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LOPHOLEJEUNEA SIKKIMENSIS VAR. *TENUICOSTATA* (HEPATICAE: LEJEUNEACEAE) A NEW VARIETY FROM GREAT HIMALAYAN NATIONAL PARK, HIMACHAL PRADESH, INDIA

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The genus *Lopholejeunea* (Spruce.) Schiffn., a member of subfamily Ptychanthoidae of Lejeuneaceae, shows maximum distribution in Asia and Oceania with *ca* 40 species (Schuster, 1980). In the present state of our knowledge *ca* 10 species and two varieties of the genus occur in India (Awasthi *& al.*, 2000). Of these, *L. applanata* (Reinw., Blume & Nees) Schiffn., *L. kashyapii* Awasthi, Srivastava & Sharma, *L. nigricans* (Lindenb.) Schiffn., and *L. sikkimensis* var. *dentata* Awasthi, Srivastava & Sharma are restricted to Eastern Himalaya, *L. abortiva* (Mitt.) Steph., *L. abortiva* var. *doliiformis* Awasthi, Srivastava & Sharma, *L. javanica* (Nees) Schiffn. and *L. nilgiriensis* Awasthi, Srivastava & Sharma are confined to South India, whereas, *L. indica* Udar & Awasthi and *L. subfusca* (Nees) Steph. are known to occur both in Eastern Himalaya and South India. *L. nicobarica,* Steph. is endemic to Nicobar Island, while, *L. sikkimensis* Steph. is widely distributed Western Himalaya, Eastern Himalaya, Central India and South India.

In a recent collection of liverworts from Great Himalayan National Park in Kullu district of Himachal Pradesh in Western Himalaya, some interesting specimens similar to *L. sikkimensis* were encountered. A detailed morpho-taxonomic study, however, revealed these plants to be different from the typical species in having delicate stem and dentate female bract lobules. Hence it is described here as a new variety.

TAXONOMIC DESCRIPTION

Lopholejeunea sikkimensis var. **tenuicostata** Sushil K. Singh *et* D.K. Singh, *var. nov.* (Figs. 1-18)

Haec variety a *Lopholejeunea sikkimensis* in stipe sectione transversali e cellulis corticalibus 11-13, medullosis 13-17, compositus, bractae *et* lobulae femininae dentatis margine differt.

Type: India, Himachal Pradesh, Great Himalayan National Park (Kullu), Sainj Valley On way from Bah Lapah, *ca* 1800 m, 26 May 2002, *S.K. Singh* 99594-b (Holotype: CAL; Isotype: BSD).

Monoecious. Shoots blackish brown, 5-9 mm long, 1.1-1.3 mm wide, irregularly branched, branching *Lejeunea*-type. Stem deep brown, in cross section 0.11-0.13 × 0.08-0.11 mm; cortical cells 11-13, thick

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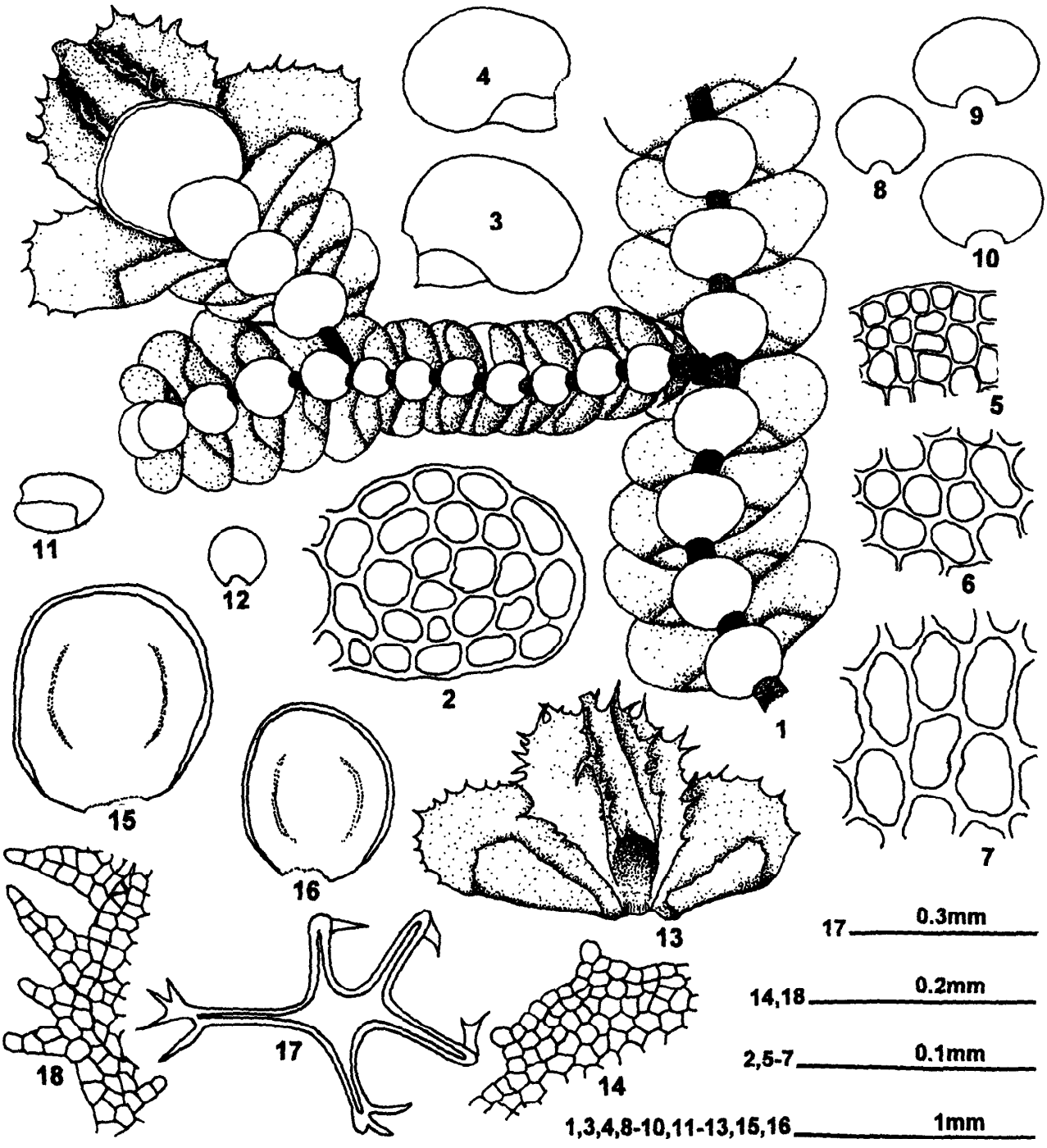


Fig. 1-18, *Lopholejeunea sikkimensis* var. *tenuicostata* Sushil K. Singh & D.K. Singh: 1. A portion of the plant (ventral view); 2. Cross section of stem; 3-4. Leaves; 5. Marginal cells of leaf lobe; 6. Median cells of leaf lobe; 7. Basal cells of leaf lobe; 8-10. Underleaves; 11. Male bract; 12. Male bracteole; 13. A perianth showing bract; 14. A portion of female bract lobule showing dentate margin; 15-16. Female bracteoles; 17. Cross section of perianth; 18. Lateral keels of perianth.

walled, 20.4-32.6 × 12.2-24.5 μm; medullary cells 13-17, comparatively smaller, 16.3-28.5 × 16.3-24.5 μm, thick walled with small trigones. Leaves loosely-closely imbricate, incubous, lobes ovate, 0.63-0.73 mm long, 0.48-0.61 mm wide, margin entire, apex rounded, cells with tri-radiate trigones; marginal cells quadrate, 8.2-14.3 × 8.2-12.2 μm; median cells hexagonal-polygonal, 16.3-24.5 × 12.2-20.4 μm; basal cells slightly elongated, 20.4-36.7 × 16.3-24.5 μm, occasionally with intermediate thickening; lobules distinctly saccate slightly less than half of lobe length, 0.20-0.33 mm long, 0.18-0.23 mm wide with indistinct teeth. Underleaves suborbicular-reniform, distantly arranged in lower portion, imbricate towards apex, wider than long, 0.27-0.35 mm long, 0.27-0.33 mm long, 0.37-0.53 mm wide, apex rounded, margin entire, base rounded, sometimes rhizoids present at base. Male inflorescence intercalary; bracts in 7-9 pairs, hypostatic, strongly saccate; lobe ovate, 0.23-0.32 mm long,. 0.18-0.25 mm wide, margin entire, apex rounded; bracteoles slightly wider than long, 0.18-0.22 mm long, 0.22-0.28 mm wide. Female inflorescence terminal on main or short lateral branches; bract lobe ovate-obovate, 0.83-1.0 mm long, 0.56-0.75 mm wide, margin dentate, apex acute; bract lobules triangular-rectangular, inflated over more than half of lobe length, 0.48-0.66 mm long, 0.22-0.28 mm wide, entirely adnate with bract lobes, margins toothed, apex subacute; bracteoles very large, almost orbicular, 3/4th of perianth length, 0.9-1 mm in diam., margins revolute, entire, apex rounded. Perianth large, obovate, 0.8-1.2 mm long, 0.63-0.75 mm wide, 5-keeled; keels sharply dentate, surface between keels smooth.

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Habitat: Growing over rocks in association with *Frullania muscicola* Steph. in moist and exposed places in coniferous forests. The area receives an average annual rainfall of *ca* 1150 mm.

Distribution : India: Western Himalaya, Himachal Pradesh, Kullu district. Endemic.

DISCUSSION

In a recent study Awasthi *& al.* (2000) grouped the Indian species of the genus *Lopholejeunea* (Spruce) Schiffn. into three categories on the basis of presence or absence of dentations on female bract, bracteole and perianth *viz,*. (i) female bracts, bracteoles and perianth dentate, (ii) female bracts and perianth dentate, bracteoles entire and (iii) female bracts and bracteoles entire, perianth dentate. In the presence of dentate female bracts and perianth and entire bracteoles, the present variety belongs to the second category.

Lopholejeunea sikkimensis Steph. var. *tenuicostata* closely resembles *L. sikkimensis* var. *sikkimensis* in the presence of ovate leaf lobes with entire margins and rounded apex, dentate female bract lobes, large bracteoles with entire and revolute margins, and 5 keeled perianth with dentate keels. However, it distinctly differs from the latter, which has a robust stem comprising 26-32 medullary cells and smooth female bract lobules (Awasthi & *al.*, 2000). It also resembles *L. sikkimensis* Steph. var. *dentata* Awasthi, Srivastava & Sharma in general appearance of plants, shape of leaf lobes and lobules, underleaves, female bract lobes and lobules, female bracteoles, but differs from the latter

which has 4-keeled perianth, with dentate-laciniate keels, as well as the presence of dentitions in between the keels.

Within its group *L. sikkimensis* var. *tenuicostata* resembles *L. nilgiriensis* Awasthi, Srivastava & Sharma and *L. subfusca* (Nees) Steph. in general appearance of plants, leaf lobes and lobules, and underleaves. However, both species distinctly differ from the former in perianth morphology, female bract lobules and bracteoloes. *L. nilgiriensis* differs in having entire and dimorphic female bract lobules, 4-5-keeled perianth with the dentations present on and in between the keels. Whereas, *L. subfusca* differs from the present variety in the presence of nodular intermediate thickenings in the cells of leaf lobes, flat female bracteoles, and 4-keeled perianth.

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