

Bryophyte flora of Hunan Province, China. 10. *Ulota gymnostoma* sp. nova (Orthotrichaceae)

Shui-Liang Guo¹, Johannes Enroth² & Viivi Virtanen³

¹ College of Life and Environmental Sciences, Shanghai Normal University, Shanghai, 200234, China; current address: Department of Biological and Environmental Sciences, P.O. Box 65, FIN-00014 University of Helsinki, Finland

² Department of Biological and Environmental Sciences and Botanical Museum, P.O. Box 7, FIN-00014 University of Helsinki, Finland

³ Botanical Museum, P.O. Box 7, FIN-00014 University of Helsinki, Finland

Received 12 Aug. 2004, revised version received 8 Oct. 2004, accepted 13 Oct. 2004

Guo, S.-L., Enroth, J. & Virtanen, V. 2004: Bryophyte flora of Hunan Province, China. 10. *Ulota gymnostoma* sp. nova (Orthotrichaceae). — *Ann. Bot. Fennici* 41: 459–463.

Ulota gymnostoma S.L. Guo, Enroth & Virtanen (Orthotrichaceae) is described as a new species from Hunan Province of China, and illustrated in line drawings. It is distinguished from all congeners mainly by the gymnostomous capsule. A lectotype is designated for *U. macrocarpa* Broth. *Ulota crispa* (Hedw.) Brid. and *Orthomitrium tuberculatum* Lewinsky-Haapasaari & Crosby are reported as new for Hunan.

Key words: new species, nomenclature, *Orthomitrium*, Orthotrichaceae, taxonomy, *Ulota*

Brotherus (1929) described *Ulota macrocarpa* and cited three specimens (= syntypes), one of which was collected by H. Handel-Mazzetti in Sichuan in 1914, and two in Hunan in 1917 and 1918. Despite a careful search, we failed to find the Sichuan specimen, but the two Hunanese ones are now deposited in H-BR, and we examined them in connection with our continuing studies on the bryophyte flora of Hunan. The specimens clearly represent two species. One of the specimens agrees with Brotherus' protologue of *U. macrocarpa* ("Theca oblonga, sicca haud contracta, plicata, striis 8 luteis [...] Exostomii dentes par paria connati, minutissime papillosi. Processus 8, filiformes, dentium fere longitudinis, laevissimi"). Thus, we designate that specimen in agreement with the protologue of *U. macrocarpa* as its lectotype.

Ulota macrocarpa Broth.

Symb. Sin. 4: 70. 1929. — LECTOTYPE (designated here): China. Hunan Province, Yunshan National Forest Park: "Prope urbem Wukang, in silva frondosa elata umbrosa montis Yün-schan, ad arbores", 1200–1300 m, 8.VIII.1917 Handel-Mazzetti 11.191 ("Diar. Nr. 2206", H-BR!).

The other Handel-Mazzetti specimen in our opinion represents a hitherto undescribed species, of which more material was collected during our recent expeditions in Hunan.

Ulota gymnostoma S.L. Guo, Enroth & Virtanen, sp. nova (Figs. 1 and 2)

Species haec praecipue capsulis sine peristomio ab affinibus distincta.

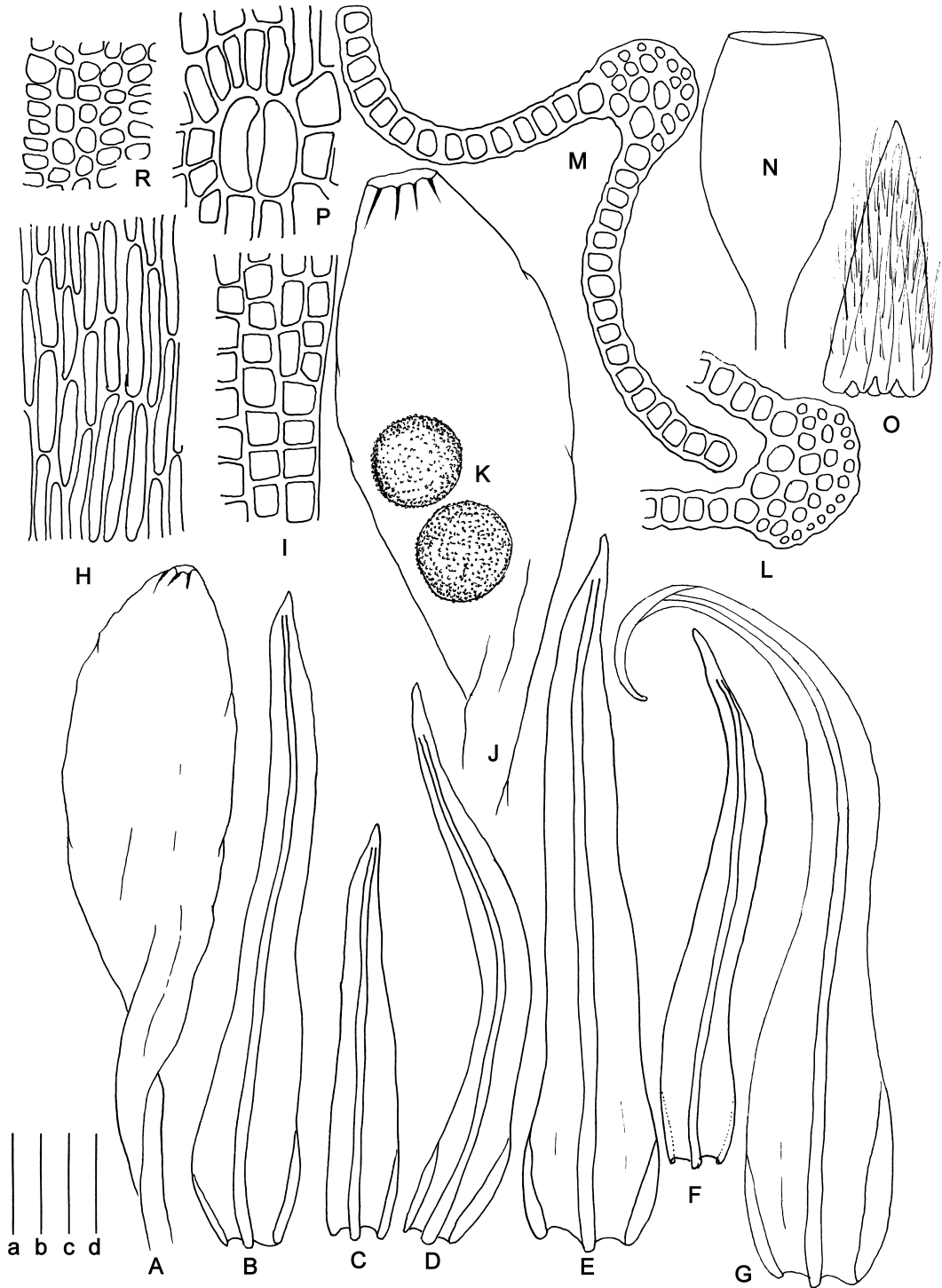


Fig. 1. *Uloa gymnostoma* (from holotype). — A and J: Capsules when dry. — B and E–G: Vegetative leaves. — C and D: Perichaetial leaves. — H: Inner basal lamina cells. — I: Basal marginal lamina cells. — K: Spores. — L and M: Transverse sections of leaf. — N: Capsule when wet. — O: Calyptra. — P: Stoma on capsule. — R: Upper lamina cells. Scales: a = 0.40 mm, use for A–G and J; b = 0.80 mm, use for N and O; c = 64 μ m, use for P; d = 40 μ m, use for H and I, K–M, and R.

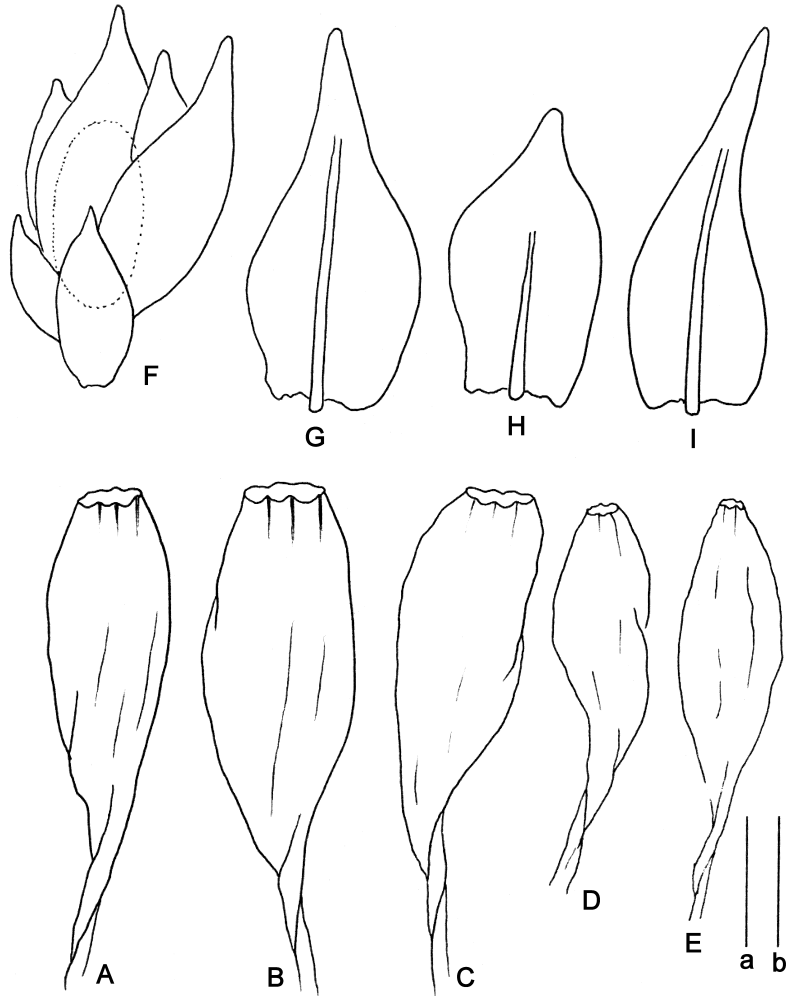


Fig. 2. *Ulota gymnostoma* (from Koponen *et al.* 54771, H). — **A–E:** Capsules when dry. — **F:** Perigonium. — **G–I:** Inner perigonal leaves. Scales: a = 0.40 mm, use for 6–9); b = 0.75 mm, use for 1–5.

HOLOTYPE: China, Hunan, Changsha Area, Liu Yang Co., Daweishan National Forest Park, along road from Lu-Yuan hotel towards Tian-Xing Hu, 25°25'N, 114°07'30"E, ca. 1400 m, on trunk of *Prunus persica*, 20.IX.2000 Virtanen 62091 (H, mixed with *Giraldiella levieri* and *Ulota crispa*).

Plants in small tufts, deep-green, stems erect, densely leaved, up to 10 mm long, often bifurcate. Leaves strongly crisped and slightly twisted when dry, spreading-erect to curved-spreading when moist, linear-lanceolate from an ovate, concave base, 2.8–4.5 × 0.4–0.7 mm, contracted above shoulder, sometimes plicate at leaf base, basal margins broadly incurved, upper margins plane. Costae strong, ending just below leaf apex. Upper and median lamina cells irregularly rounded, quadrate or short-elliptic, 6–17 × 9–17 μm; basal cells near costa sublinear to narrowly rectan-

gular, 27–58 × 4–7.0 μm, yellowish, becoming shorter elliptic and thicker-walled above, gradually becoming shorter, short-rectangular to quadrate toward margins, cells at basal angles 12–16 × 6.0–13.0 μm, hyaline in many leaves, forming a distinct border; all lamina cells smooth.

Autoicous. Inner perigonal leaves 0.8–1.2 mm long, oblong-ovate, costate paraphyses few. Perichaetial leaves lanceolate, 1.6–2.3 mm long, shorter than vegetative leaves, vaginula oblong-cylindric, with few paraphyses. Setae 1.0–1.5 mm long, erect, distinctly plicate, slightly dextrorse. Capsules exserted or nearly so, erect, brownish, obloid-ovoid, 0.7–1.1 × 1.9–2.3 mm, narrowed to an 8-plicate and puckered mouth when dry, with a crinkled neck, gradually narrowed to the seta; exothecial cells differentiated into ± 8 stripes

of brown-reddish, thick-walled cells alternating with stripes of yellowish, slightly thin-walled cells for a very short distance below the mouth, exothecial cells at median and lower part yellow, thick-walled, rectangular, $35\text{--}50 \times 17\text{--}20 \mu\text{m}$; stomates superficial, abundant in the middle part. Peristome none. Spores isomorphic, spherical, finely papillose, $33\text{--}40 \mu\text{m}$ diam., often germinated in old capsules. Calyptra mitrate and smooth, somewhat lobed at base, with numerous yellowish, slightly papillose hairs.

All hitherto known species of *Ulot* have peristomate capsules. Handel-Mazzetti's specimen numbered 12.162 (H-BR) and cited by Brotherus (1929) in the protologue of *U. macrocarpa* has capsules with a puckered mouth and no traces of a peristome at all. Examining our recent Orthotrichaceae collections from Hunan we found a further 15 specimens identical with the one cited above. That specimen was collected in the Yunshan National Forest Park in SW Hunan, but our own collections cited below come mainly from the Badagongshan National Nature Reserve in NW Hunan, and one (which we selected as the holotype) from the Daweishan National Forest Park in NE Hunan.

Ulot *gymnostoma* thrives in open or partially shaded places and grows on tree trunks, quite often mixed with *Ulot* *crispa* (type specimen above and some of the paratypes cited below). It has been collected from the trunks of *Phellodendron amurense*, *Pterostyrax psilophyllus*, *Liriodendron chinense*, *Metasequoia glyptostroboides*, and *Prunus persica*, and probably other trees, since all specimen labels do not identify the tree species. As Härkönen et al. (2004) showed, the bark characters of *Metasequoia* are quite different from those of *Liriodendron* and *Pterostyrax*, so *U. gymnostoma* is clearly not restricted to any particular type of tree bark.

Lewinsky and Crosby (1996) described a new genus and species, *Orthomitrium tuberculatum*, based on a collection from Guizhou, a province neighbouring Hunan in the west. *Orthomitrium* has a combination of an *Orthotrichum* gametophyte and a *Macromitrium* sporophyte, with immersed stomata on capsules. In 2000, the author V. Virtanen collected a specimen of *O. tuberculatum*, which is hereby reported as new for Hunan: Hunan Province, Sangzhi Co.,

Badagongshan National Nature Reserve, 1370 m, on trunk of *Tapiscia sinensis*, 21.IX.2000 Virtanen 61357 (H).

Ulot *gymnostoma* is superficially somewhat similar to *Orthomitrium*, but it combines a *Ulot* gametophyte with a *Macromitrium* sporophyte. It can be separated from *Orthomitrium tuberculatum* by the unicellular spores, superficial stomata on the capsules, leaves with a differentiated border at base, and smooth lamina cells. The capsules of *U. gymnostoma*, being gymnostomous and with superficial stomata, represent one of the types present in *Macromitrium*, superficially similar to those of *Macromitrium gymnostomum* and *M. holomitrioides* (cf. Noguchi 1989). However, the spores of *U. gymnostoma* are much larger, the calyptrae are mitrate and densely hairy, the leaves have a typical *Ulot*-type areolation (with zones of hyaline cells in basal leaf margins), and the plants are erect and lack the creeping stems typical of *Macromitrium*. Also, *M. gymnostomum* has rather obscure, densely papillose median and upper lamina cells, and *M. holomitrioides* has somewhat hyaline, rounded-hexagonal, mammillose, collenchymatous median and upper lamina cells.

ADDITIONAL SPECIMENS EXAMINED of *Ulot* *gymnostoma* (paratypes): — **China**. Hunan Province. Yunshan National Forest Park: "Prov. Hunan austro-occ.: In monte Yün-schan prope urbem Wukang, in corb. viv.: *Rhus vernicifl.*" ca. 1200, 19.VI.1918 Handel-Mazzetti 12.162 ("Diar. Nr. 2515", H-BR 4335 028, as *Ulot* *macrocarpa*). Sang-Zhi Co., Badagongshan National Nature Reserve: Yang-Jiang-Ping, *Phellodendron amurense* plantation and road side, mid-subtropical zone, 1450 m, 4.X.1998 Koponen, Huttunen, Piippo & Rao 48788 (H); Liao-Ye-Wan, ca. 1 km NE of the administration office, along trail in second growth forest and *Liriodendron*, *Alniphyllum*, *Metasequoia* and *Phellodendron* plantations, mid-subtropical zone, 1400 m, 7.X.1998 Koponen, Huttunen, Piippo & Rao 54771 (H, mixed with *Ulot* *crispa*); On the way from Houping to Gongtongwan (*Davidia* place), *Catalpa fargesii*, *Corylus chinensis* plantation, 1400 m, 26.IX.1999 Rao 58746, 58764 (H, the former mixed with *Ulot* *crispa*); Badagongshan-Tianpingshan, Yang-Jiang-Ping, secondary evergreen broad-leaved forest with *Clethra fargesii*, *Davidia involucreata*, *Diospyros glaucifolia*, *Tapiscia sinensis*, *Diospyros glaucifolia*, *Fagus lucida*, *Pterostyrax psilophylla*, etc., 1350 m, on trunk of *Pterostyrax psilophylla*, 20.IX.2000 Enroth 64910, 64915, 65045 (H, the latter mixed with *Ulot* *crispa*); slope behind the Badagongshan Research Station, ca. 1300 m, on trunk of *Liriodendron chinense*, 24.IX.2000 Virtanen 61658, Enroth 64679, 64718 (H); Yuan-Yang-Ya, 1430 m, on trunk of *Metasequoia glyptostroboides*, 20.IX.2000 Enroth 65085 (H).

SPECIMENS OF OTHER TAXA EXAMINED: — *Ulota robusta*. **India**. “Himalaya orient. reg. temp., Sikkim” *J. D. Hooker 216* (syntype of *U. robusta*, NY). — *Ulota macrocarpa*. **China**. “Hunan: Prope urbem Wukang, in silva frondosa elata umbrosa montis Yün-schan, ad arbores”, 1917 *Handel-Mazzetti 11.191* (Diar. Nr. 2206, H-BR 4335 024). — *Macromitrium gymnostomum*. **China**. Hunan, Wulingyuan World Heritage Area, Zhangjiajie, 1999 *Rao 58525* (H); Changsha City, Mt. Yuelu, 1997 *Koponen et al. 48962* (H); Sangzhi Co., Badagongshan, 1999 *Rao 58960* (H); Xinning Co., Shunhuangshan National Forest Park, 2001 *Enroth 70674, 70760* (H). — *Macromitrium holomitrioides*. **China**. Hainan Island, Mt. Gianfengling, Sky Lake Nature Reserve, 770 m., on fallen trunk, 1985 *Wu W1185016* (H).

Acknowledgements

Guo Shuiliang gratefully acknowledges the support by the State Scholarship Fund of China for his visit to the University of Helsinki in 2003–2004. Thanks are also due to the curators of NY for loan of specimens. Our research on the bryoflora of Hunan is being carried out in cooperation between the Forest Department of Hunan Province and its Forest Botanical Garden, and the Department of Biological and Environmental Sciences and the Botanical Museum, University of Helsinki.

The project was a part of the project “The biodiversity of tropical southeast Asiatic bryoflora”, which was one of the projects of the Finnish Biodiversity Research Programme 1997–2000 (2002) (FIBRE), and was lead by Prof. Emer. Timo Koponen. The Academy of Finland Fellowships nos. 34229, 40867, 10134229, and 153706 are cordially acknowledged.

References

- Brotherus, V. F. 1929: IV. Teil. Musci. — In: Handel-Mazzetti, H. (ed.), *Symbolae Sinicae*. Botanische Ergebnisse der Expedition der Akademie der Wissenschaften in Wien nach Südwest-China 1914/1918: 1–147, pls. I–V. Julius Springer Verlag, Wien.
- Härkönen, M., Rikkinen, J., Ukkola, T., Enroth, J., Virtanen, V., Jääskeläinen, K., Rinne, E., Hiltunen, L., Piippo, S. & He, X.-L. 2004: Corticolous myxomycetes and other epiphytic cryptogams on seven native tree species in Hunan Province, China. — *Syst. Geogr. Pl.* 74: 189–198.
- Lewinsky, J. & Crosby, M. R. 1996: *Orthotricum tuberculatum* (Orthotrichaceae), a new genus and species from Guizhou, China. — *Novon* 6: 1–5.
- Noguchi, A. (supplemented by Z. Iwatsuki) 1989: *Illustrated moss flora of Japan*. Part 3: 493–742. — Hattori Bot. Lab., Nichinan.