



New records of Chinese Hookeriaceae (Musci)

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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. maibarae* and *Calyptrochaeta pocsii* 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.

1. *Calyptrochaeta japonica* (Card. & Thér.) Iwats. & Nog., J. Hattori Bot. Lab. 46: 236. 1979.
Eriopus 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 Si-

chuan, 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.

Specimens examined. Fujian Province, Mt. Wuyi, subpeak Sinfengling, in valley, on rock, 23 Jul 1980, P.-J. Lin et al. 2587 (FH, IBSC, SYS).

2. *Calyptrochaeta spinosa* (Nog.) Ninh, Acta Bot. Acad. Scientiarum Hungaricae 27: 159. 1981.
Calyptrochaeta spinosa (Nog.) Lin, J. Taiwan Musuem 37(2): 55. 1984. nomen superfluum.

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

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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.

Calyptrochaeta 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–] 56–89 μm long). We have not yet seen an authentic Chinese material of *D. parviretis*. The published Chinese record of *C. parviretis* is from Taiwan (Lai and Wang-Yang, 1976).

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

1. Leaf margins weakly toothed; leaf cells thin-walled *C. japonica*
1. Leaf margins strongly toothed; leaf cells thick-walled 2
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. *Calyptrochaeta 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, *Calyptrochaeta pocsii*

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 acumens and longer and larger leaf cells. All these diagnostic characters, however, are variable in *C. spinosa* and we can not see how *C. pocsii* can be maintained as a distinct species.

Calyptrochaeta 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).

3. ***Distichophyllum collenchymatosum*** Card., Bull. Soc. Bot. Genève sér. 2,3: 278. 1911.

Although not clearly shown in his illustrations, Noguchi (1956) distinguished *D. collenchymatosum* from *D. maibarae* 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. collenchymatosum* and only a short apiculus (less than 10 μm long) in *D. maibarae*. Furthermore, *D. collenchymatosum* has larger leaves, measuring longer than 3 mm and about 1–1.25 mm wide. The leaves of *D. maibarae* 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. collenchymatosum*. 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. collenchymatosum* 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).

4. ***Distichophyllum maibarae*** Besch., J. de Bot. 13: 40. 1899.

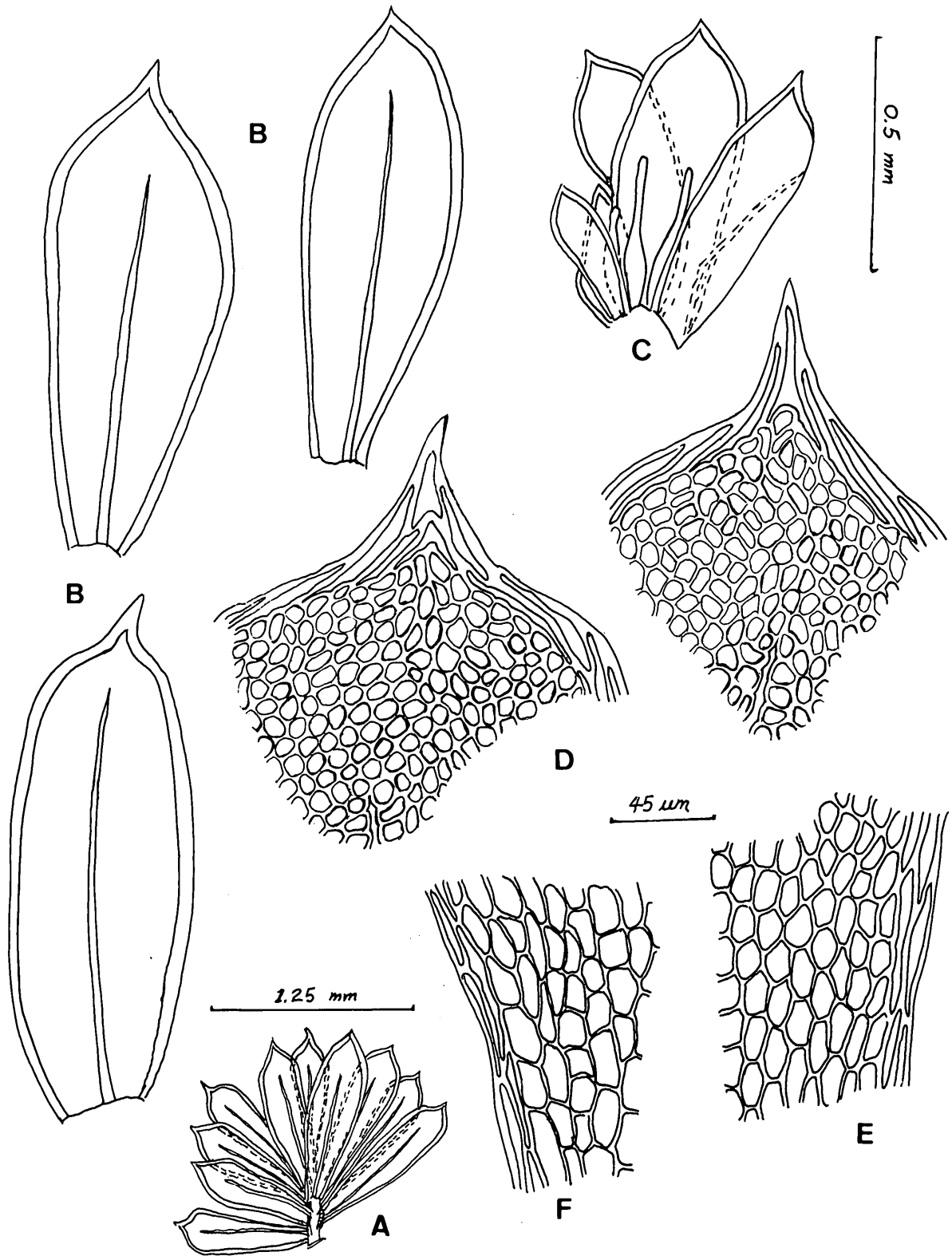


Fig. 1. *Distichophyllum oblongum* Tan & Lin. A, plant habit when wet; B, leaves; C, perichaetium; D, leaf apices; E, median leaf cells; F, basal leaf cells.

Distichophyllum maibarae is best identified by its short leaf apiculus which consists of hexagonal to shortly 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. nigricaulae*. 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 Gangulee from Sikkim is a new synonym of *D. maibarae*. The species name in Gangulee (1977, p. 1488) is based on a nomen nudum, *Distichophyllum levieri* Broth. in Bruehl, which was preempted by *D. levieri* (Geh.) Broth. from Australia. The paratypes at FH (Sikkim, Kurseong, Mahaldaram Forest, *Rev. P. Decoly & Schaul* [sub *Brotherus 2543*]) and the illustration in Gangulee (1977) show beyond doubts that *D. decolyi* is *D. maibarae*, a new species record for India.

5. ***Distichophyllum nigricaulae*** Bosch & Lac. var. *elmeri* (Broth.) Tan & Robins., *Smithsonian Contr. Bot.* 75: 22. 1990.

The variety *elmeri* differs from the typical variety in having mucicous 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. nigricaulae* 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. nigricaulae* are clearly smaller in size than the inner ones.

Distichophyllum nigricaulae 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, Miao-er-shan, at tree trunk base, 15 Sep 1974, P.-J. Lin 1748 (holotype: IBSC; isotype, FH).

Plantae parvulae; 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 shrunken 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 differentiated 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, markedly 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 areolation. 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.

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中國油蘚科(蘚類)的新紀錄

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本文報導有關中國油蘚科的新發現：其中有四個種為省的新紀錄，一個變種是中國的新紀錄，和一個廣西省的特產新種，*Distichophyllum oblongum* Tan & Lin, sp. nov. 此外，本文並提供中國毛柄蘚屬(*Calyptrochaeta*)的分種檢索表。作者並發現印度的特產種 *Distichophyllum decolyi* Gangulee 是 *Distichophyllum maibarae* Besch. 的新異名；而越南的特產種 *Calyptrochaeta pocsii* Ninh 極可能為 *Calyptrochaeta spinosa* (Nog.) Ninh 的異名。