Bryological Note

*Anastrophyllum aristatum* (Herzog ex N. Kitag.)
A.E.D. Daniels *et al.*, *comb. et stat. nov.*
(Marchantiophyta: Anastrophyllaceae) from India and China

A E D Daniels¹, D G Long², K C Kariyappa³, P Daniel³

¹Scott Christian College (Autonomous), India, ²Royal Botanic Garden, Edinburgh, UK, ³Tamil Nadu, India

Spruce (1876) first described *Anastrophyllum* as a subgenus of *Jungermannia* L.; later Stephani (1893) raised it to the rank of genus, *Anastrophyllum* (Spruce) Steph. Traditionally, it has been placed in the large family Lophoziaceae, but recent molecular studies have shown that major parts of Lophoziaceae nest within Scapaniaceae and that *Anastrophyllum* and *Barbilophozia* and their close relatives represent a new family *Anastrophyllaceae* L. Söderstr., De Roo & Hed. (Schill *et al.*, 2004; De Roo *et al.*, 2007; Söderström *et al.*, 2010). They have also shown that the segregate genus *Sphenolobus* should be resurrected for several species previously placed in *Anastrophyllum*. There are probably around 28 species of *Anastrophyllum* in the world and around 18 in Asia (J. Váňa, pers. comm.). In India, the genus was discovered by J. D. Hooker in 1848 in the alpine Sikkim Himalaya (Schill & Long, 2003), where he collected at least three species first reported by Mitten (1861). So far seven species have been reported from the Sino-Himalaya (Schill & Long, 2003), of which six occur in the Indian region and all seven in the Yunnan Province of China. Two species have been reported from Sri Lanka, *A. bidens* (Reinw. *et al.*) Steph. and *A. piligerum* (Nees) Steph. (Váňa & Piippo, 1989), but none appears to have been reported previously from South India (Bapna & Kachroo, 2000).

In 2004, material of an unusual *Anastrophyllum* was collected in the Gaoligong Shan mountains of Yunnan, SW China and again in 2010 in the Agasthyamalai Biosphere Reserve in the southern Western Ghats of India. Both were later identified as *A. bidens* (Nees) Steph. var. *aristatum* Herzog ex N. Kitag., and confirmed by Prof. Jiri Váňa. This taxon was originally described from Borneo (Indonesia) by Kitagawa (1970) and its range was later extended to...
Figure 1  *Anastrophyllum aristatum* (Herzog ex N.Kitag.) A.E.D.Daniels et al. (A) Plant, ventral view; (B) plant, dorsal view; (C) stem t.s.; (D, E) leaves; (F) leaf apex; (G) median leaf cells; (H) basal leaf cells; (I–L) female bracts; (M) perianth; (N) cilia of perianth mouth; (O) perianth t.s.; (P) dehisced capsule; (Q) capsule inner wall; (R) capsule outer wall; (S) elater; (T, U) spores. Drawn from Daniels & Kariyappa 232.
Papua New Guinea and Australia (Váňa & Piippo, 1989). The present discoveries are new records for China and India and the latter extends the distribution of the genus to the southernmost end of the country.

The description of var. *aristatum* and the characters that differentiate it from *A. bidens* var. *bidens* were based on sterile material. The Indian collection is fertile and critical study of this material shows that it is very distinct from *A. bidens* var. *bidens* as shown in Table 1. These differentiating characters in our opinion warrant the rank of species. Hence, this variety is raised to species rank and the necessary new combination made.

**Anastrophyllum aristatum** (Herzog ex N.Kitag.) A.E.D.Daniels, D.G.Long, K.C.Kariyappa & P.Daniel, comb. et stat. nov. (Figure 1).

**Table 1 Differences between Anastrophyllum bidens and A. aristatum**

<table>
<thead>
<tr>
<th>Characters</th>
<th><em>A. bidens</em></th>
<th><em>A. aristatum</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Leaf lobe apex</td>
<td>Single row of 2–3 cells</td>
<td>Single row of 5 or more cells</td>
</tr>
<tr>
<td>2. Female bracts</td>
<td>1–4-lobed</td>
<td>1–3-lobed</td>
</tr>
<tr>
<td>3. Margins of female bracts</td>
<td>Irregularly serrate, sinuate and denticulate</td>
<td>Entire or faintly wavy</td>
</tr>
<tr>
<td>4. Perianth mouth</td>
<td>Ciliate and sparsely denticulate</td>
<td>Ciliate but not denticulate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(cilium slender, elongate, and sometimes branched)</td>
</tr>
</tbody>
</table>

This is not the first instance of liverworts occurring in Australia or Papua New Guinea being discovered in the Western Ghats of India. Recently, Daniels & Daniel (2009) and Daniels & Raja (2011) discovered the Australian *Spruceanthus thoetianus* (Gottsche & F.Muell.) B.Thiers & Gradst. and the New Guinean *Thysananthus appendiculatus* Steph. in the Western Ghats.

**Anastrophyllum aristatum** is a forest species growing mostly on rocks at elevations from 1230 to 2800 m (Kitagawa, 1970). The present collections were in evergreen forest in which any disturbance resulting in the opening of the forest canopy could lead to loss of humidity and elimination of sensitive bryophytes such as this species. Hence, conservation of forests, particularly evergreen forests, is essential in order to protect such rare liverwort species.

We thank the Tamil Nadu State Forest Department for permission to explore the area and help in the field. This work was done under the All India Co-ordinated Project on Taxonomy and Capacity Building (AICOPTAX), Ministry of Environments & Forests, Government of India, New Delhi, and KCK is thankful for a fellowship. AEDD thanks M. Sanjappa, formerly Director, Botanical Survey of India, for his keen interest and encouragement and the Principal, Scott Christian College, for facilities. D. G. Long thanks the Curator (JE), for lending the
type specimen and Professor Jiří Váňa, Prague, for advice and literature.

Taxonomic Additions and Changes: *Anastrophyllum aristatum* (Herzog ex N. Kitag.) A.E.D. Daniels et al., comb. et stat. nov.

References


