New records of Chinese Hookeriaceae (Musci)

Benito C. Tan¹³ and Pang-Juan Lin²
¹Farlow Herbarium, Harvard University, Cambridge, MA 02138, U.S.A.
²South China Botanical Garden, Academia Sinica, Guangzhou, Guangdong, China

(Received April 9, 1991; Accepted June 12, 1991)

Abstract. Four new provincial records, one new varietal record, and one new species (Distichophyllum oblongum) of Chinese Hookeriaceae are reported, and their intra-Chinese distribution discussed. A key to the Chinese species of Calyptrochaeta is presented. Distichophyllum decolyi Gangulee from India is a new synonym of D. maiharae and Calyptrochaeta pociii Ninh from Vietnam is suggested to be a synonym of C. spinosa.

Key words: Calyptrochaeta; China; Distichophyllum; Flora; Hookeriaceae; Mosses.

A study of recent collections of Chinese Hookeriaceae, in connection with a familial preparation for the projected Chinese moss flora, has yielded several noteworthy records for the various provinces of, and also for the whole of, mainland China. New provincial records have been carefully checked against literature accumulated by us, and also against the updated computerized database of Chinese moss taxa prepared by Prof. P.L. Redfearn, Jr. at Southwest Missouri State University. Finally, one new species of Distichophyllum is described from Guangxi Province.

Eríopus mollis Card.

This species is well known in Japan and Taiwan. It can be separated from other congeneric Chinese species by its broadly ovate, slightly asymmetrical lateral and median leaves, the weakly toothed leaf margins, and oval to short rhomboidal, thin-walled, leaf cells (32– 50–80 μm long). The perichaetial leaves of C. japonica have long acuminate apices.

In China, C. japonica has been reported from Sichuan, Hainan, and Taiwan. We have seen only specimens from Hainan and Taiwan. The specimen cited below is the first record for the province of Fujian.

Noguchi (1937) provided an excellent illustration of this species based on Taiwanese material.


This former Taiwan endemic was reported recently by Hu and Wang (1987) from Zhejiang Province of China. Its well differentiated and often strongly toothed leaf borders consist of two to three rows of linear cells. Most of the leaf cells are oblong and fusiform in shape, with thick-walls. Noguchi's (1937) illustration of this species is accurate.

Calyptrochaeta spinosa appears to be a variable species. The two widely variable features are the leaf marginal dentation and the dimension of leaf cells. Plants of C. spinosa with weakly toothed, ovate leaves
can be confused with *C. japonica*. But the latter has broadly ovate lateral and medial leaves with thin-walled cells. In *C. spinosa*, the lateral leaves are oblong-ovate and the middle lamellae of the thick leaf cell walls are clearly visible under the compound microscope.

*Calyptraeota spinosa* can also be mistaken for *C. parviretis* (Fleisch.) Iwats., Tan & Touw. The latter is a larger plant with short oval leaf cells (30-45 μm long). The leaf cells of *C. spinosa* range from oval, rhomboidal to fusiform (45-78 μm long). We have not yet seen an authentic Chinese material of *D. parviretes*.

The published Chinese record of *C. parviretis* is from Taiwan (Lai and Wang-Yang, 1976).

The three species of Chinese *Calyptraeota* can be distinguished by the following keys.

1. Leaf margins weakly toothed; leaf cells thin-walled.......................... *C. japonica*
2. Leaf margins strongly toothed; leaf cells thick-walled.......................... *C. spinosa*
2. Plants large, stems more than 4 cm tall; upper 1/3 leaf cells short oval to polygonal, 30-45 μm long, often collenchymatous.......................... *C. parviretis*
2. Plants small, stems less than 4 cm tall; upper 1/3 leaf cells short rhomboidal to fusiform, 56-89 μm long, not collenchymatous.......................... *C. spinosa*

When Noguchi (1937) described *C. spinosa*, he contrasted it with *C. remotifolia* (C. Muell.) Iwats. & Tan. However, Tan and Robinson (1990) suggested that *C. spinosa* is closer in gametophytic characters to *C. ramosa* (Fleisch.) Tan & Robins. and may prove to be a variety or a small form of it. *Calyptraeota ramosa* differs from *C. remotifolia* primarily in having narrower leaf borders and also perichaetial leaves with long acuminate apices (Fleischer, 1908; Tan and Robinson, 1990).

The type of *C. spinosa* has no inflorescences or sporophytes (Noguchi, 1937). Although Yang and Lee (1964) reported the perichaetial leaves of *C. spinosa* from Mt. Ali, Taiwan, as "linear-lanceolate", they failed to describe the leaf apical outline in details to shed light on the possible synonymy between *C. spinosa* and *C. ramosa*. Thus far, we have seen only male plants from mainland Chinese collections. The perigonal leaves are ovate to lanceolate in outline.

The Vietnamese species, *Calyptraeota pocci* Ninh, is most likely a synonym of *C. spinosa*. Ninh (1981) reported it to differ from *C. spinosa* in having smaller plant size (about 1 cm tall), larger and decurrent leaves, shorter leaf acumen and longer and larger leaf cells. All these diagnostic characters, however, are variable in *C. spinosa* and we can not see how *C. pocci* can be maintained as a distinct species.

*Calyptraeota spinosa* is reported here as new to the provinces of Guangxi, Guangdong and Hainan. It appears to be much more common in China than *C. japonica*.

**Specimens examined.** Guangxi, P.-C. Wu et al. 353 (FH, IBSC). Guangdong, 14 km from Ruyuan-Xian, Ruy-Yang Forestry Bureau, in valley, on rock, 6 Jun 1973, P.-J. Lin 760 (FH, IBSC). Hainan Island, Chiangjiang County, Bawanglin Forest Preserve, P. Redfearn 35826 (MO); Baisha County, trail leading to Tigerhead Mt., P. Redfearn 35784 (MO).


Although not clearly shown in his illustrations, Noguchi (1956) distinguished *D. collenchymatous* from *D. maibarai* by the stout and colored yellow leaf borders in the former and narrow and almost pale leaf borders in the latter. We observe another difference in the leaf apices: a well developed, stout mucro (20-35 μm long) in *D. collenchymatous* and only a short apiculus (less than 10 μm long) in *D. maibarai*. Furthermore, *D. collenchymatous* has larger leaves, measuring longer than 3 mm and about 1-1.25 mm wide. The leaves of *D. maibarai* are less than 2 mm long and about 0.75 mm wide.

*Distichophyllum sinense* Dix. was correctly reduced by Noguchi (1956) to a synonym of *D. collenchymatous*. The specimen of *D. sinense* at FH and MO has rather thick leaf cell walls. In spite of the specific epithet, the collenchymatous feature of the leaf cells in *D. collenchymatous* is not prominent. The species is reported here new to Fujian Province.

**Specimens examined.** Fujian Province, Mt. Wuyi, on rock, P.-J. Lin 2911 (FH, IBSC).

Fig. 1. *Distichophyllum oblongum* Tan & Lin. A, plant habit when wet; B, leaves; C, perichaetium; D, leaf apices; E, median leaf cells; F, basal leaf cells.
**Distichophyllum maibarae** is best identified by its short leaf apiculus which consists of hexagonal to shorty oblong cells whose widths are much broader than those of the adjacent leaf border cells. The species seems to be common in Taiwan, Hainan and Zhejiang provinces, as is borne out by several herbarium specimens found by us to be misidentified as *D. nigricaula*. The differences between the two species are discussed below.

We report here the first collections of *D. maibarae* from Jiangsu Province (Wu & Jin 2216, 2219, MO).

**Distichophyllum decolyi** Ganguele from Sikkim is a new synonym of *D. maibarae*. The species name in Ganguele (1977, p. 1488) is based on a nomen nudum, **Distichophyllum leevieri** Broth. in Bruehl, which was preempted by *D. leevieri* (Geh.) Broth. from Australia. The paratypes at FH (Sikkim, Kurseong, Mahaldaram Forest, Rev. P. Decoly & Schaul [sub Brothers 2543]) and the illustration in Ganguele (1977) show beyond doubts that *D. decolyi* is *D. maibarae*, a new species record for India.


The variety elmeri differs from the typical variety in having muticus or shortly mucronate (6-9 µm) leaf apices (Tan and Robinson, 1990). The Hainan collection compares well with the type of *D. elmeri* from the Philippines in all important details.

In China, *D. nigricaula* var. elmeri can be confused with the much more widespread *D. maibarae* Besch. The latter, however, has a thinner leaf border, a larger leaf apiculus, and homogenous laminal cells in the upper 1/3 of the leaf. Typically, the submarginal leaf cells of *D. nigricaula* are clearly smaller in size than the inner ones.

**Distichophyllum nigricaula** was reported from Taiwan (Kuo and Chiang, 1987; Lin, 1988) and Hainan (Lin et al., 1991). The var. elmeri, however, is a new record for China. Its presence in Hainan reinforces the floral affinity of the island and the Philippines as pointed out by Tan, Li and Lin (1988) and Ko (1989).

**Specimens examined.** Hainan Province, Jianfengling (Mt.), 7 Jun 1962, P. -C. Chen et al. 593 (FH, IBSC, PE).

6. **Distichophyllum oblongum** Tan & Lin, sp. nov. (Fig. 1) -TYPE: China, Guangxi Province, Miaozh -shan, at tree trunk base, 15 Sep 1974, P.-J. Lin 1748 (holotype: IBSC; isotype, FH).

Plants parvulæ; folia oblonga vel oblanceolata, circa 1 mm longa et minus quam 0.5 mm lata, valde limbata, integra, et mucronata; cellulae polygonatae vel quadratae, incrassatae, non collenchymatosae.

Plants small, in dense mats; stems procumbent, branched, reaching 7 mm long, and less than 1 mm wide in dry state. Leaves shrunk and twisted when dry, and complanate when wet; lateral and dorsal leaves similar, mostly oblong, or narrowly oblanceolate, about 1 mm long and less than 0.5 mm wide. Leaf borders stout, 15–22 µm wide, entire, strongly differentiat-ed throughout, and confluent at leaf apex forming a strong mucro measuring 45–90 [100] µm long. Costa strong, ending some 10–12 cells from the leaf apex. Laminal cells irregular in shape, mostly polygonal, some quadrate, 11–16 µm long, thick-walled, not collenchymatous, homogenous across the leaf blade, becoming rectangular and thin-walled at leaf base. Perichaetial leaves smaller than the vegetative leaves, oblanceolate, marked bordered, ecostate, and with mostly rectangular leaf cells. The rest not seen.

This new species, because of its small stature, belongs in section **Distichophyllum**. It is distinctive in having narrowly oblong leaves with very strong and firm leaf borders. It is closest to *D. aciphyllum* Dix. from Borneo in plant size, but the Bornean species has obovate and broadly spatulate leaves measuring more than 1 mm long and 0.5 mm wide.

**Distichophyllum oblongum** is also like *D. ceylanicum* (Mitt.) Par. in overall leaf shape and areola-tion. But this latter species belongs to section **Mniadelphus** Mitt. which includes species of large plant size with papillose setae. According to Townsend (1982), the leaves of *D. ceylanicum* average 1.25–1.75 mm long and the leaf borders are mostly 12–14 µm wide. In *D. oblongum*, there are approximately 13–15 rows of cells between the leaf border and the costa, while in the leaves of *D. ceylanicum*, the number of cell rows between the leaf border and the costa ranges from 18 to 22.
Acknowledgements. The second author wishes to acknowledge the financial supports provided by the Farlow Herbarium of Harvard University, the W.C. Steere Fund of New York Botanical Garden, and the Missouri Botanical Garden for her visit to the herbaria in the United States in the autumn of 1990. Together, we are grateful to FH and MO for access to their Chinese moss collections, and to Dr. P. L. Redfearn, Jr. for permission to use his 1991 database of Chinese moss taxa. Dr. W. R. Buck helped improve the English text and Dr. R. Barneby corrected the Latin diagnosis. Dr. M. R. Crosby kindly called our attention to the source publication of *Calytrochaeta spinosa* (Nog.) Ninh.

Literature Cited


