

**LEJEUNEA PAPILIONACEA STEPH. (HEPATICAE: LEJEUNEACEAE) – AN ADDITION TO
INDIAN BRYOFLORA FROM EAST SIKKIM**

DEVENDRA SINGH, MONALISA DEY AND D.K. SINGH¹

Botanical Survey of India, Central National Herbarium, Howrah – 711 103

¹Botanical Survey of India, CGO Complex,

Salt Lake City, Kolkata – 700 064

e-mail : singh_drk@rediffmail.com

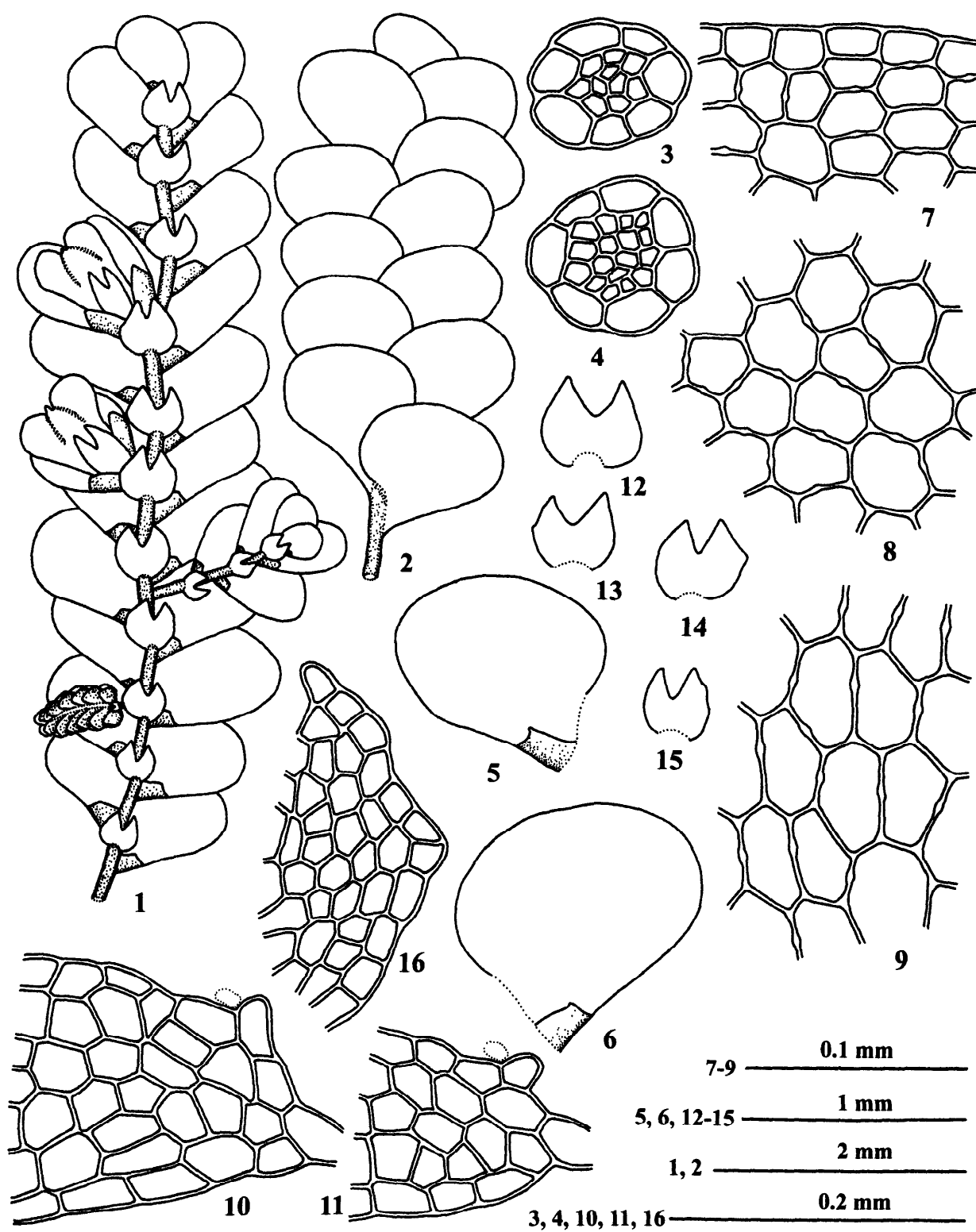
During the course of intensive explorations of the East district of Sikkim for the study and documentation of its Hepaticae and Anthocerotae, an interesting epiphyllous population of *Lejeunea* Lib., with plants having androecial branches with 2 – 14-paired male bracts and dorso-ventrally flattened, obcordate perianth with two auriculate lateral keels, was collected. A critical morpho-taxonomic study of the plants revealed it to be different from all the species of the genus known so far from the country. A subsequent literature review (Mizutani, 1963, 1971; Udar & Awasthi, 1981; Zhu & Grolle, 2001; Zhu & So, 2001) revealed it to be *Lejeunea papilionacea* Steph., a species so far known from Africa, Sri Lanka, Indonesia, Papua New Guinea and Philippines. The same has been illustrated and described in detail.

DESCRIPTION

***Lejeunea papilionacea* Steph. in Hedwigia 31: 17. 1892. Figs. 1 – 38**

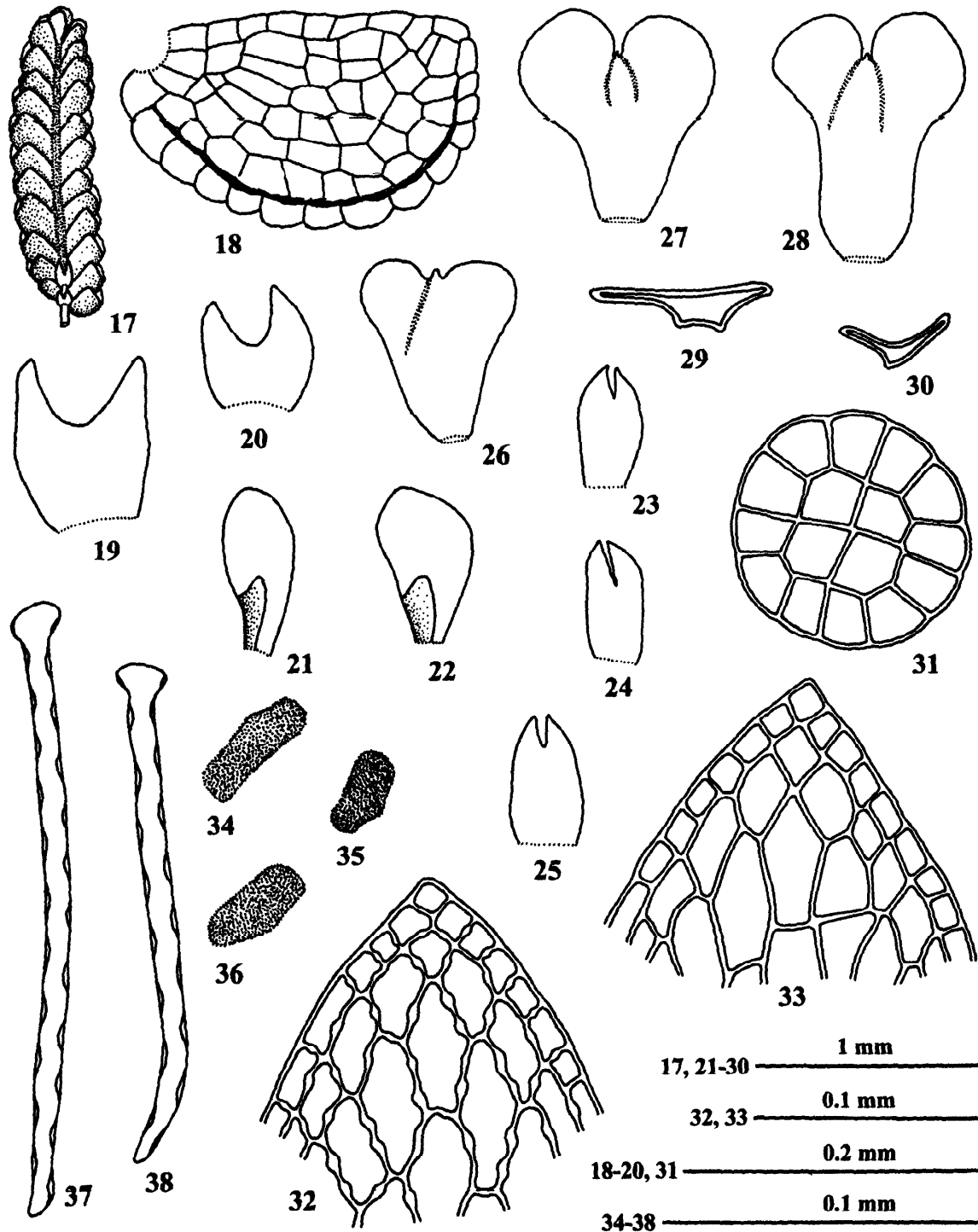
Plants yellowish green when fresh, pale brown in herbarium; shoot 8 – 15 mm long, 1 – 1.5 (–2) mm wide; irregularly branched, branching *Lejeunea*-type. Stem orbicular – slightly oval in outline in cross-section, 87.5 – 105 × 81.4 – 97.6 µm, 6 – 7 cells across the diameter; cortical cells in 7 vertical rows, sub quadrate – rectangular, 22.5 – 40 × 17.5 – 32.5 µm, thin-walled; medullary cells 10 – 17 in number, polygonal, 10 – 17.5 × 7.5 – 15 µm, thin-walled; ventral merophytes of stem 2 cells wide. Leaves imbricate or sometimes contiguous, obliquely – widely spreading; leaf lobe rectangular–ovate, 0.5–0.8 mm long, 0.35–0.5 mm wide, apex rounded, margin entire, antical margin slightly arched, postical margin almost straight; marginal leaf cells sub-quadrate–rectangulate, 17.5 – 30.5 × 10.0–22.5 µm; median leaf cells polygonal, 22.5 – 40 × 20.3 – 32.5 µm; basal leaf cells elongated, polygonal, 37.5 – 50 × 20 – 30 µm; cells thin-walled with small–large trigones, intermediate thickenings frequent; cuticle smooth – very finely punctate; oil-bodies not seen; leaf lobule inflated, 1/7–1/5 as long as the leaf lobe, rectangular, 0.13–0.2 mm long, 0.1–0.18 mm wide, bidentate; first tooth unicellular, hyaline papilla at the proximal side of first tooth; second tooth indistinct. Underleaves distant, reniform, 2–3 times as wide as the stem, 0.35–0.5 mm long, 0.3–0.45 mm wide, usually slightly longer than wide, bilobed to 1/2 the underleaf length, margin entire, outer margin usually with a single blunt tooth, sinus narrow – wide. Rhizoids numerous, fasciculate at the base of underleaves; rhizoid disc absent.

Monoecious. Androecia terminal on short lateral branches; male bracts in 2–14 pairs, closely imbricate, 0.14–0.20 mm long, 0.1–0.14 mm wide; bract lobule almost as long as the bract lobe; keel slightly crenulate, winged, with a single row of hyaline projecting cells; male bracteole 1 (– 2), present only at the base of androecium, 0.07–0.12 mm long, 0.07–0.08 mm wide. Gynoecia terminal on short or long branches with a single sub-floral innovation; female bract lobe oblong-ovate, 0.5–0.7 mm long, 0.26–0.36 mm wide, apex rounded–obtuse, margin entire; bract lobule oblong–lanceolate, 1/4–2/5 as long as the bract lobe; female bracteole oblong or sometimes slightly oblong-ovate, 0.46–0.52 mm long, 0.25–0.30 mm wide, bilobed to 1/4–



Figs. 1 – 16. *Lejeunea papilionacea* Steph.

1.a portion of plant in ventral view; 2. the same in dorsal view;
 3, 4. cross-sections of stem; 5, 6. leaves; 7. apical cells of leaf; 8. median cells of leaf; 9. basal cells of leaf;
 10, 11. leaf lobules; 12 – 15. underleaves; 16. underleaf margin showing a lateral blunt tooth.



Figs. 17 - 38. *Lejeunea papilionacea* Steph.

17. a male branch; 18. a male bract; 19, 20. male bracteoles; 21, 22. female bracts; 23 - 25. female bracteoles; 26 - 28. perianths; 29, 30. cross-sections of perianth; 31. cross-section of seta; 32. outer layer of capsule wall; 33. inner layer of capsule wall; 34 - 36. spores; 37, 38. elaters.

1/3 their length, margin entire; perianth obcordate, dorso-ventrally compressed, 0.88–1.26 mm long, 0.63–0.88 mm wide; keels 3–4, 2 lateral, auriculate, 1–2 ventral, smooth; beak 1–2 cells long; seta orbicular in out line in cross-section, 0.14–0.16 mm in diameter, with four inner and 12 outer cells; capsule spherical, 0.2–0.22 mm in diameter, dehiscing into 4 valves; valve 0.28–0.32 mm long, 0.15–0.18 mm wide; capsule wall bistratose, cells of outer layer subquadrate–polygonal, $17.5\text{--}62.5 \times 17.5\text{--}30.0\text{ }\mu\text{m}$, with irregular sinuate thickenings; cells of inner layer subquadrate–polygonal, $15.0\text{--}57.5 \times 15.0\text{--}27.5\text{ }\mu\text{m}$, thin-walled; spores irregular in shape, $27.0\text{--}42.5 \times 12.5\text{--}17.5\text{ }\mu\text{m}$, surface minutely spinose–papillose; elaters linear, $150.0\text{--}212.5\text{ }\mu\text{m}$ long, $7.5\text{--}10.0\text{ }\mu\text{m}$ wide, walls slightly sinuately thickened.

Distribution: India. Eastern Himalaya (Sikkim – present study); Cameroon, Ghana, Guinea, Sierra Leone, Réunion, Madagascar, Sri Lanka, Indonesia, Papua New Guinea, Philippines (Zhu & Grolle, 2001).

Specimen examined: Epiphyllous, growing on the leaves of *Pilea* sp. in moist and shady places in association with *Radula acuminata* Steph. and *Lejeunea obscura* Mitt. Eastern Himalaya: Sikkim, East district, Dalapchand, c. 1650 m, 27. 02. 2006, D. Singh, 39604A (CAL).

DISCUSSION

Lejeunea papilionacea Steph. is characterized by rectangular – ovate leaves with rounded apex; small leaf lobule, $1/7\text{--}1/5$ as long as the lobe (Figs. 5, 6); thin-walled leaf cells with small – large trigones and frequent intermediate thickenings (Figs. 7–9); reniform underleaves usually with a single blunt tooth along the outer margin (Figs. 12–16); 2–14-paired male bracts (Fig. 17); dorso-ventrally compressed, 3–4-keeled, obcordate perianth with 2 auriculate lateral keels (Figs. 26–30); irregularly shaped spores with minutely spinose – papillose surface (Figs. 34–36); linear elaters with slightly sinuately thickened walls (Figs. 37–38). Among the Indian species of the genus, *L. papilionacea* Steph. comes close to *L. anisophylla* Mont. in having monoecious plants; leaf cells with small – large trigones and frequent intermediate thickenings; distant underleaves usually with a single blunt tooth along the outer margin; and obcordate perianth. But it differs from the latter which has larger leaf lobules ($1/4\text{--}1/3$ as long as lobe) and 4–5-keeled perianth with smooth lateral keels (Zhu & So, 2001).

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