BULL. BOT. SURV. INDIA
Vol. 49, Nos. 1-4 : pp. 219-224, 2007

JUNGERMANNIA NILGIRIENSIS, A NEW SPECIES FROM NILGIRI HILLS (WESTERN GHATS) INDIA

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Jungermannia is a large genus forming terricolous population with 125 species distributed worldwide (Vana, 1975, 1996; Hong, 1997, 2003; Schuster, 1969; Vana & Hong, 1999). Of these, 54 species are known from India (see Bapna & Kachroo, 2000). Among the 4 subgenera of this genus (Amakawa, 1960), *Jungermannia* subgenus *Plectocolea* is represented by 10 validly recognized species in India of which 3 species are known to occur in South India (see Udar & Srivastava, 1975; Kumar, 1982; Udar & Kumar, 1981, 1983; Singh, 1991; Parihar & al., 1994; Bapna & Kachroo, 2000; Alam, 2005). This subgenus is characterized by purple, decurrent, fasciculate rhizoids, exerted (1/2 to 2/3) and plicate (3-7) perianth and moderately developed perigynium.

During cursory examination of recent collections as well as some older specimens of liverworts from Nilgiri hills in Western Ghats the authors came across some interesting plants of *Jungermannia* subgenus *Plectocolea* showing similarity with *Jungermannia hasskarliana* (Nees) Steph. However a closer look revealed them to be significantly distinct from the latter in size of plants, position of rhizoids on perianth surface and in development of trigones in the cells of perianth. Further careful studies show that it also differs from the related species of the subgenus. Hence it is reported here as *Jungermannia nilgiriensis* sp. nov. The species has also been found in earlier collections from Western Himalaya and Palni hills.

This species can be separated from the other species of the subgenus *Plectocolea* with the help of following key :

KEY TO SPECIES OF *JUNGERMANNIA* SUBGENUS *PLECTOCOLEA* IN INDIA

1. Leaves obliquely inserted ... section *Eucalyx* (Lindb.) Grolle *J. infusca*

1a. Leaves sub- transversely inserted ... section *Plectocolea* (Mitt.) Amak ... 2

2. Leaves ligulate with ventrally curved margins ... *J. comata*

2a. Leaves orbicular to ovate, with or without dorsally curved margins ... 3

3. Leaves normally orbicular ... 4

3a. Plants brown; rhizoids present on axis and on abaxial surface of leaves, male and female bracts; perigynium developed up to $\frac{1}{3}$ of perianth length ... *J. hasskarliana*

Received on 16.06.2007; Accepted on 18.12.2007.

4. Plants light to dark green; rhizoids not present on abaxial surface but at the base of insertion of leaves, male and female bracts; perigynium developed up to ½ of perianth length ... 5

4a. Rhizoids present on perianth surface ... *J. nilgiriensis*

5. Rhizoids not present on perianth surface ... *J. pfleidereri*

5a. Leaves normally ovate ... 6

6. Perigynium developed up to $\frac{1}{4}$ $\frac{1}{2}$ of perianth length ... 7

6a. Plants small, 0.3-0.7 cm long, purple; asexual reproduction by 1- celled gemmae ... *J. rubripunctata*

7. Plants large, 1.5-3.0 cm long, normally light green- dark green; asexual reproduction absent ... 8

7a. Perigynium $\frac{1}{4}$ of perianth length ... *J. sikkimensis*

8. Perigynium $\frac{1}{3}$ $\frac{1}{2}$ of perianth length ... 9

8a. Perianth mouth crenulate ... *J. truncata*

9. Perianth mouth ciliated ... *J. truncata* var. *setulosa*

9a. Perigynium hardly developed ... 10

10. Leaves with 1 large oil body in few cells ... *J. tetragona*

10a. Leaves with 1-6 oil bodies in each cell ... *J. glauca*

Jungermannia nilgiriensis Afroz Alam, Adarsh Kumar and S. C. Srivastava **sp. nov.** (Figs. 1-23).

Plantae dioeciae, minor 1.2-2.0 cm longa; pallidus viridis ad pallidus brunneus; caulis simplex, erectus; folia cauline distans, nomalis orbicularis-suborbicularis, concave, infirnus decurrentibus, dorsilobus, subtransversaliter ad obliquus insertus, obliquus expansus, trigones nullis vel Purvis. Rhizoidea vntralibus paginate axibus ad basibus folium insertibus et paginate. Androecia terminalis, bracteis ad 7-8 jugus, androecia 2 in bracteis. Perianthibus; perainthium clavatus-fusiformis, 4-6 plicatum, cellulae cum debiliter trigonae, perigynium ueque ad ½ logitudis.

Holotypus: India : South India, Tamil Nadu [Ootacamund (Kruthukuli)], ca 2250 m, 30.03.2001, leg.: *P.K. Verma & Afroz Alam*, 13704/2001 (LWU).

Plants up to 1.2-2.0 cm long, light green to light brown, prostrate, forming dense patches. Stem 165-215 μm in diameter, 9-11 cells across; cortex 2-4 cell layered thick, cells thick walled, light yellowish brown, 11.2-17.5 × 10-21 μm; medullary cells comparatively larger, thin walled, hyaline, 11.2-27.5 × 11.2-28 μm; flagella at posterior part of the axis; branching sparse, lateral, sometimes with sub floral innovation. Leaves mostly distant, entire, rarely slightly retuse, succubous, normally orbicular to sub orbicular, rarely ovate, concave, broader than long, 0.32-0.76 mm long, 0.36-1.0 mm broad, poorly decurrent dorsally, sub transversely to obliquely inserted, obliquely spreading; marginal leaf cells 15.2-32.5 × 15.2-30.4 μm; middle and basal leaf cells 26.68-57.0 × 17.5-32.5 μm, walls thin, trigones small to slightly prominent, surface smooth. Rhizoids few to sometimes numerous, hyaline and purple, all over the ventral surface of axis, at base of leaf insertion and on perianth surface. Dioicous. Male

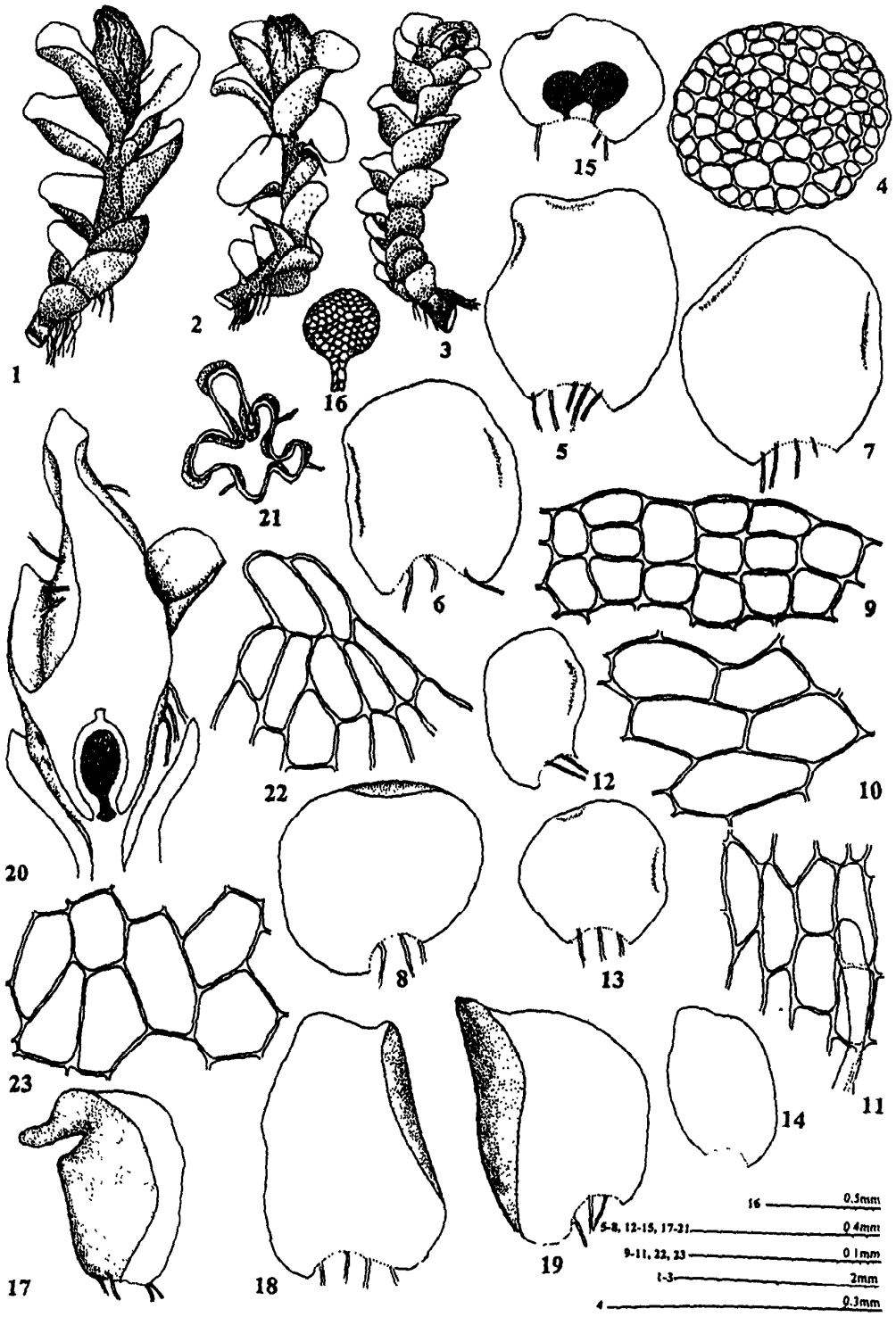

Fig. 1. *Jungermannia (Plectocolea) nilgiriensis* sp. nov. :

1-2. Female plants with perianth; **3.** Male plant; **4.** *T. S.* of axis; **5-8.** Leaves; **9.** Apical cells of leaf; **10.** Median cells of leaf; **11.** Basal cells of leaf; **12-14.** Male bracts; **15.** Male bract with antheridia, **16.** Antheridium; **17-19.** Female bracts; **20.** *L.S.* of perianth; **21.** *T. S.* of perianth; **22.** Cells of perianth mouth; **23.** Median cells of perianth.

inflorescence terminal on main stem with 7-8 pairs of bracts; antheridia 2 per bract with biseriate stalk, 142.0-185.0 μm. Female inflorescence terminal on main shoot; bracts in 1 pair, larger than cauline leaves, 0.45-0.48 × 0.81-1.3 mm; normally orbicular- reniform, margin recurved and undulate. Perianth clavate-fusiform, longly exserted, 4-6-plicate; mouth gradually narrowed, sometimes wide, crenulate, 0.72 mm in diameter (in cross section); apical cells 19.0-26.60 × 15.2-22.8 μm; middle cells 23-34 × 19.0-27.0 μm, cell wall thin with feebly developed trigones; perigynium up to ½ of the perianth length. Sporophyte immature.

Range: Endemic to India.

Distribution : South India: Tamil Nadu Nilgiri hills [Ootacamund (Kruthukuli)], Palni hills – Kodaikanal (Bryant Park). Western Himalaya: Uttarakhand Chaubatia in Almora.

Ecology and habitat: Terrestrial, grows on wet soil covered rocks in shady places in association with *Anthoceros* sp., *Cephaloziella kiaerii* and mosses.

Specimens examined : India : Western Ghats, Tamil Nadu, Nilgiri hills, Ootacamund (Kruthukuli), *ca* 2200 m, 30.03.2001, *P.K. Verma & Afroz Alam*, 13704/2001 (LWU), here designated as type; Palni Hills, Kodaikanal (Bryant Park), ca 1500 m, 04.01.1966, *R. Udar & party*, 128/1966 (LWU); Palni hills, Kodaikanal (Upper Lake Side), ca 2200m, 15.10.2000, *S. C. Srivastava & Party*, 13129/2000 (LWU); Western Himalaya: Uttarakhand, Almora (Chaubatia), ca 1000 m 19.09.1980, *S.C. Srivastava & D. Kumar*, 4477/80 (LWU); *Jungermannia* (*Plectocolea*) *hasskarliana*: 14772, Bryophytes from Malay Peninsula, leg. *C. Curtis*, Dated: July, 1884, det.: Stephani. (G); *Jungermannia* (*Plectocolea*) *hasskarliana*: Bryophytes from Eastern Himalaya: Meghalaya- Shillong, ca 1800 m, Date: April, 1976, leg.: *D.K. Singh*, det.: *R.Udar and A. Kumar*, 5354-56/1976(LWU).

CHARACTERISTICS OF SPECIES

1. Plants small, up to 1.2-2.0 cm long, prostrate in mats. 2. Leaves distant, entire, rarely slightly retuse, succubous, normally orbicular to sub orbicular, rarely ovate, concave, broader than long. 3. Rhizoids few to sometimes numerous, hyaline and purple, present all over the ventral surface of axis, at base of the insertion of leaf, male and female bracts and perianth surface. 4. Male inflorescence terminal on main stem with 7-8 pairs of bracts; antheridia 2 per bract with biseriate stalk. 5. Female inflorescence terminal on main shoot; bracts in 1 pair, larger than cauline leaves, normally orbicular-reniform, margin recurved and undulate. Perianth clavate-fusiform, longly exserted, 4-6- plicate; perigynium up to ½ of the perianth length.

DISCUSSION

This species resembles an earlier described species of the genus, *Jungermannia hasskarliana* of the subgen. *Plectocolea* section *Plactocolea* but differs from the latter in several morphological features. The differentiating features of the two species are presented in the table below. The plants collected from western Himalaya show minor variation in cell wall thickening which is comparatively more developed in south Indian plants.

Table 1. : Comparative account of *J. nilgiriensis* and *J. hasskarliana*

Characters	***J. nilgiriensis*** sp. nov.	***J. hasskarliana*** (Nees) Steph.
Length	Plants up to 1.2 cm to 2.0 cm long.	Plants up to 2.5 cm to 3.0 cm long.
Life form	Forming dense patches.	Forming tufts.
Leaves	Orbicular, concave and sub transversely to obliquely inserted .	Conduplicate concave and sub transversely Inserted.
Rhizoids	Present at the base of leaves, male and female bracts, and perianth surface.	Scattered over the abaxial surface of leaves, male and female bracts, and perianth surface.
Trigones	Feebly developed in perianth cells.	Well developed in perianth cells.
Perigynium	Developed up to $\frac{1}{2}$ of the perianth length.	Developed up to $\frac{1}{3}$ of the perianth length.

ACKNOWLEDGEMENT

The authors are grateful to Ministry of Environment and Forests, Govt. of India, New Delhi for financial assistance.

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