 × 0.4 mm) and smaller female bracts (0.3 × 0.15 mm) not covering the perianth in *C. chitagongensis*. The relative size (length & width) of the female bract-lobe and bract-lobule is different also in the two species. The female bract-lobule is much smaller, almost one fourth or one third of the bract-lobe in the new Indian species (female bract-lobes, 0.43-0.63 × 0.16-0.32 mm, bract-lobules, 0.15-2.0 × 0.06-0.08 mm) while in *C. chitagongensis* (see Tixier, 1985, p. 95-97), the female bract-lobule is more than half of the length of the bract-lobe (female bract-lobes, 0.3 × 0.15 mm, bract-lobules, 0.2 × 0.1 mm).

C. epiphylla also resembles to some extent with *C. schwabei* Herz. in having leaves without hyaline border, ligulate leaf-lobule, stylus and autoicous sexuality, however, the former is distinctly distinguishable from *C. schwabei*, which is a corticolous species and has wider, ligulate leaf-lobule with the apex not curved towards the axis, large stylus, 2-6 celled long and 1-2 celled wide at base. In *C. epiphylla* the leaf-lobules are narrower with the apex curved towards the axis (Figs 1, 8, 9), stylus is small, 2(3)-celled long and single celled wide at base (Figs 8, 9). Besides, 24-celled gemmae are reported in *C. schwabei* while gemmae are not observed in Indian species (see Zhu, 1995, pp. 100-101).

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