

# *Herbertus udarii* Kumar et Manocha, A new species from India

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A new species of *Herbertus* S.F. Gray, *H. udarii* Kumar et Manocha has been described from Darjeeling. The species although closely resembles *H. longifissus* (St.) Miller, also known from Darjeeling, but differs in the characters, like plant size, stem anatomy, shape of leaves and leaf-lobes, vitta extension in the same and the SEM details of the leaf cuticle. All the vegetative features have been critically evaluated.

**Key-words** - Hepaticae; Bryophyta; Jungermanniales; Herbertaceae; *Herbertus*; *H. udarii* Kumar et Manocha.

## INTRODUCTION

THE genus *Herbertus* S.F. Gray, is the only Indian member of the family Herbertaceae K. Mull., under suborder Herbertineae Schust. of the order Jungermanniales Limpr. (see Schuster, 1972, 1979, 1984). The family Herbertaceae includes two genera viz., *Herbertus* S.F. Gray and *Triandrophyllum* Fulford & Hatcher. But in India, the family is represented by only *Herbertus*, whereas *Triandrophyllum* is restricted to South America (South Georgia).

The genus *Herbertus* Gray is widely distributed all over the world and represented by approximately 108 species. In India, only 23 taxa are present (Abeywickrama, 1959; Arnell, 1963; Bönner, 1966; Chopra, 1938, 1943; Hattori, 1966, 1971, 1975; Herzog, 1939; Kumar & Manocha, 1995; Miller, 1965; Montagne, 1842; Pande & Udar, 1950; Parihar 1961-62; Parihar *et al.*, 1994; Stephani, 1909, 1922 and Udar & Srivastava, 1975, 1977).

An investigation of collection from various localities of Darjeeling, available in the Lucknow University Hepatic Herbarium (LWU), revealed the occurrence of plants somewhat differing from the species already existing in those localities. A critical examination of these plants thus resulted in the establishment of a new species from Darjeeling viz., *Herbertus udarii* mostly resembling to the species *H. longifissus* (St.) Miller. The main vegetative features characteristic to this species are medium sized plants, deep brown colour, leaves approximate to imbricate, bifid 3/5, not

constricted at the bifurcation point, lobes lanceolate having 4-7 superimposed apical cells and disc ovate. The underleaves are bifid about 3/5-2/3. Leaf cuticle smooth in laminar cells and lamellate in vitta cells. The species thus has been treated here as a new taxon viz., *Herbertus udarii* Kumar et Manocha sp. nov.

### ***Herbertus Udarii* Kumar et Manocha sp. nov.**

*Planta mediocris, nicotianus. Folia caulina, approximatus ad imbricatus, bifida circa 3/5, non constricted ad punctum divergens, lobis lanceolatus cum 4-7 cellula apicalis, discus ovatus. Amphigastria longiora quam foliis, bifida circa 3/5-2/3. Cuticula laevis super cellula laminaris dum obliquus tenuis lamellate ad cellulae vittae.*

(Text-figure 1, Figures 1-46)

Plants medium, up to 30 mm long and 3 mm wide (when wet), soft, flexible, straight, deep brown (in herbarium). Branching frequent, irregular, ventral intercalary, imbricate, long attenuating, becoming microphyllous and flagelliform terminally; flagella also present. Rhizoids present on the abaxial faces of reduced leaves and underleaves of the flagelliferous branches as well as on the flagella. Stem stiff, dark brown, thick, oval (in cross-section), upto 12-cells (0.10 mm) across dorso-ventrally and 15-cells (0.19 mm) across laterally, well-differentiated into cortical and medullary cells; cortical cells present in 2(-3) layers, thick-walled with very small cell lumen, circular to elliptical, 4.6-13.8 x 4.6-18.4  $\mu\text{m}$ ; medullary cells comparatively less thickened, ovate to oblong, 4.6-

18.4 x 9.2-25  $\mu\text{m}$ , forming coarse trigones. Leaves incubous, approximate to imbricate, widely spreading to squarrose equally on both the sides, inserted transversely with broad and shallow base, covering  $3/4^{\text{th}}$  diameter of the stem, bifid  $3/5$ , upto 1.32 mm long and 0.44-0.53 mm wide, equally wide to the mid-disc at the bifurcation point. Lobes asymmetric, unequal, divergent upto 0.84 mm; antical lobe shorter and generally straight or sometimes curved towards postical lobe; postical lobe obliquely curved outward or inclined, 0.75-0.97 mm long, gradually tapering, lanceolate, multiseriate at base, becoming biseriate and ultimately uniseriate towards an acuminate tip, consisting of 4-7 superimposed apical cells. Sinus wide, acute to blunt at base. Discus ovate, slightly wider than long, 0.44-0.48 mm long and 0.44-0.53 mm wide, widest at middle with slightly arcuate margin antically, rectangulate at base, margins of the disc slightly wavy, rarely bearing minute blunt projections. Slime papillae sessile and solitary. Vitta distinct, bifurcated at mid-disc or little below, terminating a little beyond lobe-mid, 5-9 cells high, 10-13 cells wide in the disc, 4-6 cells wide at lobe base. Branch leaves identical but much smaller than the main stem leaves. Leaf-cells thin-walled, trigonous; trigones smaller than the cell lumen; laminar cells in the disc quadrate to subquadrate; faintly stellate, forming bulging and nodular to coarse and confluent trigones, 11.2-28 x 8.4-22.4  $\mu\text{m}$ ; cells lying below the sinus similar to the laminar cells in the disc, 22.4-39.2 x 11.2-22.4  $\mu\text{m}$ ; cells in the lobe quadrate to subquadrate, forming minute trigones, 16.8-28 x 5.6-16.8  $\mu\text{m}$ ; vitta cells rectangulate to narrowly elongated, forming bulging and confluent nodular trigones, 36.4-64.4 x 8.4-19.6  $\mu\text{m}$ . Under SEM laminar cells smooth in texture; vitta cells covered with long, fine lamellae, traversing obliquely in the cell area; vitta cells in the lobe area are covered with parallelly running lamellae which are sometimes spindle shaped. Underleaves distant on the main stem, transversely attached, deeply curving abaxially, widely spreading to squarrose, shallowly inserted, covering entire width of

the stem, slightly longer than leaves, 1.28-1.54 mm long and 0.35-0.40 mm wide,  $3/5$ - $2/3$  bifid, slightly wider to the mid-disc at the bifurcation point measuring about 0.44 mm. Lobes asymmetric, unequal, straight, subparallel to divergent upto 1.32 mm, 0.53-1.1 mm long, narrowly lanceolate with an acuminate tip. Sinus wide, obtuse to blunt at base. Discus subquadrate to ovate, longer than wide, 0.48-0.53 mm long and 0.35-0.39 mm wide, widest at middle, truncate to subtruncate at base, margins of the disc rarely bear projections. Slime papillae, vitta and cells similar to the leaves. Branch underleaves identical but much smaller than the main stem underleaves. Fertile specimens are not seen.

*Habitat* : Growing in association with the species of *Scapania* (fertile), *Apalozia*, *Plagiochila*, *Lepidozia*.

*Type Locality* : Eastern Himalayas-West Bengal-Darjeeling-Ray Ville Road.

*Range* : Asia-Endemic to India.

*Distribution in India* : Eastern Himalayas-West Bengal-Darjeeling.

*Specimen examined* : LWU. 1400/69 (Holotype). Loc.: Ray Ville Road, Darjeeling, in association with *Scapania*, *Apalozia*, *Plagiochila*, *Lepidozia*, Date: 31.12.1969, Leg.: R.Udar, S.C. Srivastava & D. Kumar, Det.: D. Kumar & N. Manocha, submitted in the Lucknow University Hepatic Herbarium (LWU).

## DISCUSSION

The species *Herbertus udarii* with its restricted distribution in Darjeeling, Eastern Himalayas (Endemic to India) has been recently discovered and described for its morphotaxonomic details. The present species shows variation in the bifurcation ratio of leaves which are generally bifid upto 60% ( $3/5$ ) but rarely they are found to be bifid upto 75% ( $3/4$ ) (Figs 5-13, Text-figure 1).

The species shows close affinity with another

## PLATE 1

Figures 1-4. Fig. 1. Some laminar and vitta cells in the leaf disc. Fig. 2. Some laminar cells in the leaf disc, from other side. Fig. 3. Same,

magnified. Fig. 4. Vitta cells, magnified [SEM micrographs 1-4 from LWU. 1400/69 (Holotype)]

Himalayan species. *H. longifissus* in general appearance of the plant, frequent branching, leaves approximate to imbricate, widely spreading to squarrose and transversely inserted, bifid 60% (3/5), with shorter antical lobe, lobes comprising upto 7 superimposed apical cells, vitta bifurcated at mid-disc or little below, vitta height and width in the leaf-disc, leaf-cells and underleaves lacking constriction at the bifurcation point but the former differs from the latter in having smaller plants (upto 60 mm long and 2 mm wide in *H. longifissus*). The stem is upto 0.19 mm wide laterally across diameter with 2(-3) layers of cortical cells (in cross-section) in *H. udarii* (Figs 3,4, Text-figure 1) whereas it is upto 0.33 mm wide with 3(-4) layers in *H. longifissus*. Further, the former has smaller leaves, lacking constriction at the bifurcation point, smaller divergent lobes, and disc slightly wider than long (Figs

5-13, Text-figure 1) while the latter has larger leaves upto 2.2 x 0.70 mm, which is comparatively narrower at the bifurcation point showing curved constriction, larger, upto 1.4 mm, falcate-second lobes, and disc almost equal in length and width. The vitta terminates in the present species little beyond lobe-mid whereas it is grooved and terminates just below the apex of leaf lobe in *H. longifissus*.

The two species further differ in cuticular structure as revealed under SEM where *H. udarii* shows smooth laminar cells and development of long, fine lamellae traversing obliquely in the cell area (Figs 1-4, Plate 1) but in *H. longifissus* leaf surface is ornamented with papillate outgrowths giving nodular appearance over the laminar cells and the papillae align to provide striations over the vitta cells.

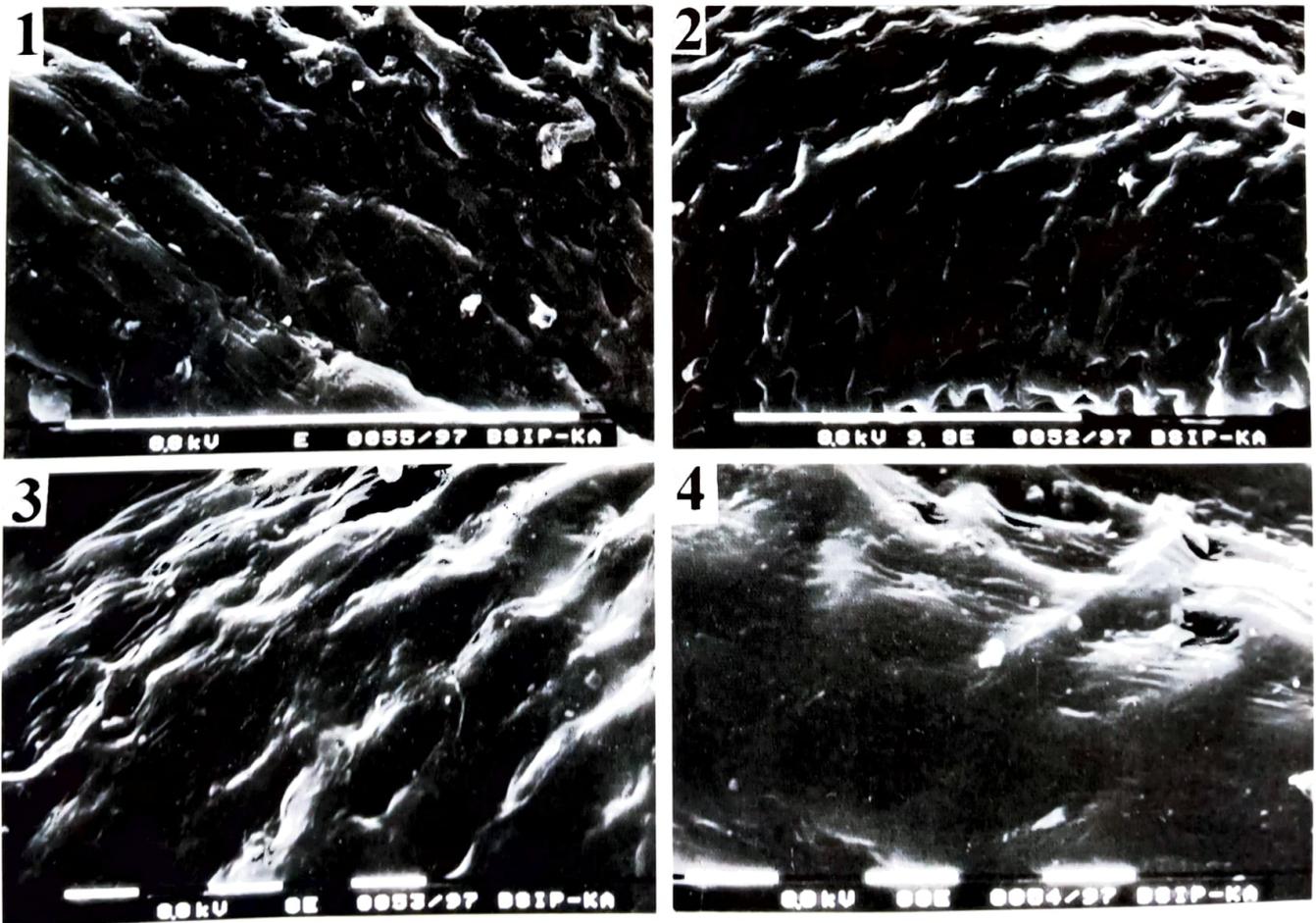
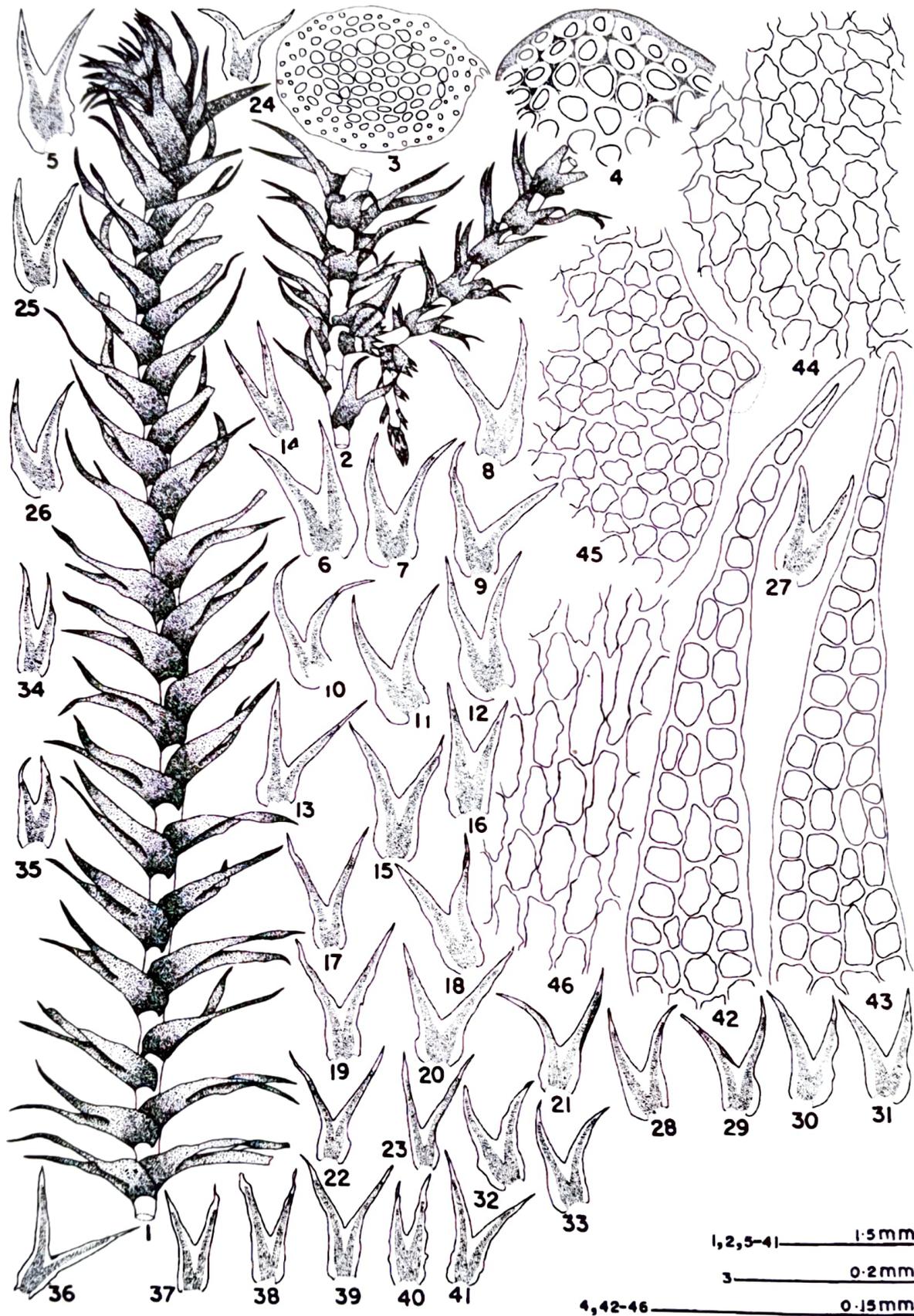


PLATE 1



Text-figure 1, Figures 1-46. Fig. 1. Dorsal view of the plant (A portion). Fig. 2. Ventral view of the plant with branch (A portion). Fig. 3. T.S. of stem. Fig. 4. T.S. of stem (A portion magnified). Figs 5-13. Leaves of the main stem. Figs 14-23. Underleaves of the main stem. Figs 24-33. Leaves of the branch. Figs 34-41. Underleaves of the branch. Figs 42-43. Cells in the leaf lobe. Fig. 44. Cells lying below the sinus in the leaf disc. Fig. 45. Laminar cells in the disc, toothed margin of the disc showing slime papillae. Fig. 46. Vitta cells in the disc. [Figures 1-46 drawn from LWU. 1400/69 (Holotype)]

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