

## A NEW VARIETY OF THE MOSS *TORTULA ROBUSTA* FROM SOUTH GEORGIA

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**ABSTRACT.** A recent revision of the genus *Tortula* on the sub-Antarctic island of South Georgia indicated that *T. robusta* Hook. et Grev. shows continuous variation in leaf size and cell size, and *T. robusta* var. *laxa* Bartr., defined by its large leaves and large cells, is therefore considered to be a synonym of var. *robusta*. A discrete taxon was found, however, which differs from typical *T. robusta* in its oblong to oblong-lanceolate leaves which are always recurved when moist. Differences between this group and *T. fontana* (C. Muell.) Broth. of South Georgia and *T. rubra* Mitt. of New Zealand are also discussed. The oblong to oblong-lanceolate leaved taxon is described as *T. robusta* var. *recurva* P. J. Lightowlers var. *nova*. Brief details are given of a growth experiment that indicates that the variety probably has a genetic basis.

A revision of the moss genus *Tortula* on the sub-Antarctic island of South Georgia has recently been completed and an account is being prepared. The most common species of *Tortula* on the island is *T. robusta* Hook. et Grev., a large and distinctive plant first described by Hooker and Greville (1824). Greene (1964) noted that the species commonly forms an association with *Acaena*, a rosaceous suffrutescent herb. Examination of bryophyte collections from elsewhere in the south temperate-Antarctic zone indicate that the species is also abundant in Tierra del Fuego and Patagonia.

South Georgian material of this species shows a wide range of morphological variation. For example, leaf length varies from 4.4 to 8 mm and cell width from 11 to 21  $\mu$ m. Large-leaved specimens with large, lax cells have been assigned to the var. *laxa* Bartr. by Bartram (1946) but variation in leaf length and cell size of South Georgian specimens was found to be continuous. Examination of type material *Tortula robusta* Hook. et Grev. var. *laxa* Bartr. n. var., Fuegia media, Estancia Cameron, Puesto Medio in serato humido. 1928 12. XII Leg. H. Roivainen, FH) confirms that this variety should be reduced to synonymy with *T. robusta* var. *robusta*.

Within the South Georgian material, however, a distinct group of five specimens was detected which, although similar to *T. robusta* in all other respects, has oblong or oblong-lanceolate leaves, which are always recurved when moist. Typical *T. robusta* from this area has lanceolate to lingulate-lanceolate leaves, which are patent to recurved. The leaf shape of the five atypical specimens resembles the leaves of a related South Georgian species, *T. fontana* (C. Muell.) Broth., but the leaves of this taxon are broader, longer and slightly pandurate or spatulate. A scatter diagram of leaf measurements of South Georgian herbarium material of *T. robusta*, *T. fontana* and the oblong to oblong-lanceolate leaved group (Fig. 1) shows that the last named forms a discrete taxon.

This taxon bears a close resemblance to *T. rubra* Mitt., described from New Zealand (Mitten in Hooker, 1867), which has leaves of an identical shape, size and stance. The South Georgian material, however, differs from *T. rubra* in the following leaf characters:

- i. The nerve is narrower in upper leaf and percurrent, rather than broad and percurrent to excurrent as in *T. rubra*.
- ii. The abaxial nerve surface is smooth to slightly papillose, not strongly papillose as in *T. rubra*.
- iii. The longly rectangular upper basal cells are smooth and not papillose as in *T. rubra*.
- iv. Teeth are present on the upper third of the margin only. The margins of *T. rubra* leaves are dentate only near the apex but teeth are also found on the abaxial nerve surface at the tip.

The South Georgian specimens therefore appear to differ from all taxa described previously. Although there are clear affinities with *T. rubra*, the specimens are closer to *T. robusta* and are therefore described here as a new variety of that species. The name *T. robusta* var. *recurva* is proposed in reference to the characteristic leaf stance of the taxon.

*Tortula robusta* Hook. et Grev. var. *recurva* P. J. Lightowlers var. *nova*.

Diagnosis: Differt a var. *robusta* foliis oblongis vel oblongo-lanceolatis in statu humido recurvatis.

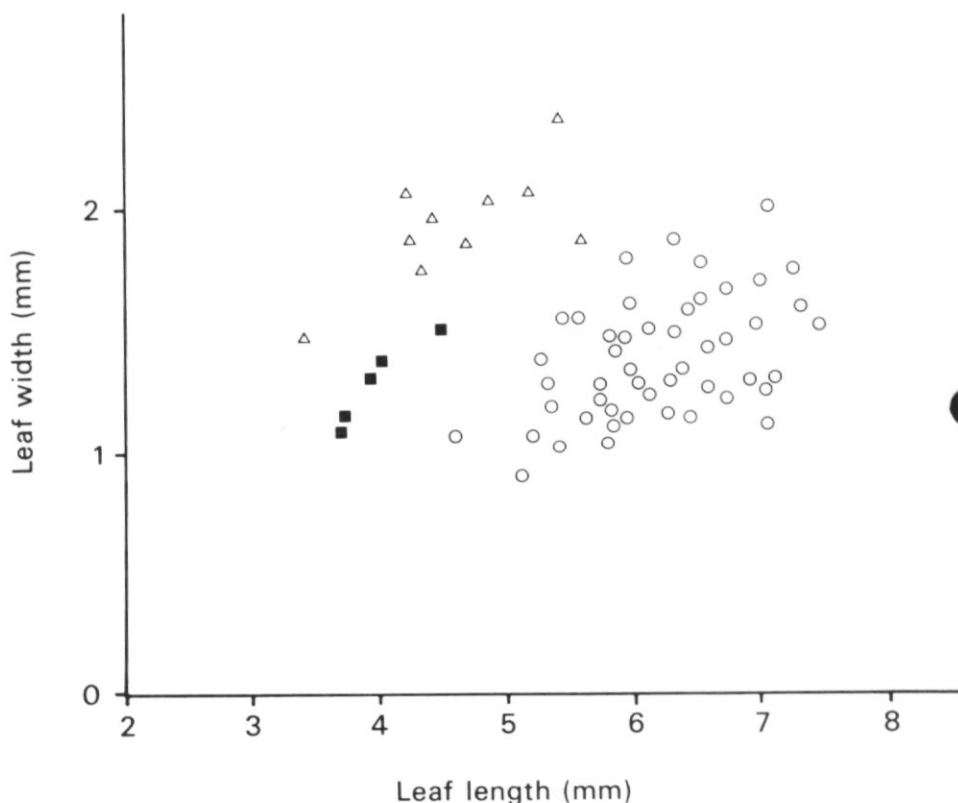


Fig. 1. Scatter diagram showing leaf length and leaf width of *Tortula fontana* ( $\Delta$ ), *T. robusta* var. *robusta* ( $\circ$ ) and the oblong to oblong-lanceolate leaved taxon, *T. robusta* var. *recurva* ( $\blacksquare$ ). Each point is the mean of five measurements from one shoot, each shoot being taken from a different sample.

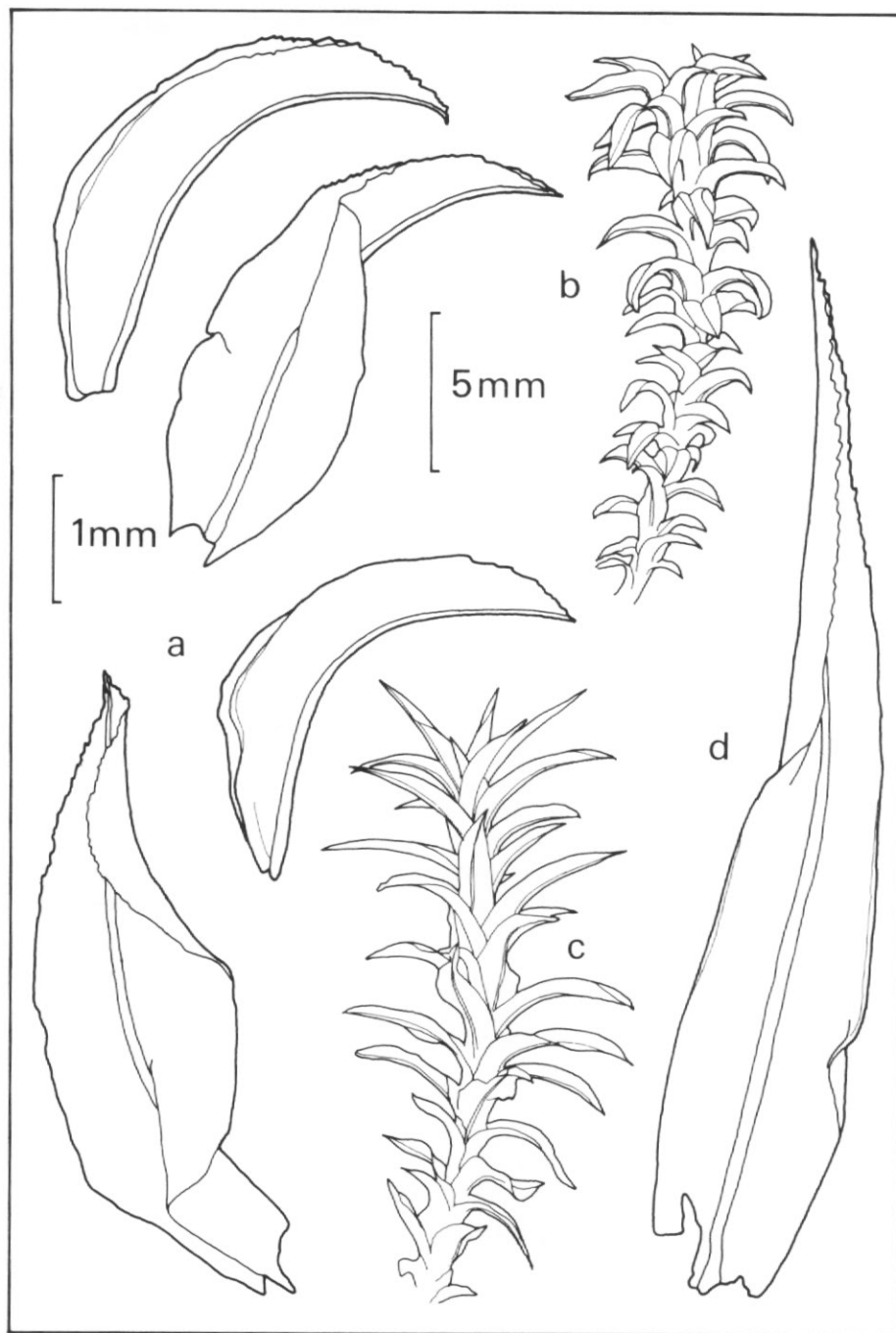


Fig. 2. *Tortula robusta*; a, leaves of var. *recurva*; b, shoot of var. *recurva*; c, shoot of var. *robusta*; d, leaf of var. *robusta*. Scales: left hand for leaves, centre for shoots.

Differs from var. *robusta* in its oblong to oblong-lanceolate leaves which are recurved when moist.

*Description:* Stems erect, without a central strand, sparingly branched, forming turves 2.0–7.0 cm high. Leaves 3.2–4.8 mm × 1.0–1.6 mm, recurved when moist, curled and slightly twisted when dry. Leaf shape oblong-lanceolate to oblong, narrowing to an acute to obtuse apex. Leaves differentiated into a chlorophyllose papillose upper limb and a hyaline smooth sheath, the latter sheathing the stem for one-quarter to one-third of leaf length. Leaf margin plane or weakly recurved below mid-leaf, dentate to denticulate in upper third. Nerve percurrent, abaxial surface smooth or papillose with simple verrucate papillae. Upper lamina cells 12.5–20 µm wide, quadrate but becoming shortly rectangular to rectangular towards basal sheath, marginal row often smaller, sparsely papillose with complex papillae. Basal cells 2–8 times as long as wide, sometimes porose, smooth and hyaline, sometimes lax and inflated, narrower towards the margins of the leaf and occasionally forming a border. Longly rectangular cells often continuing up leaf margin into limb. Rhizoids smooth, brown, sparingly produced on lower parts of stem. Sterile. Gametangia and sporophytes unknown (Fig. 2).

*Holotypus:* Crevices of north-facing rocks at south edge of glacial outwash plain. Alt. c. 300 m. At head of valley running south-west from Husvik, Stromness Bay, South Georgia. Leg. S. W. Greene 18.3.1961. No. Greene 3114. AAS. Duplicates in BA, BM, MEL, NY, TNS.

Other specimens examined: S. W. Greene 731 (AAS, ALTA, B, O, CHR), R. I. L. Smith 1158 (BM, MEL, LE), 4971 (AAS), 4972 (BM).

Growth experiments suggest that differences between *T. robusta* var. *recurva* and *T. robusta* var. *robusta* and *T. fontana* are genetic in origin. Cultures of all three taxa were initiated from stem fragments on a sterile compost of beach sand and sedge peat in 4-cm pots. These were placed in covered propagating trays in a cooled growth cabinet, which maintained a constant temperature of 10°C and was illuminated by 18 40-W fluorescent lamps for 18 h per day. Relative humidity was maintained at about 80–100% and the plants were watered regularly by a hand-held fine spray of sterile distilled water. Growth was vigorous and after two years the material filled the pots with stems about 2 cm in height. *T. robusta* var. *recurva* remained distinguishable in leaf shape and stance from cultures of *T. fontana* and *T. robusta* var. *robusta* grown under the same conditions. The effect of previous environments on the experimental plants cannot be discounted but the results show that the differences between these three taxa are not due to direct environmental influence.

#### ACKNOWLEDGEMENTS

I am grateful to B. G. Bell for his supervision of the Ph.D. study of which this work formed a part and also for his advice on the manuscript. Thanks are also due to Professor P. H. Davis for help with the Latin diagnosis.

Received 21 February 1984; accepted 3 April 1984

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