



A Morphotaxonomic details of *Jungermannia* (*Solenostoma*) *heterolimbata* Amak from Darjeeling (near Sandakphu): An Endemic Species to India.

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Jungermannia (*Solenostoma*) *heterolimbata* is an Endemic species to India. It was firstly reported by Amakawa (1967) from Darjeeling, later on Vana, J. (1972) also reported the species from India. A morphotaxonomical study of the plants are given in detail in the current account. Specimens collected from Darjeeling by Lucknow University Bryology School were studied and the details are given on the bases of Examination and observation from there specimen only.

The species belong to the section *Desmorhiza* of Subgenus *Solenostoma*. The Plants are 10-13 mm long, olive green to brown, rhizoids long, decurrent along the stem forming distinct fascicle. Leaves orbicular sinuately inserted, Plants dioecious, Male inflorescence Intercalar, Perianth Clavate, tetraplicate, plicae only at apex.

JUNGERMANNIA (SOLENOSTOMA) HETEROLIMBATA AMAK.

Jungermannia (*Solenostoma*) *hetreolimbata* Amak., Journ. Hatt. Bot. Lab. 30:183 (1967); Vana, Jour. Hatt. Bot. Lab. 36: 66 (1972).

(Plate-1, Figs. 1-10; Plate-2, Figs. 1-14; Plate-3, Figs. 1-6)

Plants in turfs, 10-13 mm long, 1.5-2.0 mm wide, olive green to brown, stem erect or ascending simple or branched, branching lateral intercalary, 0.20-0.25 mm 8-10 cells across the diameter, one-two layers of cortical cells are thick walled, 20-30 x 25-50 μm , medullary cells thin-walled, 20-35 x 20-45 μm . Subfloral innovations present. Rhizoids numerous, long, decurrent along the stem forming a distinct fascicle. Leaves succubous, distant or slightly contiguous, sinuately inserted, decurrent on both the sides, canaliculately concave, slightly appressed to the dorsal surface, when flattened orbicular, apex obtuse or rounded, 0.65-1.0 mm long, 0.8-1.2 mm wide, cells 17.0-30.6 x 10.2-30.6 μm along the leaf margin, 27.2-44.2 x 20.4-50.6 μm in the middle and 34.0-81.6 x 20.4-40.8 μm at the base, 1-4 rows of the cells along the leaf margin thick-walled and small, the cells of the next rows thin-walled, trigones distinct and acute angled, cuticle smooth.

Dioecious. Male inflorescence intercalary, bracts many pairs, ventricose, 1.0-1.5 mm long, 1.2-1.8 mm wide. Perianth clavate, 2.25-2.6 mm long, 4-plicate, plicae indistinct (plicae only at apex), $\frac{1}{2}$ exerted, mouth crenulate, beak present, perigynium undeveloped. Apical cells of the perianth 10.2-40.8 x 13.6-20.4 μm , middle cells 23.8-37.4 x 17.0-23.8 μm and cells at the base 23.8-51.0 x 17.0-20.4 μm . Female bracts one pair similar to stem leaves, 0.9-1.0 mm long, 1.2-1.3 mm wide, Sporophyte with foot, seta and capsule. Capsule on maturity four valved. Capsule wall bistratose, outer layer cells much broader than long having nodular thickenings on radial and end walls, cells of the inner layer much longer than broad with semiannular

thickening bands. Spores 15.3-20.3 μm in diameter, brown. Elaters bispirate, 119-153 μm long, 20.4-23.8 μm wide with tapering ends.

SEM of spores: The sporoderm architecture comprises of minute papillae both on the distal (Plate-3, Figs. 3,4,6) as well as on the proximal face but more densely on the distal face. Sometimes these papillae fuse with each other (generally towards the equator). On the proximal face (Plate-3, Figs. 1,2) a distinct tri-radiate mark is present, the papillae present on this tri-radiate mark are slightly larger. The tri-radiate rays terminate near the equator.

Habitat: Terricolous.

Type Locality: Darjeeling (Near Sandakphu).

Distribution in India: Endemic to Eastern Himalayas: W. Bengal- Darjeeling (Near Sandakphu).

Range: India (Endemic).

Characteristics of the species :

1. Plants 10-13 mm long, olive green to brown.
2. Rhizoids long, decurrent along the stem forming a distinct fascicle.
3. Leaves orbicular, sinuately inserted with 1-4 rows of marginal cells thick walled and subsequent rows of cells thin-walled.
4. Dioecious. Male inflorescence intercalary, bracts in many pairs.
5. Perianth clavate, tetra-plicate, plicae only at apex, perigynium undeveloped.

Following specimens have been examined:

LWU 8306/78, Bryophytes from Eastern Himalayas, *Jungermannia* (*Solenostoma*) *heterolimbata* Amak., Loc.: Darjeeling, alt. ca 2000 m, Habitat: on soil in association with *Frullania yunnanensis*, *Scapnia pseudolepicolea*, *Jungermannia* (*Solenostoma*) *apressifolia* Mitt. and *Jungermannia* (*Solenostoma*) *macrocarpa* Steph., Leg.: S.C. Srivastava, 20.5.1978, Det.: S.C. Srivastava & P. Singh.

Jungermannia (*Solenostoma*) *heterolimbata* Amak. is typified by the orbicular leaves which are bordered by 1-4 rows of small, thick-walled cells and the clavate perianth with plicae (tetra-plicate) only at apex.

This species resembles *J. (Solenostoma) apressifolia* Mitt. in external appearance, both being green-brown, with erect simple or branched stem (branching lateral intercalary), leaves decurrent on both the sides, canalically concave, slightly appressed to the stem, when flattened, orbicular, perianth clavate. However, *J. apressifolia* differs from *J. heterolimbata* in having only thin-walled leaf cells throughout and (3) 4-5 plicate perianth, while in *J. heterolimbata* 1-4 rows of marginal leaf cells are small and thick-walled and perianth with plicae only at apex.

In specimen LWU 8306/78 the plants are comparatively smaller in size (only 10-13 mm long) and brown, while the plants examined by Amakawa (1967) from Darjeeling are larger in size (upto 3 cm) and olive green in colour.

Plate -1

Jungermannia Solenostoma heterolimbata Amak.

(Figs. 1-10)

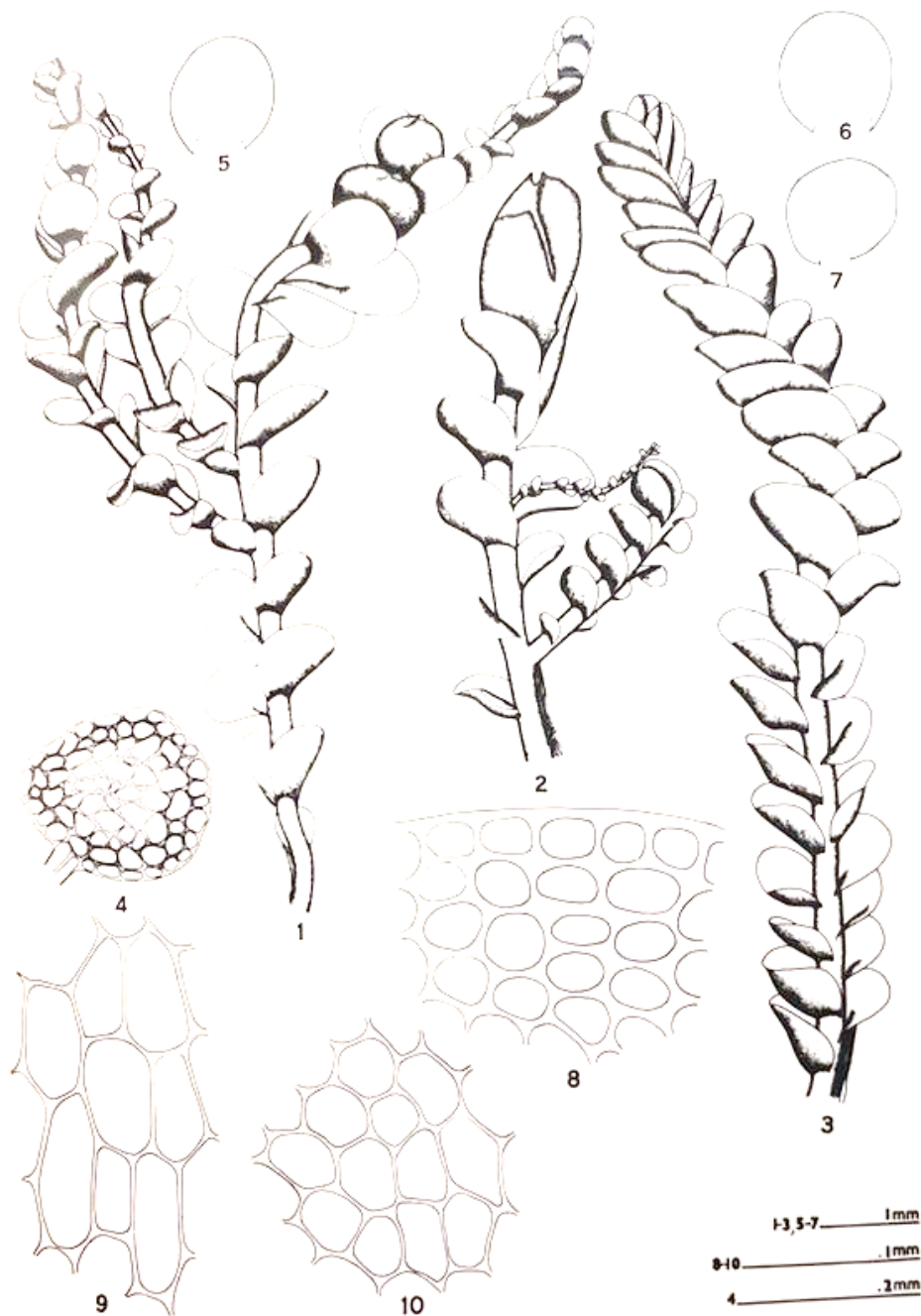


Fig. 1,2. Female plants.

Fig.3. Male plant.

Fig.4. Cross section of stem.

Fig.5-7. Leaves.

Fig. 8. Marginal cells of leaf.

Fig.9. Median cells of leaf.

Fig. 10. Basal cells of leaf.

All the figures drawn from specimen LWU 8306/78.

Plate-2

Jungermannia Solenostoma heterolimбата Amak.

(Figs. 1-14)

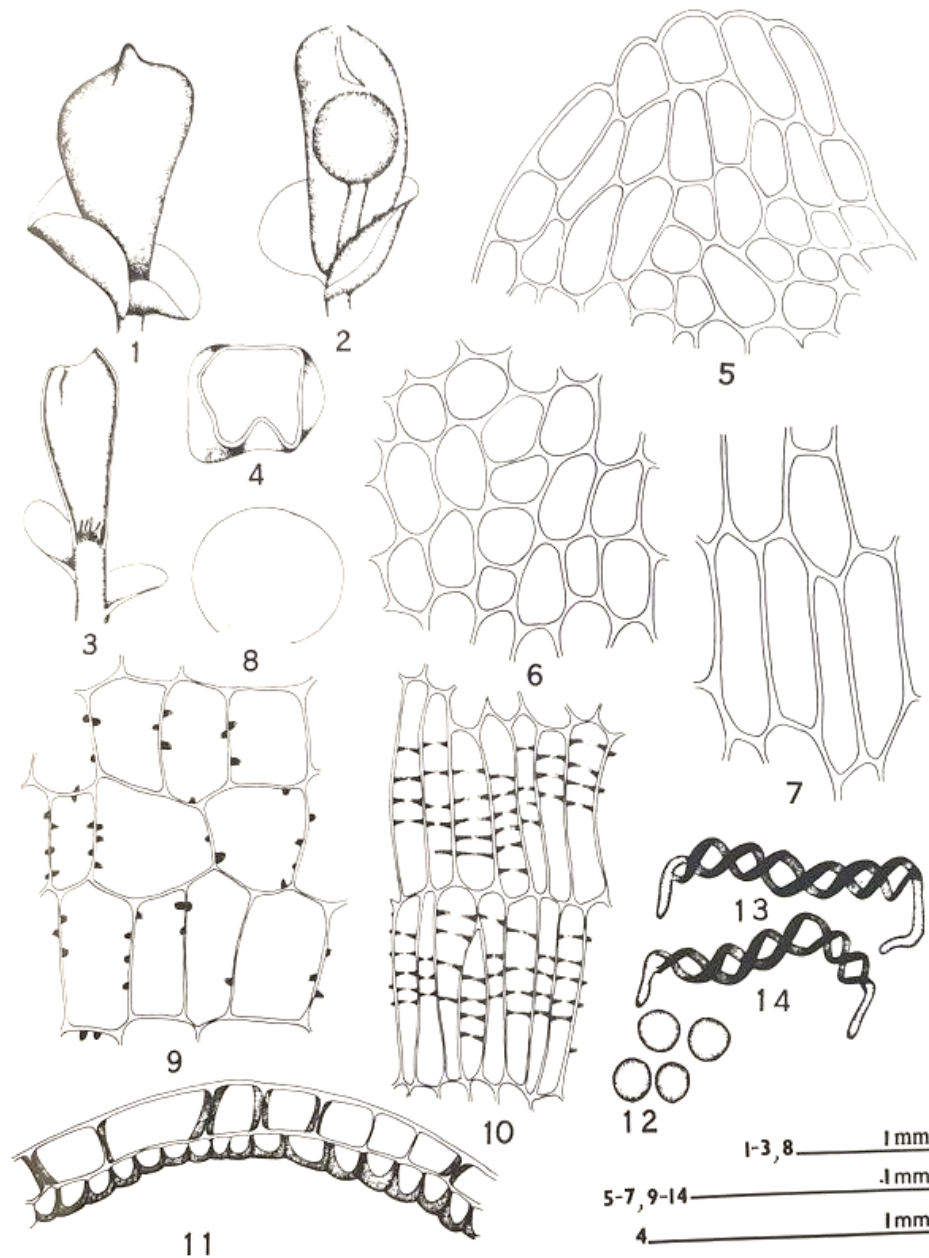


Fig. 1,2. Perianths.

Fig. 3. L.S. perianth.

Fig.4. T.S. perianth.

Fig.5. Apical cells of perianth.

Fig.6. Median cells of perianth.

Fig.7. Basal cells of perianth.

Fig. 8. Female bract.

Fig. 9. Cells of outer layer of capsule wall.

Fig. 10. Cells of inner layer of capsule wall.

Fig. 11. T.S. capsule wall

Fig. 12. Spores.

Fig. 13,14. Elaters.

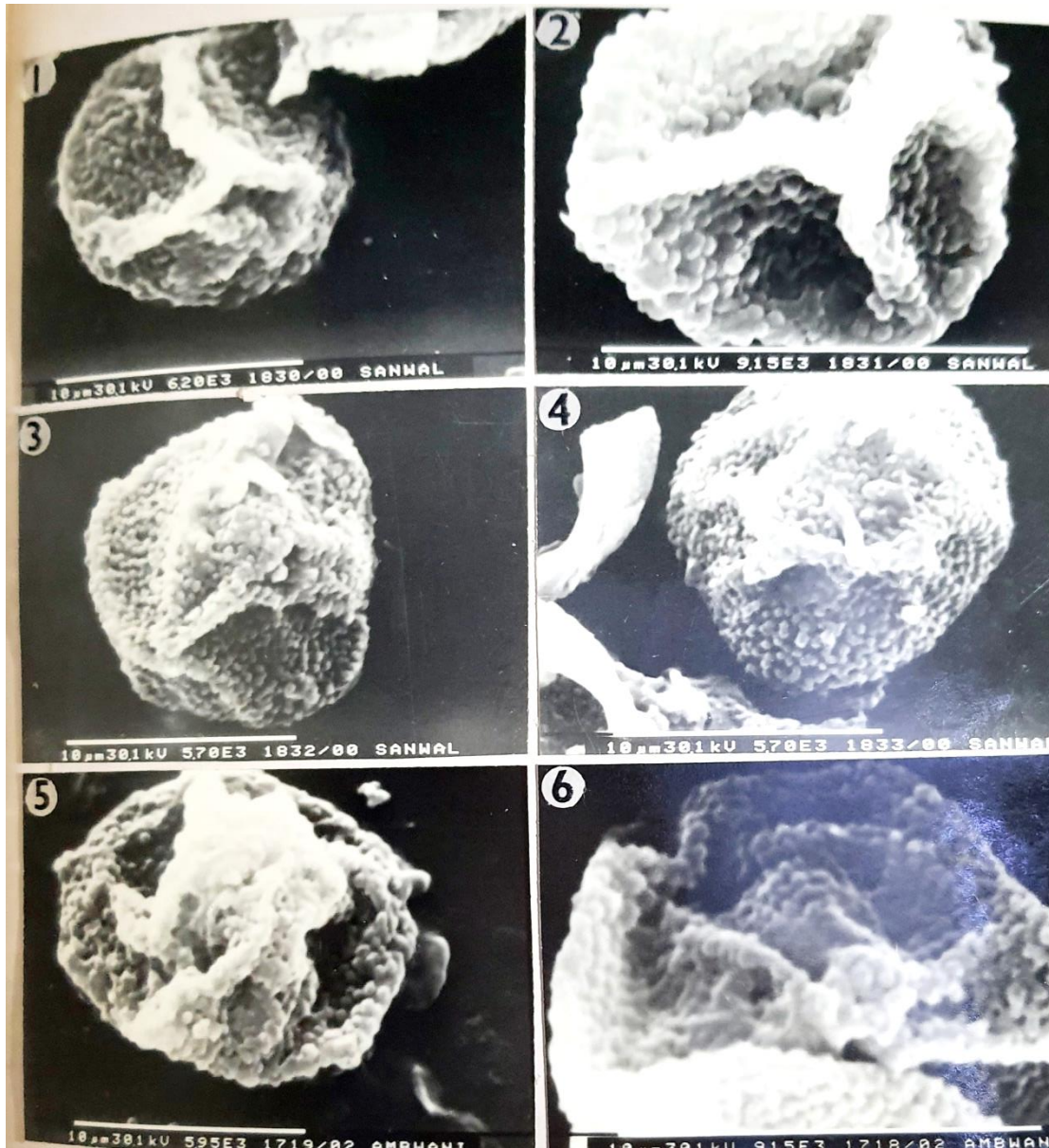
All the figures are drawn from specimen LWU 8306/78.



Plate -3

Jungermannia Solenostoma heterolimbata Amak.

(Figs. 1-6)



Figs. 1,2. Spores, proximal view.

Figs. 3-5. Spores, distal view.

Fig. 6. Spore, distal view (enlarged).

(SEM from LWU 8306/78).