



## The Identity of *Microdendron sinense* (Polytrichaceae)

Jaakko Hyvönen; Pan-Cheng Wu

*The Bryologist*, Vol. 96, No. 4. (Winter, 1993), pp. 631-634.

Stable URL:

<http://links.jstor.org/sici?sici=0007-2745%28199324%2996%3A4%3C631%3ATIOMS%28%3E2.0.CO%3B2-0>

*The Bryologist* is currently published by American Bryological and Lichenological Society.

---

Your use of the JSTOR archive indicates your acceptance of JSTOR's Terms and Conditions of Use, available at <http://www.jstor.org/about/terms.html>. JSTOR's Terms and Conditions of Use provides, in part, that unless you have obtained prior permission, you may not download an entire issue of a journal or multiple copies of articles, and you may use content in the JSTOR archive only for your personal, non-commercial use.

Please contact the publisher regarding any further use of this work. Publisher contact information may be obtained at <http://www.jstor.org/journals/abls.html>.

Each copy of any part of a JSTOR transmission must contain the same copyright notice that appears on the screen or printed page of such transmission.

---

JSTOR is an independent not-for-profit organization dedicated to and preserving a digital archive of scholarly journals. For more information regarding JSTOR, please contact [support@jstor.org](mailto:support@jstor.org).

## The Identity of *Microdendron sinense* (Polytrichaceae)

JAAKKO HYVÖNEN

Department of Botany, P.O. Box 47, FIN-00014 University of Helsinki, Finland

PAN-CHENG WU

Institute of Botany, Academia Sinica, 141 Xizhimenwai Dajie, 100044 Beijing, People's Republic of China

**Abstract.** *Microdendron sinense* Broth. (Polytrichaceae) is transferred to *Pogonatum*, as *Pogonatum sinense* (Broth.) Hyvönen & Wu comb. nov. The sporophyte of the species is described in detail for the first time.

The monotypic genus *Microdendron* Broth. was described by Brotherus (1929) on material collected by Handel-Mazzetti in China in northwestern Yunnan. Unfortunately, the type material (H-BR) included no sporophytes (although two setae were illustrated and described in Brotherus 1929). Accordingly the status of this monotypic genus has been in doubt. Gametophytic characters imply close affinity to *Dendroligotrichum* (C. Müll.) Broth. (Brotherus 1929) and to *Pogonatum* P. Beauv. (Smith 1971; Hyvönen 1989). Chen et al. (1978) gave an overall description of the species and illustrations of the sporophyte, but no taxonomic conclusions were drawn. Li (1985) published illustrations of *M. sinense* but without further discussion. Neither of these Chinese treatments cited specimens.

Three specimens recently collected in China in Yunnan and Xizang (see the list of specimens below) include young capsules and allow study of the peristome teeth and other important characters of the sporophyte. In addition to these specimens the type material and the recent collection reported by Long (1992) from Bhutan were also studied.

### GAMETOPHYTE

As mentioned above, the gametophyte of *Microdendron* suggests a close affinity to some species of *Pogonatum* and to *Dendroligotrichum* (Brotherus 1929; Smith 1971). The stems are up to 180 mm long and comparable to the largest species of *Pogonatum*, such as *P. urnigerum* (Hedw.) P. Beauv., *P. japonicum* Sull. & Lesq., *P. fastigiatum* Mitt., and *P. cirratum* Sw. subsp. *macrophyllum* (Dozy & Molke) Hyvönen.

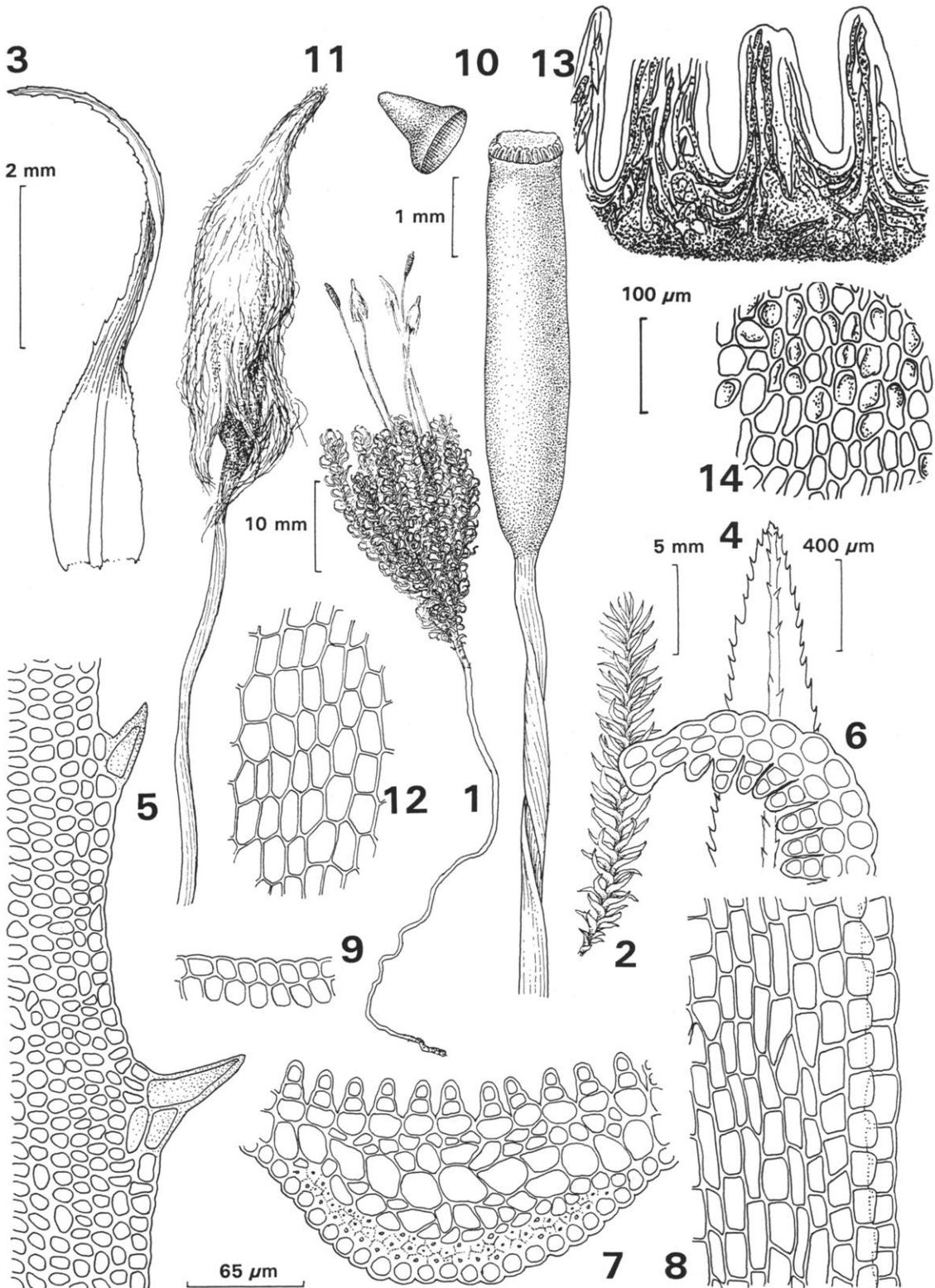
The nature of the branching so typical for the genus *Dendroligotrichum*, cited as a character shared by *Microdendron* (Smith 1971), is problematic. In some *Pogonatum* species, such as *P. fastigiatum*, *P. urnigerum*, and *P. volvatum* (C. Müll.) Par., branching is common as well, although not so regular as

in *Microdendron* and *Dendroligotrichum*. Detailed anatomical study of the conducting tissues of the latter genus was made most recently by Scheirer (1972). Héban and Berthier (1972) present detailed study of the branching pattern of *Dendroligotrichum dendroides* (Hedw.) Broth., *Polytrichastrum alpinum* (Hedw.) G. L. Sm., and *Polytrichum commune* Hedw. Héban (1977), in his general treatment of the conducting tissues of the bryophytes, discusses also the branching of the Polytrichaceae. His conclusion is that the branching by subperichaetial innovations, the phenomenon common also in many species of *Pogonatum*, does not essentially differ from that found in *Dendroligotrichum*. Normally the development of lateral branches is inhibited by apical dominance (Héban 1977). But in both cases of branching the physiology of the apical part of the stem is altered (Héban & Berthier 1972), making growth of one or several branches possible. Detailed anatomical studies of the gametophyte of *Microdendron sinense* are lacking but there is no reason to assume that it differs from that observed in other species of the Polytrichaceae. Branching occurs also in sterile stems and in this respect it resembles *Dendroligotrichum* and some species of *Pogonatum* as given above.

The reason for the termination of the apical dominance can be only speculated upon. In any case one should hesitate to give explanations based only on knowledge of the contemporary ecological conditions. In every case some of the characters are pleiomorphic, i.e., ancestral traits (Wanntorp et al. 1990). The calyptra of *Microdendron* has ample rhizoids (hairs) as is typical for all species of *Pogonatum*, whereas the calyptra in *Dendroligotrichum* is only sparsely hairy (Smith 1971).

### SPOROPHYTE

The sporophyte is in every respect typical for the genus *Pogonatum*. The urn is cylindrical, up to ca.



FIGURES 1-14. *Pogonatum sinense* (Broth.) Hyvönen & Wu. — 1. Dry habit. — 2. Moist branch. — 3. Perichaetial leaf. — 4. Apex of leaf. — 5. Marginal teeth. — 6-7. Central portion of leaf cross sections. — 8. Basal cells of sheath. — 9. Lamella as seen in side view. — 10. Capsule and operculum. — 11. Calyptra. — 12. Exothelial cells. — 13. Peristome teeth. — 14. Exothelial cells. Figures 1-10, 12-14, *W.-M. Zhu 44*; 11, *M.-Z. Wang 12060*, PE. Use the 2

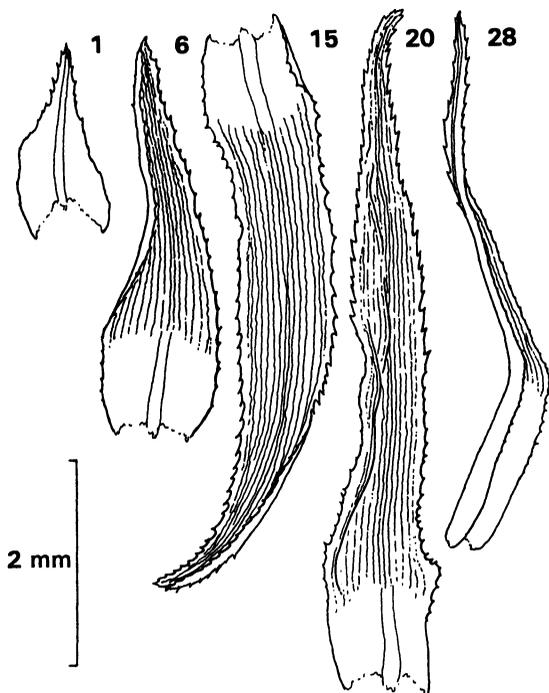


FIGURE 15. Leaves; numbers refer to the position of each leaf in the sequence from bottom to top of one branch (*W.-M. Zhu 44, PE*).

5 mm long, and lacks stomata. The exothecial cells are mamilliose, especially in the apical part. Removal of the operculum reveals 32 compound teeth with intense reddish-brown median coloration. The peristome of *Dendrologotrichum* has 64 single teeth, and stomata are present and dispersed all over the exothecium, which is smooth.

Apart from the excessive branched habit *M. sinense* resembles *P. fastigiatum* and other species of the *Cirratum* species group in *Pogonatum* subg. *Catharinella* (C. Müll.) Hyvönen (Hyvönen 1989), as noted already by Chen et al. (1978). The phylogenetic relationships of *Microdendron* are not discussed further here pending the computer assisted cladistic analysis of the whole genus currently under preparation by the senior author.

For the reasons discussed above we feel justified in transferring *M. sinense* to *Pogonatum*, which requires a new combination. Wijk et al. (1967) list the epithet *sinense* Card & Thér. in Asia 2 under the genus *Pogonatum*. This citation is, however, erroneous. The original citation (Bull. Torrey Bot. Club 43: 69) is *Pogonatum simense* (B.S.G.) Jaeger, from Transvaal, South Africa. Accordingly the epithet

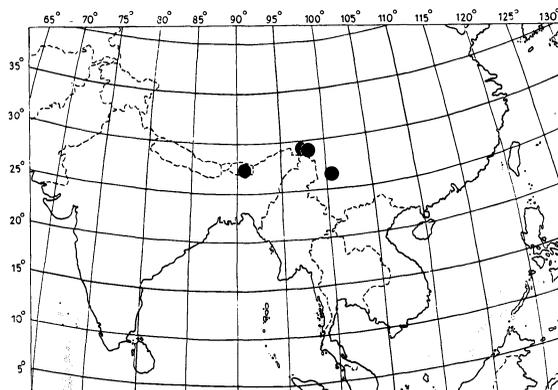


FIGURE 16. Distribution of *Pogonatum sinense* (Broth.) Hyvönen & Wu.

*sinense* has not been used in genus *Pogonatum* and the new combination presented here is acceptable.

**POGONATUM SINENSE** (Broth.) Hyvönen & Wu comb. nov. (FIG. 1-16)

*Microdendron sinense* Broth., *Symb. Sin.* 4: 137. 1929. TYPE: CHINA. Yunnan. Northwest Yunnan, below Doker-la, on Mekong-Salwin chain near the Tibetan border, in temperate *Abies-Salix* forest, on granite, 3,800-4,150 m, *Handel-Mazzetti 8098* (holotype H-BR!, isotypes FH, G).

*Plants* loosely caespitose, olivaceous to brown; *stems* branched, erect, up to 180 mm high; leaves borne on upper 20-30 mm of the stem; *leaves* crowded, contorted when dry, erect-spreading to slightly squarrose when moist, narrowly linear-lanceolate; *blade* 2.8-5.0 mm long and 0.6-0.9 mm wide, gradually narrowed to sharp apex, apical angle 20-55°; *margins* flat, bistratose, (2-)3(-5) cell-rows wide, serrate with fairly small multicellular teeth; depth of teeth 20-40 μm, apical cells of teeth 25-60 μm long; *costa* percurrent to very slightly excurrent, reddish-brown, dorsal stereid band 115-340 μm wide, ventral stereid band 75-185 μm wide, *cells* of stereid bands with firm to incrassate walls, *costa* apically sharply dentate with numerous dorsal teeth; *dorsal cells* of costa rectangular to elongate, *dorsal cells* of blade ovate to subquadrate with extremely incrassate transverse walls; *ventral lamellae* 24-68 per leaf, 1-2(-7) cells high, with essentially straight upper margin; *cells* subquadrate to ovate with incrassate to firm walls; *sheath* ovate, gradually narrowed to blade, 0.8-1.2 mm long, 0.9-1.2 mm wide, *cells* subquadrate to rectangular with firm walls;

←

mm scale for Figure 3, 1 mm scale for 10-11, 100 μm scale for 12-14, 10 mm scale for 1, 5 mm scale for 2, 400 μm scale for 4, and 65 μm scale for 5-9.

perichaetial leaves similar to cauline leaves, only with gradually longer sheath; male plants not seen.

Apparently *dioecious*; *seta* terminal or pseudolateral by subperichaetial innovation, smooth, solitary on branches, 13–17 mm long; *capsules* erect or slightly inclined, light to dark brown; *urn* cylindrical, terete,  $1 \times 3.5\text{--}5.1 \mu\text{m}$ ; *exothecial cells* mamillate, subquadrate to elongate, walls firm; *stomata* absent; *peristome* with 32 compound teeth, *teeth*  $160\text{--}195 \times 70\text{--}75 \mu\text{m}$ , basal membrane less than  $165 \mu\text{m}$ , some teeth with distinct median sinus, each of 64 parts reddish brown, with hyaline margins; *epiphragm* attached to apices of peristome teeth; *operculum* rostellate, 1.1 mm long; *calyptra* hairy, 5 mm long (hairs included); spores ca.  $8.4\text{--}14.3 \mu\text{m}$  diam., finely papillose.

Judging from label data, *Pogonatum sinense* is an oroboreal plant, collected in coniferous forests of the mountain ranges of Himalaya above 3,100 m.

*Specimens examined.*—As 2: CHINA. XIZANG. CHAYU CO.: *M.-Z. Wang 12060* (H!, PE!). YUNNAN. *Handel-Mazzetti 8098* (holotype, H-BR!). DALI CO.: *C.-Y. Yang 132* (H!, PE!). GONGSHAN CO.: *W.-M. Shu 19901* (H!, PE!). LI-JIANG CO.: *M.-Z. Wang* (PE!). As 3: BHUTAN. MONGAR DISTR.  $27^{\circ}24'N$ ,  $91^{\circ}E$ , 3,600 m, *Long 8696* (E!).

#### ACKNOWLEDGMENTS

The Curators of B, BM, E, FH, G, L, MO, NY, and PE are acknowledged for information about their collections and the loan of specimens. We are indebted to Prof. Pekka Isoviita and Mr. Krister Karttunen, M.Sc., for nomenclatural advice. We are also very grateful to Ms. Mei-Zhi Wang for checking the Chinese specimens and for her collections. Mr. Mu-Sen Gou is acknowledged for the illustrations and Mr. Yu-Cheng Dai for his kind help in translating the Chinese text in Chen et al. (1978). Dr. Gary Merrill and Dr. William D. Reese plus an anonymous

reviewer are acknowledged for their improving comments on the manuscript.

#### LITERATURE CITED

- BROTHERUS, V. F. 1929. *Symbolae Sinicae*. Botanische Ergebnisse der Expedition der Akademie der Wissenschaften in Wien nach Südwest-China 1914/1918. IV Musci. Wien.
- CHEN, PAN-CHIEH et al. 1978. *Genera Muscorum Sini- corum*. II. Beijing.
- HÉBANT, C. 1977. The Conducting Tissues of Bryophytes. *Vaduz*.
- & J. BERTHIER. 1972. La ramification et ses conséquences anatomiques dans la tige aérienne feuillée des Polytrichales (étude morphogénétique et histologique de quelques espèces appartenant aux genres *Polytrichum*, *Pogonatum* et *Dendrologotrichum*). *Revue Bryologique et Lichénologique*. Nouvelle Série 38: 177–240.
- HYVÖNEN, J. 1989. A synopsis of genus *Pogonatum* (Polytrichaceae, Musci). *Acta Botanica Fennica* 138: 1–87.
- LI, X.-J. (ED.). 1985. *Bryoflora of Xizang*. Beijing.
- LONG, D. G. 1992. Mosses of Bhutan. I. In T. Koponen & J. Hyvönen (eds.), *Proceedings of the Congress of East Asiatic Bryology*, Helsinki, August 12–19, 1990. *Bryobrothera* 1: 119–125.
- SCHEIRER, D. C. 1972. Anatomical studies in the Polytrichaceae. I. The gametophore of *Dendrologotrichum dendroides* (Hedw.) Broth. *THE BRYOLOGIST* 75: 305–314.
- SMITH, G. L. 1971. A conspectus of the genera of Polytrichaceae. *Memoirs of the New York Botanical Garden* 21: 1–83.
- WANNTORP, H.-E., D. R. BROOKS, T. NILSSON, S. NYLIN, F. RONQUIST, S. C. STEARNS & N. WEDELL. 1990. Phylogenetic approaches in ecology. *Oikos* 57: 119–132.
- WIJK, R. VAN DER, W. D. MARGADANT & P. A. FLORSCHÜTZ. 1967. *Index Muscorum 4 (P-S)*. *Regnum Vegetabile* 48: 1–604.