
A New Combination in *Mackaya* (Acanthaceae), with Lectotypification for *Mackaya tappingensis*

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ABSTRACT. Comparative survey of morphological characters shows that *Eranthemum tappingense* W. W. Smith is better treated in *Mackaya* Harvey. Consequently, a new combination, *M. tappingensis* (W. W. Smith) Y. F. Deng & C. Y. Wu, is proposed, and its lectotype is designated. The species is distributed in China and Burma (Myanmar).

Key words: Acanthaceae, *Eranthemum*, *Mackaya*, *Pseuderanthemum*.

While revising the family Acanthaceae for the forthcoming volume 19 of *Flora of China*, the position of *Pseuderanthemum tappingense* (W. W. Smith) C. Y. Wu & H. S. Lo (Anonymous, 1975) was drawn to our attention because it differs from other members of *Pseuderanthemum* Radlkofer in its secund flowers in terminal racemes and its campanulate corolla without a long slender cylindrical tube. The species was originally described as *Eranthemum tappingense* W. W. Smith (Smith, 1918) from three collections from Burma (Myanmar), i.e., *Forrest 9655*, *9484*, and *12149*. In the original description, Smith (1918) indicated that this taxon was related to *E. indicum* (Nees) C. B. Clarke and *E. lateriflorum* C. B. Clarke. *Eranthemum indicum*, originally described in *Thyracanthus* Nees as *T. indicus* Nees, was transferred to *Mackaya* Harvey by Ensermu et al. (1992), and *E. lateriflorum* to *Gymnostachyum* Nees by Hansen (1985a). It is reasonable, then, to re-evaluate the position of *E. tappingense*.

Wu (1984) included *Eranthemum tappingense* in his *Index Florae Yunnanensis*, cited the three Forrest collections listed above, and believed these collections to be from Longchuan xian of Yunnan Province, China. Simultaneously, he mentioned that the species

might belong in *Odontonemella* Lindau, but did not actually transfer the species from *Eranthemum* L. to *Odontonemella*. Hu (2002) included this species under *Pseuderanthemum* in her treatment of the family Acanthaceae for *Flora Reipublicae Popularis Sinicae* and indicated that it is distributed in the boundary areas between China and Burma (Myanmar).

Odontonemella was established by Lindau (1893), characterized by a ventricose corolla, two fertile stamens, two staminodes, and spangenpollen, and was typified by *O. indica* Lindau. *Odontonemella indica* was originally described in *Eranthemum* as *E. indicum* (Clarke, 1885) and was transferred to *Mackaya* by Ensermu et al. (1992). Lindau (1895) added a new member to the genus, *O. leptostachya* Lindau based on *Leptostachya wallichii* Nees, which is the lectotype of *Leptostachya* Nees (Hansen, 1985b; Deng & Xia, 2005) and does not fit the original description of *Odontonemella* given by Lindau (1895). Recent studies placed *Odontonemella* in synonymy with *Mackaya* (Brummitt, 1992; Ensermu et al., 1992; Mabberley, 1997; Scotland & Volessen, 2000).

In October 2004, the first author had the opportunity to check the material identified as *Pseuderanthemum tappingense* when he visited the herbaria of Kew and Edinburgh. In the Edinburgh herbarium, the first author saw all three collections cited by Smith, of which *G. Forrest 9655* was dissected by Smith. This collection clearly shows that the species has two fertile stamens and two staminodes. It is not *Pseuderanthemum* because of its campanulate corolla without a long cylindrical tube. It also differs from *Eranthemum* in the corolla shape, which is long and cylindrical in *Eranthemum* and campanulate in *Mackaya*, and in the pollen grains (Lindau, 1895; Hu,

2002). After comparison with related genera, we concluded that the species belongs in *Mackaya* rather than in *Pseuderanthemum* or *Eranthemum*. Our recent molecular data (unpublished) also indicate that *Mackaya* forms a sister group with *Asystasia* Blume and forms paraphyletic groups with *Pseuderanthemum*. A new combination, *M. tapingensis* (W. W. Smith) Y. F. Deng & C. Y. Wu, is therefore necessary.

The genus *Mackaya* (Harvey, 1859) is characterized by its secund flowers, campanulate corolla, two fertile stamens, and two staminodes. Kanjilal and Das (1939) incorrectly included *Asystasia* in *Mackaya* and transferred three Assam species of *Asystasia* to *Mackaya*, i.e., *M. atroviridis* (T. Anderson) Das, *M. macrocarpa* (Nees) Das, and *M. neesiana* (Wallich) Das. These three species are quite different from *Mackaya* in having four stamens and we prefer to place them in *Asystasia* rather than *Mackaya*. In recent studies, however, *Mackaya* has been treated separately from *Asystasia* (Ensermu et al., 1992; Mabberley, 1997; Scotland & Vollesen, 2000; Wood, 2001). It was placed in subtribe Asystasiaceae (Bentham, 1876; Clarke, 1885; Lindau, 1895), tribe Odontonomeae (Lindau, 1895), or subtribe Justiciinae (Scotland & Vollesen, 2000) together with *Dicentranthera* T. Anderson, *Asystasiella* Lindau, *Glossochilus* Nees, and *Salpinctium* T. J. Edwards.

Mackaya is a small genus of three species with a disjunct range: *M. bella* Harvey is restricted to South Africa (Phillips, 1951), but *M. indica* (Nees) Ensermu occurs in India, Bhutan, Nepal, and Burma (Myanmar). *Mackaya tapingensis*, proposed herein, is found in southwestern Yunnan, China, and adjacent Burma (Myanmar).

Pollen morphology is one of the important characters defining the generic boundary in the family Acanthaceae (Lindau, 1893, 1895; Bremekamp, 1944). Pollen of *Mackaya tapingensis* is oblate-spheroidal, 3-colporate, and ellipsoidal with a perforate exine (polar axis [P] = 50.2 [46–53] μm ; equatorial diameter [E] = 44.9 [42–48] μm) (Fig. 1). It is quite different from pollen of *Eranthemum* species but is similar to that of *Pseuderanthemum* species and other *Mackaya* species (Raj, 1961; Daniel, 1993, 1998; Scotland & Vollesen, 2000; Hu et al., 2005a, b). It differs from pollen of the other two species of *Mackaya* only in size (Ensermu et al., 1992).

Mackaya tapingensis (W. W. Smith) Y. F. Deng & C. Y. Wu, comb. nov. Basionym: *Eranthemum tapingense* W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 10: 177. 1918. *Pseuderanthemum tapingense* (W. W. Smith) C. Y. Hu & H. S. Lo,

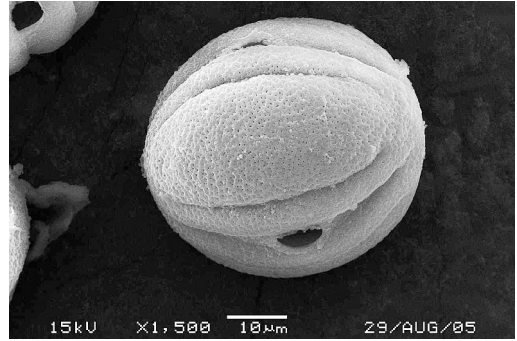


Figure 1. Pollen grain of *Mackaya tapingensis* (W. W. Smith) Y. F. Deng & C. Y. Wu from *G. Forrest 9655* (IBSC).

Fl. Hainan 4: 558. 1975. TYPE: Myanmar [Burma]: “Taping Valley, Upper Burma, lat. 24°20’N, 2000 ft., shrubby plant of 2–4 ft., flowers pale rose, in shady jungle,” Feb. 1913, *G. Forrest 9655* (lectotype, designated here, E; duplicates, IBSC, K).

Distribution and habitat. The species is distributed in southwestern China (Yunnan) and Burma (Myanmar). It grows in shady habitat under forest at elevations of 600–1800 m.

Relationships. *Mackaya tapingensis* is similar to *M. indica*, but differs in its lanceolate (vs. elliptic) leaves and glabrous (vs. puberulent or glabrescent) calyx that is basally connate to 1/3–1/2 (vs. less than 1/5) (Smith, 1918; Hu, 2002).

Additional specimens examined. BURMA (MYANMAR). **Shan:** Valley of the Taping, *G. Forrest 9484* (E); Valley of the Taping, 2000 ft., *G. Forrest 12149* (E). CHINA. **Yunnan:** Gengma Xian, 2250 m, 7 Jan. 2006, *Deng Yunfei 18452* (IBSC); Lu-se (now Luxi Shi), 1750 m, 3 Mar. 1934, *H. T. Tsai 56406* (IBSC, KUN); Lu-Hsi Hsien (now Luxi Shi), 1750 m, 9 Feb. 1934, *H. T. Tsai 56868* (IBSC, KUN, SZ); Yingjiang Xian, 900 m, 26 Oct. 1986, *Lin Qin 770760* (KUN); Yingjiang Xian, 1800 m, 19 Jan. 1989, *Sun Hang 1530* (KUN); Yingjiang Xian, 1450 m, Dec. 1981, *Tao Guoda 12791* (HITBC); Yingjiang Xian, 1500 m, 3 Nov. 1974, *Tao Guoda 13128* (HITBC, KUN); Yingjiang to Ruili, autumn 1952, *R. C. Ching 50112* (KUN, SWFC); Zhenkang Xian, 1130 m, 14 Feb. 1959, *Zhu Taiping 641* (KUN); western Yunnan, autumn 1952, *R. C. Ching 50633* (KUN, SWFC).

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Literature Cited

- Anonymous. 1975. Acanthaceae. Pp. 536–572 in Guangdong Institute of Botany (editor), *Flora Hainan*, Vol. 3. Science Press, Beijing.
- Bentham, G. 1876. Acanthaceae. Pp. 1060–1122 in G. Bentham & J. D. Hooker (editors), *Genera Plantarum*, Vol. 2. L. Reeve, London.
- Bremekamp, C. E. B. 1944. Materials for a monograph of the Strobilanthinae (Acanthaceae). *Verh. Kon. Akad. Wetensch., Afd. Natuurk., Sect. 2*, 41: 1–305.
- Brummitt, R. K. 1992. *Vascular Plant Families and Genera*. Royal Botanic Gardens, Kew.
- Clarke, C. B. 1885. Acanthaceae. Pp. 387–558 in J. D. Hooker (editor), *Flora of British India*, Vol. 4. L. Reeve, London.
- Daniel, T. F. 1993. New and reconsidered Mexican Acanthaceae. V. *Contr. Univ. Michigan Herb.* 19: 271–291.
- . 1998. Pollen morphology of Mexican Acanthaceae: Diversity and systematic significance. *Proc. Calif. Acad. Sci.* 50: 217–256.
- Deng, Y. F. & N. H. Xia. 2005. (1668) Proposal to conserve the name *Leptostachya* Nees (Acanthaceae) against *Leptostachia* Adans. (Phrymaceae) with a conserved type. *Taxon* 54: 192–193.
- Ensermu, K., R. K. Brummitt & C. A. Furness. 1992. A reconsideration of *Asystasiella* Lindau (Acanthaceae). *Kew Bull.* 47: 669–675.
- Hansen, B. 1985a. Notes on *Andrographis* and *Gymnostachyum* (Acanthaceae). *Nordic J. Bot.* 5: 353–356.
- . 1985b. A taxonomic revision of Asian genus *Leptostachya* (Acanthaceae). *Nordic J. Bot.* 5: 469–473.
- Harvey, W. H. 1859. *Mackaya bella* Harv. Pp. 8–9, pl. 13 in *Thesaurus Capensis*. John van Voorst, London.
- Hu, C. C. 2002. *Pseuderanthemum*. Pp. 89–97 in *Flora Reipublicae Popularis Sinicae*, Vol. 70. Science Press, Beijing.
- , H. P. Tsui & Y. L. Zhang. 2005a. Pollen morphology of the tribe Ruellieae (Acanthaceae) from China. *Acta Phytotax. Sin.* 43: 123–150.
- , ———, Y. Z. Xi & Y. L. Zhang. 2005b. Pollen morphology of one genus in Lepidagathideae, two in Andrographideae and eight in Justicieae (Acanthaceae) from China. *Acta Phytotax. Sin.* 43: 151–162.
- Kanjilal, P. C. & A. Das. 1939. Acanthaceae. Pp. 408–458 in U. N. Kanjilal, A. Das, P. C. Kanjilal & R. E. De (editors), *Flora of Assam*, Vol. 3. Government of Assam, Shillong.
- Lindau, G. 1893. Beiträge zur Systematik der Acanthaceen. *Bot. Jahrb. Syst.* 18: 36–64, Tafel I–II.
- . 1895. Acanthaceae. Pp. 274–353 in A. Engler & K. Prantl (editors), *Die natürlichen Pflanzenfamilien*, 4(3b). Engelmann, Leipzig.
- Mabberley, D. J. 1997. *The Plant-Book*, 2nd ed. Cambridge University Press, Cambridge.
- Phillips, E. P. 1951. *The Genera of South African Flowering Plants*. Botanical Survey of South Africa Memoir 25.
- Raj, B. 1961. Pollen morphological studies in the Acanthaceae. *Grana Palynol.* 3: 3–45.
- Scotland, R. W. & K. Vollesen. 2000. Classification of Acanthaceae. *Kew Bull.* 55: 513–589.
- Smith, W. W. 1918. Diagnoses specierum novarum in herbario Horti Regii Botanici Edinburgensis cognitarum CCCLI–CCCC. *Notes Roy. Bot. Gard. Edinburgh* 10: 167–204.
- Wood, J. R. I. 2001. Acanthaceae. Pp. 1243–1292 in A. J. C. Grierson & D. G. Long (editors), *Flora of Bhutan*, Vol. 2. Royal Botanical Garden Edinburgh, Edinburgh, and Royal Government of Bhutan, Thimphu.
- Wu, C. Y. 1984. *Index Florae Yunnanensis*, Vol. 2: 1668–1688. People’s Publishing House, Yunnan, China.