

***Jungermannia indrodayana*  
(Jungermanniaceae, Hepaticae) –  
a new species from India**

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*(Received 20 January 2006; accepted 26 October 2006)*

**Abstract** – *Jungermannia indrodayana* Sushil K.Singh & D.K.Singh, related to *J. atrobrunnea* Amak., *J. bengalensis* Amak., *J. pseudocyclops* Inoue, is described as a new species from Himachal Pradesh in Western Himalaya, India.

**Hepaticae / Jungermanniaceae / *Jungermannia* / new species / Western Himalaya / India**

## INTRODUCTION

The genus *Jungermannia* L. emend. Grolle, with 120-125 species, is widely distributed across the world except tropical rainforests, savannahs and deserts, with South East Asia being the major center of its diversity (Váňa, 1996, 1999). The taxonomy of the Asiatic species of the genus has been studied by Amakawa (1960, 1963, 1966, 1967, 1968, 1970, 1971, 1972, 1975), Váňa (1972a, b, 1973, 1974, 1975a, b), Gao & Bai (2001) and Váňa & *al.* (2005). In India, however, the taxonomy of the genus has received little attention (Kashyap, 1932; Hattori, 1966; Udar & Kumar, 1981, 1983; Srivastava & Singh, 1986a, b, 1988, 1995; Srivastava & Amakawa, 1991; Srivastava & *al.*, 2003). In the present state of our knowledge the genus is represented in the country by 41 taxa, of which 14 occur in Western Himalaya. In a recent collection of liverworts from Rohtang pass in Kullu district of Himachal Pradesh in Western Himalaya, we found specimens of *Jungermannia*, belonging to subgenus *Solenostoma* (Mitt.) Amak., which merit the status of a new species.

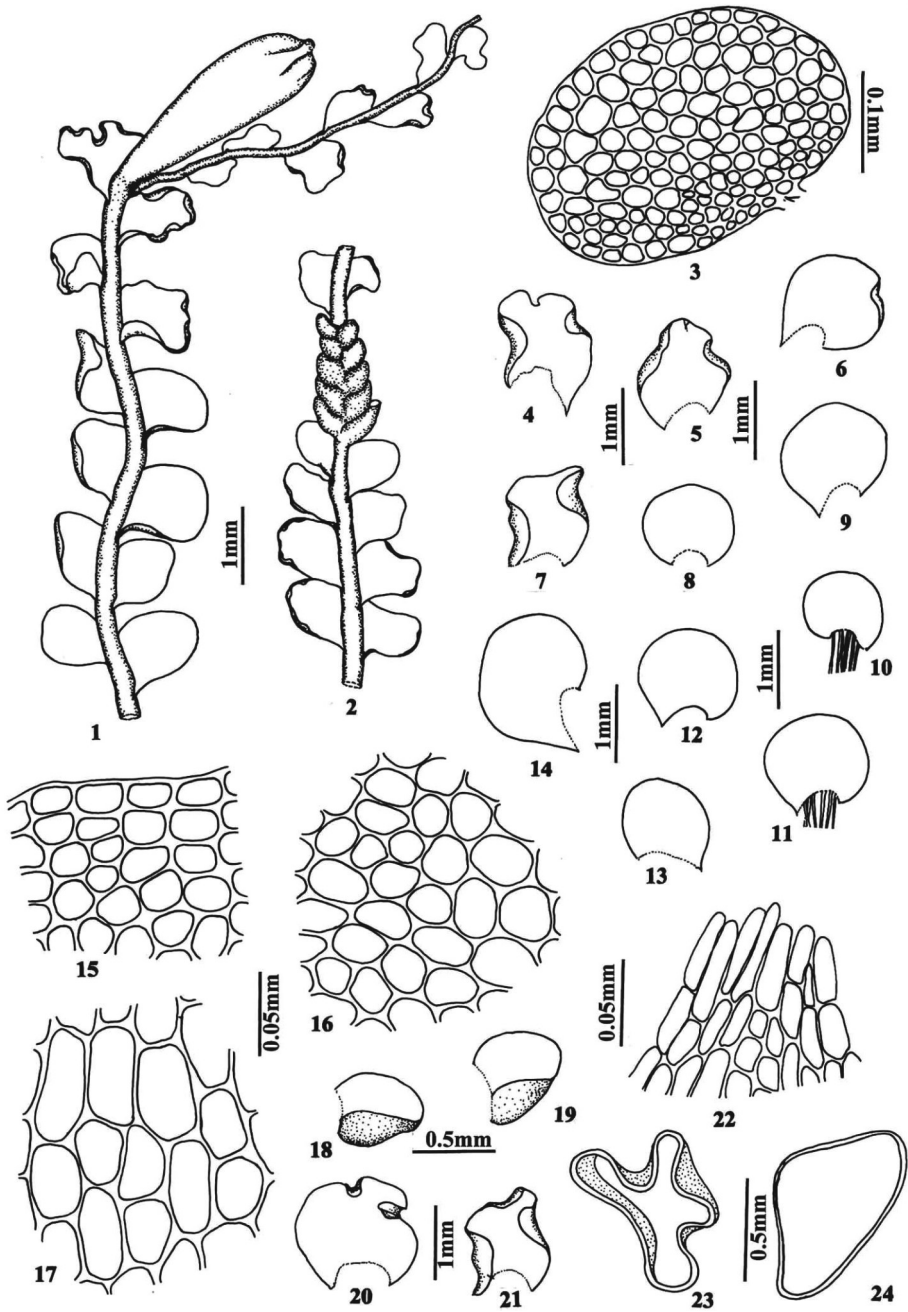
## DESCRIPTION

***Jungermannia indrodayana* Sushil K.Singh & D.K.Singh, *sp. nov.*** (Figs 1-24)

*Plantae dioeciae, filiformis, atrobrunnea, 8-20 mm longae, 1.4-1.9 mm latae, parum ramosus, saepe flagellifer; caulis cum 11-14 cellulae across diametro. Folia caulina remotiuscula, ovatae vel suborbicularis, late patula, 0.6-1.1 mm longae*

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Figs 1-24. *Jungermannia indrodayana* Sushil K. Singh & D. K. Singh: **1**. A portion of female plant with perianth (dorsal view). **2**. A portion of male plant with androecial branch (dorsal view). **3**. Stem cross-section. **4-14**. Leaves. **15**. Marginal leaf cells towards apex. **16**. Median leaf cells. **17**. Basal leaf cells. **18, 19**. Male bracts. **20, 21**. Female bracts. **22**. A portion from perianth mouth. **23**. Cross-section of perianth towards apex. **24**. The same from middle portion.

et 0.5-1.2 mm latae, margine sepa recurvo; cellulae marginales 20.4-44.8 × 20.4-40.1 μm, mediae 24.5-53.0 × 20.4-36.7 μm, basale 36.7-61.2 (-81.6) × 20.4-36.7 μm, parietis leviter incrassatus, trigones triradiatus vel subnodulosus; cuticula laevis vel minute verrucosa. Perianthia exserta, elongatus ad clavatus, 2-3 mm longae, 0.6-0.8 mm latae, apice irregulariter plicato, rostrato.

**Type:** India, Himachal Pradesh, near Rohtang pass (ca 3200 m), 31.07.2002, S.K. Singh 101223 (holotype: CAL; isotype: BSD); S.K. Singh 101226 (paratype : BSD).

**Dioecious. Plants** small, blackish-brown, 8-20 mm long, 1.4-1.9 mm wide, with few branches, flagellae common; stems in cross-section oval to broadly elliptical in outline, 285-367 × 224-265 μm, 11-14 × 10-12 cells across, not differentiated into cortex and medulla, cells quadrangular – sub quadrangular, polygonal, 12-37 × 12-29 μm, rarely with minute trigones. **Leaves** remote to loosely imbricate, sinuately inserted, ovate to sub orbicular, 0.6-1.1 mm long, 0.5-1.2 mm wide, slightly decurrent on both sides, widely spreading, often with recurved margins; cells along the leaf-margin subquadrate-hexagonal, 20-45 × 20-40 μm; median cells polygonal, 25-53 × 20-37 μm; basal cells slightly elongated, sub quadrangular, 37-61 (-82) × 20-37 μm, walls more or less equally thickened, trigones triradiate to subnodulose, cuticle nearly smooth to minutely verrucose. **Rhizoids** smooth, long, reddish-brown. **Androecia** intercalary on main or lateral branches; bracts saccate, in 5-6 pairs, 0.5-0.6 mm long, 0.4-0.45 mm wide. **Gynoecea** terminal on main branches or lateral branches with single, subfloral, flagellate branch; bracts in one pair, usually similar to leaves in shape, slightly larger, 0.9-1.2 mm long, 0.9-1.3 mm wide. **Perianth** long-exserted, elongated-clavate, 2.0-3.0 mm long, 0.6-0.8 mm wide, irregularly 4-5-plicate at apex; mouth with a short beak, cells slightly elongated at apical region.

**Habitat:** Terrestrial, growing in caespitose patches, in pure population in moist and shady places.

## DISCUSSION

Indian species of *Jungermannia* are referable to four subgenera viz. *Jungermannia* L., *Liochlaena* Nees, *Plectocolea* (Mitt.) Amak. and *Solenostoma* (Mitt.) Amak. Of these, *Solenostoma* with 25 species and 3 varieties is the largest subgenus in India, followed by *Plectocolea* with 11 species, and *Jungermannia* and *Liochlaena* with one species each (Table 1).

In addition to the above, *J. breviflora* Kashyap (= *Solenostoma breviflora*), *J. viridis* Kashyap, *J. humilis* Kashyap and *J. oblongifolia* Kashyap reported from Western Himalayan region (Kashyap, 1932) have been regarded as doubtful taxa (Srivastava & Singh, 1995).

On the basis of its small, slender, filiform plants with flagellate stem and branches, and distant leaves, *Jungermannia indrodayana* shows affinity with *Jungermannia* subgenus *Solenostoma* sect. *Nematocaulan* Amak. Within its group it is closely allied to *J. atrobrunnea* Amak. [India (Eastern Himalaya), Nepal, Bhutan], *J. bengalensis* Amak. [India (Eastern Himalaya), China] and *J. pseudocyclops* Inoue [India (Eastern Himalaya), Nepal, Bhutan, Taiwan], but considerably differs from those in the thickness of stem and size of leaf cells, number of androecial bracts and perianth morphology. The present species differs

Table 1. Diversity and distribution of the species and infraspecific taxa of *Jungermannia* L. emend. Grolle in different bryogeographic regions of India.

<i>Sl. No.</i>	<i>Subgenus/species</i>	<i>Distribution in India</i>	<i>Reference</i>
<b>Jungermannia L.</b>			
1	<i>Jungermannia gollanii</i> Steph.	WH	Amakawa, 1966 (also as <i>J. tenerrima</i> Steph.); Vána, 1972 a; Kashyap, 1932
<b>Liochlaena Nees</b>			
2	<i>J. lienantha</i> Grolle	WH, EH, WG	Mitten, 1861 (as <i>J. lanceolata</i> L.); Kashyap, 1932 (as <i>Solenostoma lanceolata</i> Steph.)
<b>Plectocolea (Mitt.) Amak.</b>			
3	<i>J. champawatensis</i> S.N. Srivast. & Amak.	WH	Srivastava & Amakawa, 1991
4	<i>J. comata</i> Nees	EH	Amakawa, 1970; Vána, 1972 b
5	<i>J. glauca</i> Amak.	WH, EH, P&WR	Hattori, 1966; Vána, 1972b
6	<i>J. hasskarliana</i> (Nees) Steph.	EH	Vána, 1972 b
7	<i>J. infusca</i> (Mitt.) Steph.	EH	Robinson, 1964 (as <i>Plectocolea infusca</i> Mitt.)
8	<i>J. pfliedereri</i> Amak. & Vána	WG	Amakawa, 1972
9	<i>J. polyrhizoides</i> Grolle	WH, EH	Vána, 1974
10	<i>J. rubripunctata</i> (S.Hatt.) Amak.	EH	Udar & Kumar, 1981
11	<i>J. sikkimensis</i> (Schiffn.) Steph.	EH	Vána, 1974
12	<i>J. tetragona</i> Lindenb.	WH, EH, CI, WG, A&N	Amakawa, 1968; Vána, 1972 b, 1974; Udar & Kumar, 1983
13	<i>J. truncata</i> Nees	EH, WG	Amakawa, 1972; Vána, 1974
<b>Solenostoma (Mitt.) Amak.</b>			
14	<i>J. appressifolia</i> Mitt.	WH, EH	Amakawa, 1967 (also as <i>J. pseudodecolyana</i> Amak.); Vána, 1972b; Srivastava & Singh, 1995; Hattori, 1966 & Amakawa, 1966 (as <i>J. decolyana</i> Schiffn. ex Steph.)
15	<i>J. appressifolia</i> var. <i>minor</i> (Amak.) Vána	EH	Vána, 1972 b; Amakawa, 1967 (as <i>J. decolyana</i> var. <i>nigricans</i> Amak.)
16	<i>J. appressifolia</i> var. <i>nigricans</i> (Amak.) Vána	EH	Vána, 1972 b
17	<i>J. ariadne</i> J.Taylor	WH, EH	Mitten, 1861; Vána, 1972 b
18	<i>J. atrobrunnea</i> Amak.	EH	Amakawa, 1967
19	<i>J. bengalensis</i> Amak.	EH	Amakawa, 1968; Amakawa, 1967 (as <i>J. filamentosa</i> Amak.)
20	<i>J. clavellata</i> (Mitt. ex Steph.) Amak.	EH	Amakawa, 1971; Vána, 1972 b
21	<i>J. confertissima</i> Nees	WH	Vána, 1972b; Amakawa, 1967 (as <i>J. duthiana</i> Steph.)
22	<i>J. crenulata</i> Sm.	WH, EH, WG	Kashyap, 1932 (as <i>S. crenulata</i> (Sm.) Steph.)
23	<i>J. fauriana</i> P.Beauv.	WG	Srivastava & Singh, 1988
24	<i>J. flagellaris</i> Amak.	EH	Srivastava & Singh, 1986 b
25	<i>J. flavorevoluta</i> Vána	EH	Vána, 1972 b

Table 1. Diversity and distribution of the species and infraspecific taxa of *Jungermannia* L. emend. Grolle in different bryogeographic regions of India. (*continued*)

<i>Sl. No.</i>	<i>Subgenus/species</i>	<i>Distribution in India</i>	<i>Reference</i>
26	<i>J. heterolimbata</i> Amak.	EH	Amakawa, 1967,1968
27	<i>J. kashyapii</i> S.C.Srivast., S.Srivast. & D.Sharma	WH	Srivastava & al., 2003
28	<i>J. lanigera</i> Mitt.	EH	Hattori,1966; Vána, 1974
29	<i>J. limbatifolia</i> Amak.	EH	Amakawa, 1968; Vána, 1974; Amakawa, 1967 (as <i>J. limbata</i> Amak.)
30	<i>J. macrocarpa</i> Steph.	EH	Amakawa, 1967;Vána, 1972 b
31	<i>J. parvixtexta</i> Amak.	EH	Amakawa, 1967
32	<i>J. pseudocyclops</i> Inoue	EH	Amakawa, 1967
33	<i>J. purpurata</i> Mitt.	WH, EH	Hattori, 1966; Amakawa, 1967; Vána, 1972b
34	<i>J. pyriforma</i> var. <i>gracillima</i> Amak.	EH	Vána, 1974
35	<i>J. sanguinolenta</i> Griff.	WH, EH	Amakawa, 1966;Vána, 1972 b
36	<i>J. schauliana</i> Steph.	EH	Hattori, 1966; Amakawa, 1967; Vána, 1972 b; Srivastava & Singh, 1995
37	<i>J. sphaerocarpa</i> Hook.	EH	Amakawa, 1960
38	<i>J. stephanii</i> (Schiffn.) Amak.	EH	Vána, 1972 b, 1974; Srivastava & Singh, 1988
39	<i>J. sub-orbiculata</i> Amak.	EH	Amakawa, 1968; Amakawa, 1967 (as <i>J. orbiculata</i> (Amak.) Amak.); Amakawa, 1966 (as <i>J. koreana</i> var. <i>orbiculata</i> Amak.)
40	<i>J. subrubra</i> Steph.	EH	Amakawa, 1967; Srivastava & Singh, 1986 a
41	<i>J. udarii</i> S.C.Srivast & P.Singh	EH	Srivastava & Singh, 1995

Note: WH: Western Himalaya; EH: Eastern Himalaya; P & WR: Punjab & West Rajasthan; CI: Central India; WG: Western Ghats; A & N: Andman & Nicobar Islands.

from *J. atrobrunnea*, which has smaller plants (up to 15 mm long), comparatively thin stem (0.2 mm thick), smaller leaves (0.5-0.6 mm long and wide), smaller leaf cells (marginal cells 10-32 × 7-12 μm; middle cells 12-25 × 10-17 μm and basal cells 17-38 × 12-17 μm) without trigones, and male bracts in 2-3 pairs (Amakawa, 1967). *J. bengalensis* is light green to olive green, up to 10 mm long with marginal leaf cells 25-32 × 10-30 μm; middle leaf cells 32-60 × 25-32 μm and basal leaf cells 50-100 × 25-32 μm with or without small, incipient trigones and pyriform, 3-plicate perianth (Amakawa, 1968). Similarly it is distinct from *J. pseudocyclops* which invariably has ovate leaves with smaller cells (marginal cells 18-28 × 15-20 μm; middle cells 28-33 × 20-28 μm and basal cells 25-40 × 18-30 μm) with bulging trigones, verrucose cuticle and pyriform perianth (Amakawa, 1967).

**Acknowledgements.** The authors are grateful to the Director of Botanical Survey of India, Kolkata for facilities and encouragement, to the Indian Botanical Liaison Officer, Royal Botanic Gardens, Kew for relevant literature and to the Ministry of Environment and Forests, New Delhi for financial assistance under All India Coordinated Project on Taxonomy (AICOPTAX).

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