

# *Miehea* (Family Leskeaceae), a genus new to moss flora of China

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**Abstract.** *Miehea indica* (Dixon) Ochyra is reported as a new generic and species record of the moss flora of China. Although *Miehea* appeared on the annotated checklist of Chinese mosses of Redfearn et al. (1996), no voucher specimen was ever cited. The taxonomic position of *Miehea* remains uncertain. It was either put in the Hylocomiaceae based on the presence of foliose paraphyllia and a sympodial growth-form or in the Thuidiaceae on the basis of shared leaf-shape and leaf areolation. After examining the ontogeny of the undivided and foliose paraphyllia of *M. indica*, a closer relationship to Leskeaceae is thus proposed.

**Keywords:** China; Leskeaceae; *Miehea*; New record; Ontogenetic transformations; Undivided paraphyllia.

## Introduction

*Miehea indica* (Dixon) Ochyra was first recorded as a member of the moss flora of China in a recent annotated checklist (Redfearn et al., 1996) based on a personal communication with Dr. D. G. Long, a British bryologist. Nevertheless, no voucher specimens were ever cited. Lately a specimen collected from Yunnan Province of China and deposited at the Missouri Botanical Garden was examined when I made a monographic study on the Hylocomiaceae (Chiang, 1994). This finding has extended the geographic range of this genus beyond India.

*Miehea* was created by Ochyra (1989) based on *M. himalayana*, which was later synonymized into *M. indica* [Basionym: *Hylocomium indicum* Dixon] (Ochyra, 1991). This monotypic genus was characterized and distinguished from *Hylocomium* by having unbranched and foliose paraphyllia and the presence of longitudinal hyaline lamellae on the surface of the stems and branches (Ochyra, 1989). Nevertheless, the taxonomic position of *Miehea* still remains open.

***Miehea*** Ochyra, Nova Hedwigia 49: 323. 1989.

***Miehea indica*** (Dixon) Ochyra, J. Hattori Bot. Lab. 69: 124. 1991. (Figure 1)

*Hylocomium indicum* Dixon, Not. R. Bot. Gard. Edinburg 19(95): 299, f. 13. 1938.—TYPE: India, near the sources of the Jumna, 12-14,000 ft., October 1868, coll. W. Bell, Herb. Edin. (110) (Holotype: E!)

*Ptychodium indicum* (Dixon) Rohrer, Lindbergia 12: 35. 1986.

*Miehea himalayana* Ochyra, Nova Hedwigia 49: 324. f. 1-3. 1989.—TYPE: Nepal - Central Himalayas,

Keldang, Dupku Danda, elev. 4,660 m; E-facing scree slope exposed to monsoon rain, 27 July 1986, Sabine & George Miehe 6845 (Holotype: KRAM-B!).

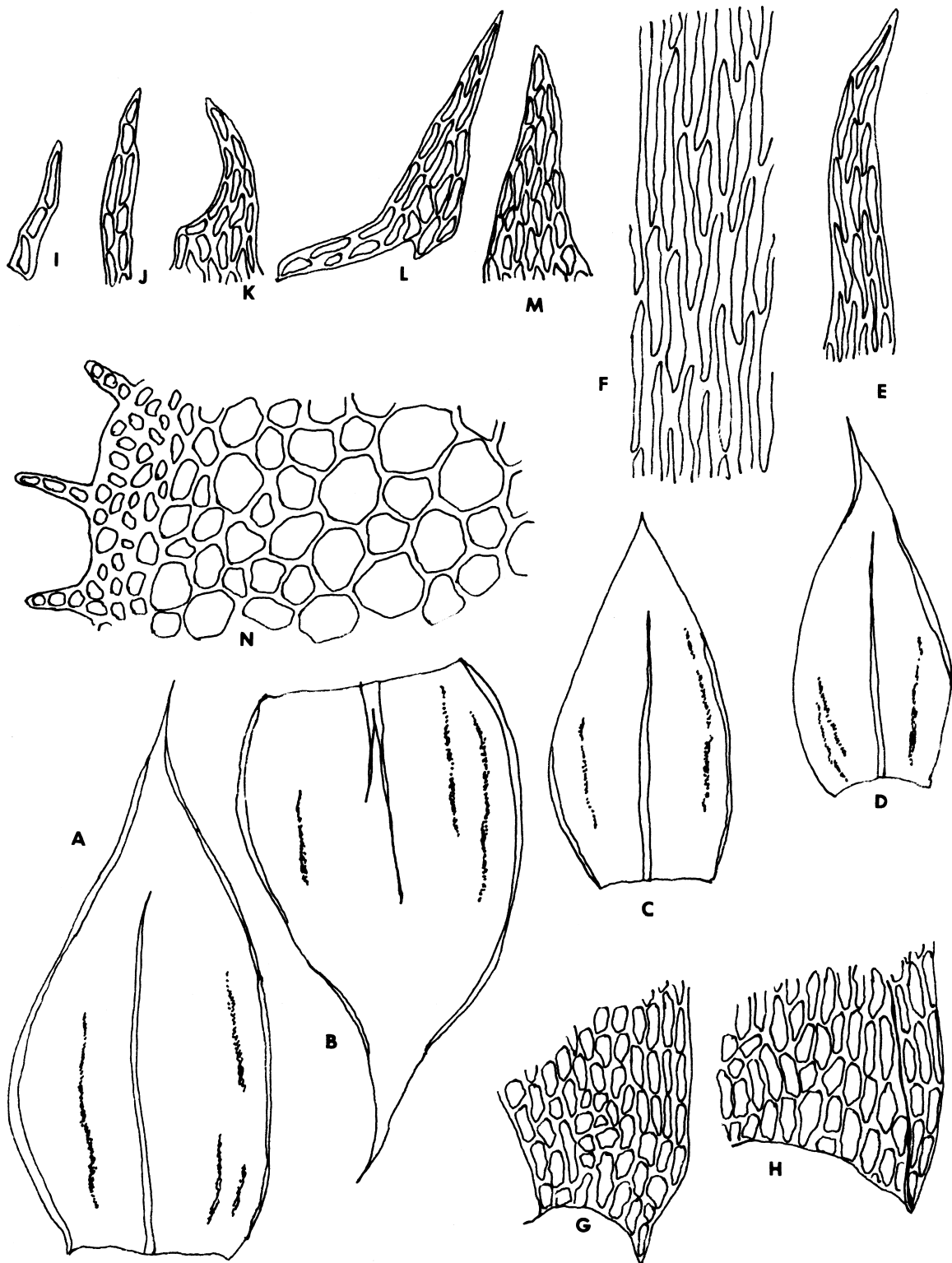
Plants medium-sized, in loose mats. Stems julaceous and sympodially branched. Central strands not differentiated. Paraphyllia abundant, scattered on stems and branches, foliose and undivided, usually long decurrent. Leaves of main stems, secondary stems and branches differentiated. Stem leaves concave, oblong-ovate with abruptly narrowed apiculate apex, branch leaves ovate-elliptic with tapering acute apex; margins entire, strongly recurved; costa single, occasionally forked, extending to 4/5 the leaf length; leaf base decurrent. Leaf cells linear, ca. 30–65 µm long, smooth, with moderately thickened walls; angular cells less differentiated, rectangular; basal cells strongly pitted. Sporophytes not seen.

*Specimen examined.* China, Yunnan, Long 18998 (MO).

*Distribution.* India, Nepal, and China.

*Notes.* An unusual character, with longitudinal lamellae on stems and branches, was emphasized in Ochyra's (1989) taxonomic discussion of *Miehea*. Longitudinal lamellae were first used to describe a non-chlorophyllous structure composed of one to four inflated hyaline cells, on stems or branches of *Pleuroziopsis ruthenica* (Weinm.) Kindb. (Ireland, 1968). Longitudinal lamellae, from which branched rhizoids arise, were therefore suggested to be different from the true paraphyllia (Ireland, 1968; also cf. Lawton, 1971; Noguchi, 1994). Based on this character and others, Buck and Vitt (1986) recognized the Pleuroziopsidaceae as a family phylogenetically distant from the Climaciaceae. In contrast, Ochyra (1989) suggested a different phylogeny, in which *Pleuroziopsis* was closer to *Climacium* than any other pleurocarpous mosses, due to the recognition of the stem lamellae of *Pleuroziopsis* as the true paraphyllia.

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**Figure 1.** *Miehia indica* (Dixon) Ochyra. A–B, Stem leaves ( $\times 33$ ); C–D, Branch leaves ( $\times 33$ ); E, Apical cells of stem leaf; F, Median laminal cells ( $\times 330$ ); G, Alar and basal cells of branch leaf ( $\times 330$ ); H, Alar and basal cells of stem leaf ( $\times 330$ ); I–M, Paraphyllia ( $\times 33$ ); N, Cross section of stem ( $\times 330$ ). Drawn from Long 18998.

Although Ochyra (1989) concluded that *Miehea* was the only genus having differentiated longitudinal lamellae, his definition of longitudinal lamellae in Ochyra (1989) appeared quite puzzling. First he described (p.329) and illustrated (Fig. 2:2-3) the decurrencies of paraphyllia which gradually merged into the longitudinal lamellae of the stems and branches. That is, lamellae were parts of the paraphyllia. But on the next page, he stated, "Originally I assumed these (lamellae) were long decurrencies of leaves or paraphyllia. However, transverse sections of the stems and branches revealed many distinctive hyaline lamellae which are usually 3–4, and only occasionally 1 or 5, cells high. However, there are many lamellae that are totally independent of the paraphyllia." When the structures in question were examined with care, "lamellae" with three or four hyaline cells, which were abundantly distributed on stems, were easily detected under microscope even without dissection. Nevertheless, I would rather interpret them as early-stage paraphyllia, not "longitudinal lamellae" because of their identical areolation and unbranched shape. To recognize the same feature of different ontogenetic stages as different characters usually causes inevitable mistakes in phylogenetic reconstruction.

The taxonomic position of *Miehea* remains controversial. Ochyra (1991) revised this genus and retained it in the Hylocomiaceae emphasizing the sympodial growth-form and the undivided paraphyllia. In addition to Ochyra's treatment Rohrer (1986) transferred *Hylocomium indicum* into *Ptychodium*, a genus of Thuidiaceae (Crum, 1976; Rohrer, 1985), on the basis of the similarity of leaf shape and areolation as well as the presence of paraphyllia. Obviously the presence of paraphyllia was emphasized in both hypotheses. And even the undivided, foliose morphology of paraphyllia has been claimed to be a type of hylocomiaceous moss (Ochyra, 1991). However the paraphyllia of both Hylocomiaceae (Chiang, 1994) and *Ptychodium* (Ochyra, 1991) are all branching and do not resemble those of *Miehea*.

In phylogeny reconstruction, ontogenetic data of individualized and complex phenotypic characters (Wagner, 1989) usually provide more phylogenetic information than any instantaneous traits (De Quieroz, 1985). In mosses the ontogenetic sequence of paraphyllia has been proved to be more informative than the adult morphology or the mere use of absence or presence criterion (Chiang, 1995; also cf. Buck and Vitt, 1986). The ontogenetic transformations of the undivided paraphyllia not only falsify the above hypotheses but also imply a closer relationship of *Miehea* to the Leskeaceae. A paraphyllia bearing genus *Pseudopleuropus* Takaki, which was catalogued in the Brachytheciaceae (Takaki, 1955), with sympodial growth-form as well, may be the taxon most closely related to *Miehea* phylogenetically. More evidence for testing the above hypothesis will be discussed in detail elsewhere.

This species is found as a new addition at both specific and generic levels to moss flora of China.

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## 米氏蘚（薄羅蘚科）中國蘚類誌新紀錄屬

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本文報導一中國蘚類植物新紀錄屬、種—印度米氏蘚，本屬雖出現在 Redfearn 等（1996）的中國蘚類植物名錄，但並未見證據標本被引證；本屬的分類地位仍屬不定，過往分類處理根據其葉狀鱗毛及多歧分枝將米氏蘚置於塔蘚科，或根據相同的葉形及葉細胞，將其置於羽蘚科中；經檢視印度米氏蘚的葉狀不分叉鱗毛的形態發生，提出其近於薄羅蘚科之分類地位。

**關鍵詞：**米氏蘚屬；不分枝之鱗毛；薄羅蘚科；發生序列；中國；新紀錄。