

ON AN ENDANGERED LIVERWORT (MARCHANTIOPHYTA) FROM INDIA : PROPOSAL FOR RED LISTING

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An extremely rare liverwort (Hepaticae) viz., *Southbya gollanii* Steph. is described from India and assessed for its status according to the guidelines of IUCN for bryophytes.

In recent years, considerable attention has been paid towards the conservation of threatened bryophytes. The initial step was taken by ECCB (1995), which published comprehensive Red Data Book of European bryophytes. Later, an expert group of IUCN for bryophytes, discussed the guidelines for the application of the new IUCN red list categories for the bryophytes (Hallingbäck & al., 1998). Past few years have witnessed a number of contributions on threatened bryophytes at global level for exploration and preparation of Red List of bryophytes from various territories of the world (Church & al., 2001; Sabovljević & al., 2004; Kotirantá & al., 1998; Tzvelev, 2000; Vieira & al., 2005; Sergio & al., 2001; Ganeva, 1998; Kučera and Váňa, 2003; Rassi & al., 2001; Kubinská & al., 1996; Sérgio & al., 1992; Szweykowski, 1992; Jukoniene, 1996; Aleffi & Schumacker, 1995). Apart from these, a world list of bryophytes (Tan & al., 2000) has also been prepared including mosses (38 spp.) and liverworts (45 spp.) Out of these, 3 mosses and 4 liverworts are Indian representatives (Tan & al., 2000). Unfortunately, there is paucity of efforts to explore and mark threatened bryophytes of India. Udar & Srivastava (1983), who provided a list of 85 rare and threatened taxa of bryophytes from India, made the first meaningful report in this direction. This work was particularly important, as it was a kind of first Red List of Indian bryophytes. After a huge gap of several years, two of us (SCS and KKR) had the privilege to study one of the least known species, *Isotachis indica* Mitt. from India and proposed its possible inclusion in Red Data Book (Srivastava & Rawat, 2001). Recently, another such effort was made by Singh (2008) to enumerate the threatened species of liverworts of India. He (Singh, 2008) provided a list of 12 liverworts and two hornworts with a short note for each on their status. However, a number of the Indian taxa are still inadequately known (even morpho-taxonomical details are unavailable) due to lack of sufficient literature and suitable authentic specimens, which make the scenario worst. This study is an extension of our earlier effort (Srivastava & Rawat, 2001), as it deals with another liverwort, *Southbya gollanii* Steph. from India, providing full morpho-taxonomic details. It is very rare, as it does not seem to have been collected or reported since its original discovery and is still untraced despite several collection forays in the area in past few decades. The present study is based on the type specimens obtained from G. It is believed that the present work would inspire students of bryology towards preparation of the "Red Data Book" of Indian bryophytes" and some more people will come up to help achieve this target.

Southbya gollanii Steph., Sp. Hep. 3: 37. 1996. (Arnelliaceae).

Plants up to 0.7 mm long, 0.66 - 0.75 mm wide (with leaves), blackish-brown when dry. Stem prostrate, simple, elliptical in cross section, 0.20 - 0.21 × 0.14 - 0.21 mm; 11 - 13 cells across diameter; cortical cells larger, 22.8 - 38.0 × 19.0 - 22.8 µm, thick-walled, pigmented with nodular trigonous thickenings at the corners along margin; medullary cells smaller, 19.0 - 34.2 × 11.4 - 19.0 µm, thin-walled, without pigmentation and trigones, subfloral innovation frequently present. Rhizoids pale brown to colourless, scattered on the ventral surface of the stem. Leaves succubous, closely imbricate, orbicular, entire, opposite, transversely to subtransversely inserted, antically connate at the base, 0.45 - 0.66 × 0.51 - 0.66 mm in size, as long as wide, cells of the leaf much variable in shape and size of the base of the antical and postical margins, antical basal cells of the leaf polygonal, small, 15.2 - 38.0 × 15.2 - 22.8 µm; postical basal cells of the leaf rectangular, 41.8 - 114.0 × 11.4 - 26.6 µm, apical marginal cells of the leaf rectangular to subrectangular, without trigones, 19.0 - 53.2 × 15.2 × 30.4 µm; basal cells usually elongated, 30.4 - 102.6 × 11.0 - 30.4 µm, but some cells

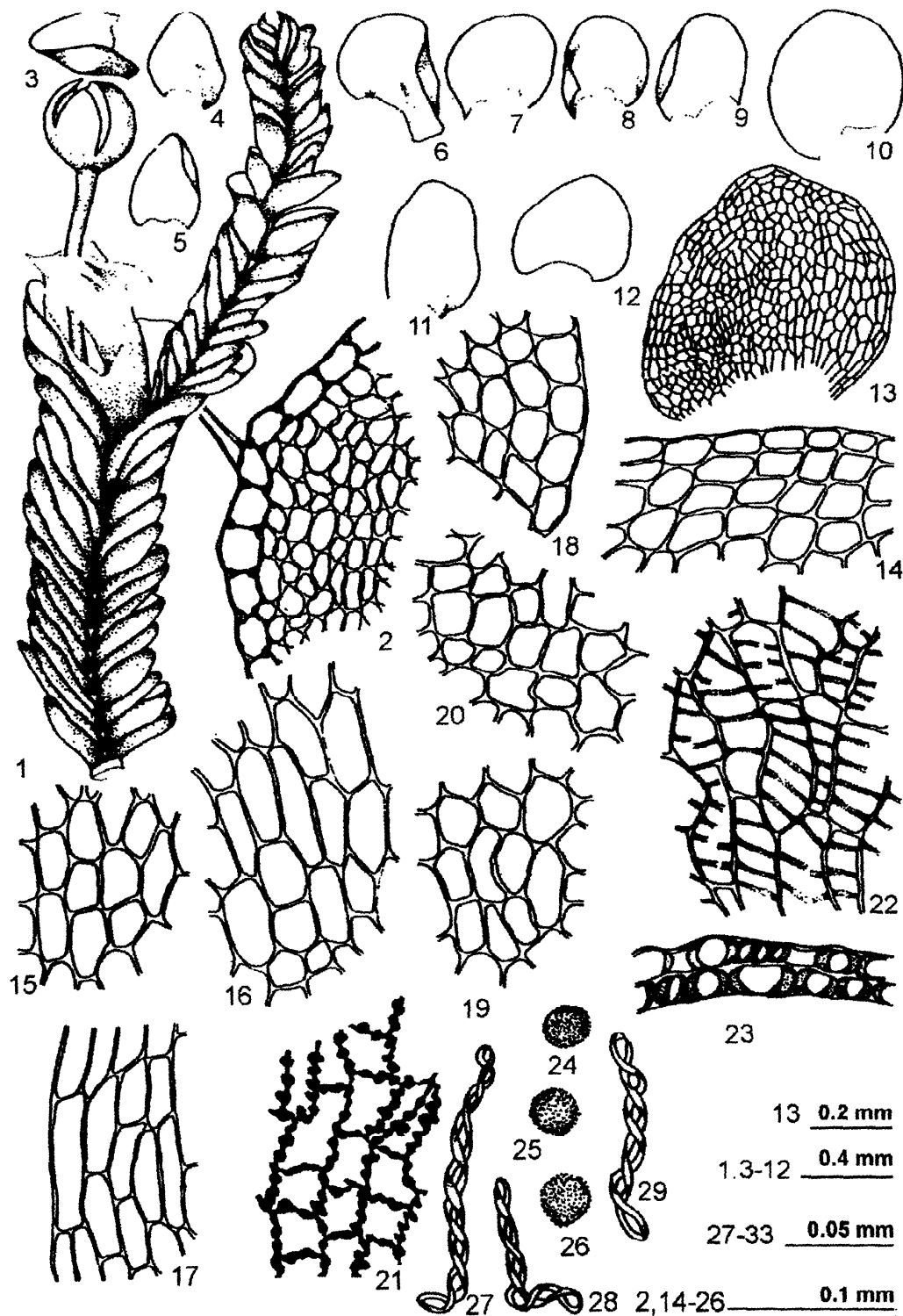


Fig. 1. *Southbya gollanii* Steph. : 1. Dorsal view of the plant showing female inflorescence; 2. Enlarged portion of the cross-section of the stem; 3-12. Leaves; 13. Leaf, cellular; 14. Apical cells of the leaf; 15. Median cells of the leaf; 16. Basal cells of the leaf; 17. Postical basal cells of the leaf; 18. Antical basal cells of the leaf; 19. Median cells of the bract; 20. Median cells of the perianth; 21. Outer cells of the capsule wall; 22. Inner cells of the capsule wall; 23. T.S. of the capsule wall; 24-26. Spores; 27-29. Elaters.

rectangular in shape, $22.6 - 30.4 \times 15.2 - 19.0 \mu\text{m}$. Dioecious, male plants not seen. Perianth terminal, bracts in one pair, similar to cauline leaves but larger in size, both the bracts connate together and fused with the perianth in lower part forming low perigynium, apical cells of the bract rectangular to subrectangular, $19.0 - 41.8 \times 15.2 - 30.4 \mu\text{m}$; median cells irregularly polygonal, $19.4 - 41.8 \times 19.0 - 30.4 \mu\text{m}$; basal cells rectangular, $22.8 - 60.8 \times 15.2 - 26.6 \mu\text{m}$; apical perianth cells polygonal with simple trigones, $22.8 - 34.2 \times 11.4 - 30.4 \mu\text{m}$; median perianth cells polygonal-rectangular, $26.6 - 49.4 \times 15.2 - 30.4 \mu\text{m}$, without trigones; basal perianth cells elongated-polygonal, $22.8 - 83.6 \times 15.2 - 34.2 \mu\text{m}$, without trigones. Sporophyte with foot, seta and capsule; seta fragile, elongated; capsule globose, blackish-brown, dehiscing into 4 valves; wall bistratose, $24 - 30 \mu\text{m}$ thick, cells of outer layer $30.4 - 49.4 \times 22.8 - 30.4 \mu\text{m}$, with nodular to confluent thickenings on radial walls, such thickenings at places may extend on inner tangential wall; cells of inner layer $57.0 - 114.0 \times 19.0 - 34.2 \mu\text{m}$, with semi-annular thickenings on radial walls, which extend shortly on to the outer tangential wall forming complete and incomplete transverse bands in surface view. Spore spherical to subspherical, $15.2 - 22.8 \mu\text{m}$ in diameter, finely echinate with granular surface; elaters $79.8 - 129.2 \mu\text{m}$ long and $11.4 - 22.8 \mu\text{m}$ wide with two spiral thickenings.

Specimen examined: India, North West Himalaya, Mussoorie, Nag Tiba, 3000 - 3300 m; Leg. *Bahadur, Bryoheca Levier* 3227; holotype 822 (G).

Southbya gollanii was originally described from Mussoorie (Stephani, 1906) and since then the status of this species remained undefined in the Indian bryoflora. Although this species was enumerated by various workers from time to time and was treated repeatedly, but was never recollected from India since its original discovery. It has, however, once been reported from Nepal (Grolle, 1966). Over a decade later, Hattori & Kitagawa (1975) pointed out that two species of *Southbya* i.e. *S. gollanii* and *S. grollei* Kitagawa, occur in Nepal and remarked that previous record of *S. gollanii* from Nepal Himalayas is erroneous and is referable to *S. grollei*. However, both the species are separable by several gametophytic features (Mizutani, 1979).

Grolle (1966) described *Gongylanthus himalayensis* Grolle from Nepal and considered it to be different from *Southbya gollanii*. In a subsequent contribution Grolle (1987) treated *S. gollanii* and *G. himalayensis* as congeneric and conspecific and thus treated the former under *Gongylanthus* [*G. gollanii* (Steph.) Grolle.]. Amazingly *G. himalayensis* has well developed marsupium while *S. gollanii* has well defined perianth and perigynium. Hence *S. gollanii* has been treated as separate from *G. himalayensis*.

The plants are epiphytic and known from Nepal (2 localities), Bhutan (1 locality) South West China (1 locality) and India (1 locality) (Kashyap, 1932; Hattori & Kitagawa, 1975; Grolle, 1966, 1987). The species is very rare, and was last reported about 20 years back. In India, the species has never been collected since its original discovery. The area of occupancy is less than 500 sq km spread over five localities, and the habitat is declining. The type locality itself is a famous tourist spot and faces continuous disturbance by tourist activities and other human interference. It therefore, meets the IUCN criteria for endangered species, based on the small area (Criteria B), and decline in habitat quality and extent (Criteria C) - hence proposed as an 'Endangered' species.

IUCN category assessment : Endangered – EN (according to Criteria B and C).

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