

Nomenclatural Changes in *Kalimeris*: towards a Revision of Asian *Aster* and Allied Genera

AKIKO SOEJIMA¹ and MASASHI IGARI²

¹Biological Science, Graduate School of Science, Osaka Prefecture University, Sakai, Osaka 599-8531, Japan;

²17-2 Ushikawayakushi, Toyohashi, Aichi 440-0015, Japan

Kalimeris (Asteraceae) is a small eastern Asian genus closely related to *Aster*. It is distinguished from *Aster* mainly by its shorter pappus. Although the length of the pappus has been considered to be a good diagnostic character, the distinction has not always been clear and the boundary between them has long been controversial among botanists. Molecular data suggest that the short pappus might have arisen in parallel in different evolutionary lines in *Aster*. We therefore consider it proper to merge *Kalimeris* with *Aster*. Four new combinations are proposed here: *Aster incisus* Fisch. var. *macrodon* (Vaniot & H. Lév.) Soejima & Igari, *A. indicus* L. var. *collinus* (Hance) Soejima & Igari, *A. indicus* L. var. *stenolepis* (Hand.-Mazz.) Soejima & Igari, and *A. yomena* (Kitam.) Honda var. *angustifolius* (Nakai) Soejima & Igari.

Key words: *Aster*, Asteraceae, East Asia, *Kalimeris*, new combination

Aster (tribe *Astereae*, Asteraceae), includes about 400 species distributed widely in temperate regions worldwide. Within the tribe *Astereae*, subtribe *Asterinae* is rather easily distinguished from others by the flat, open white, pink or purple ligules. There are, however, many small genera within the subtribe where the generic delimitations are ambiguous and are a source of disagreement among botanists. In Japan and adjacent regions, Kitamura (1937) recognized three small genera, *Kalimeris* Cass., *Heteropappus* Less., and *Gymnaster* Kitam. (\equiv *Miyamayomena* Kitam.), as segregates of *Aster* L. The three genera were distinguished from each other mainly by pappus length. Kitamura's treatment has been accepted by many subsequent authors (Kitamura 1957, Ohwi 1965, Hu 1967, Ling *et al.* 1985, Gu & Hoch 1997), but other authors have retained these genera in *Aster s. lat.* while subdividing

the genus into several subgenera or sections (Bentham 1873, Hoffmann 1890, Hara 1952, Grau 1977, Jones & Young 1983, Ito & Soejima 1995, Soejima & Peng 1998, Pak 1999). Except for *K. miqueliana*, which they considered to belong to another section of *Aster*, Ito & Soejima (1995), based on molecular analyses using chloroplast DNA (Ito *et al.* 1995), placed the species of *Kalimeris* in *Aster* sect. *Asteromoea* Makino in their treatment in the *Flora of Japan*. Later, in their revision of *Kalimeris*, Gu & Hoch (1997) treated the species of *Aster* in section *Asteromoea* as *Kalimeris*, but leaving *K. miqueliana* in *Aster*.

In addition to the different generic treatments, Gu & Hoch (1997) differed from Ito & Soejima (1995) in the usage of infraspecific ranks. Ito & Soejima (1995) used the rank of variety for infraspecific taxa, while Gu & Hoch (1997) used sub-

species. Except for these differences, the taxonomic boundaries recognized by Gu & Hoch (1997) and Ito & Soejima (1995) mostly coincide, except for *Aster incisus* (\equiv *Kalimeris incisa*). Ito & Soejima (1995) plus earlier Japanese botanists (Koidzumi 1923, Kitamura 1937, 1957, Hara 1952, Ohwi 1965) treated *A. incisus* Fisch., described on the basis of a specimen collected in Siberia, Russia, as occurring in Japan as well as in Siberia, China and Korea. Gu & Hoch (1997), however, treated *K. incisa* as being restricted to the Asian continent and distinguished the Japanese plants as *K. yomena* (Kitam.) Kitam. subsp. *angustifolia* (Nakai) H. Y. Gu.

According to Gu & Hoch (1997), *Kalimeris incisa* and *K. yomena* subsp. *angustifolia* differ in branching pattern and rhizome morphology; the former has relatively stiff branches less than 25 cm long and condensed rhizomes no longer than 1 cm, whereas the latter has flexible branches up to 40 cm long and rhizomes up to 10 cm long. They reported the confusion over these two taxa had been due to their relatively long pappus, which characterizes both of them. Gu & Hoch (1997) also distinguished *K. pinnatifida* and *K. yomena* mainly on the length of the pappus bristles. According to them (Gu & Hoch 1997), the pappus bristles of *K. pinnatifida* are 0.2–0.3 mm long and shorter than those of *K. yomena*. They therefore transferred *K. pinnatifida* var. *angustifolia* to *K. yomena* (as subsp. *angustifolia*), which is morphologically similar, but differs slightly in pappus length and branch flexibility. They distinguished subsp. *angustifolia* from subsp. *yomena* by the pappus bristles more than 0.4 mm long and by the flexible branches of subsp. *angustifolia*. In subsp. *yomena* the pappus bristles are less than 0.4 mm long and the branches are stiff.

We reached the same conclusion as Gu & Hoch (1997) through our recent reinvestigation of *Kalimeris* in Japan and on the continent. The Japanese plants differ from *K. incisus* and are conspecific with *K. yomena*, but we prefer to treat them

within *Aster* in sect. *Asteromoea* Makino. Although there is a tendency of the large genus *Aster* is being split (Noyes & Rieseberg 1999, Brouillet *et al.* 2001, Semple *et al.* 2001), *Kalimeris* is monophyletic with *Aster s. str.* and should be included in *Aster* (Ito *et al.* 1998). We therefore propose a new combination as follows. Three additional new combinations are also proposed to accommodate our placement of the continental species of *Kalimeris* within *Aster*.

1. *Aster incisus* Fisch. var. *macrodon* (Vaniot & H. Lév.) Soejima & Igari, **comb. nov.**

Basionym: *Aster macrodon* Vaniot & H. Lév., Bull. Acad. Int. Géogr. Bot. 20: 141 (1909). — *Kalimeris incisa* subsp. *macrodon* (Vaniot & H. Lév.) H. Y. Gu, Ann. Missouri Bot. Gard. 84: 778 (1997). *Typus*. KOREA, Cheju Island (Quelpart), 25 Sep. 1906, U. Faurie 1071 (holo- E; iso- BM, KYO).

2. *Aster indicus* L. var. *collinus* (Hance) Soejima & Igari, **comb. nov.**

Basionym: *Boltonia indica* α . *collina* Hance, Ann. Sci. Nat. Bot. sér. 5, 5: 219 (1866). — *Kalimeris indica* var. α . *collina* (Hance) Kitam., J. Jap. Bot. 19: 340 (1943). — *Kalimeris indica* subsp. *collina* (Hance) H. Y. Gu, Ann. Missouri Bot. Gard. 84: 789 (1997). *Typus*. CHINA, Guangdong: Guangzhou, Oct. 1859, Hance 5195 (lecto- BM, designated by Gu & Hoch [1997]).

3. *Aster indicus* L. var. *stenolepis* (Hand.-Mazz.) Soejima & Igari, **comb. nov.**

Basionym: *Asteromoea indica* var. *stenolepis* Hand.-Mazz., Acta Horti Gothob. 7: 225 (1938). — *Kalimeris indica* var. *stenolepis* (Hand.-Mazz.) Kitam., J. Jap. Bot. 19: 340 (1943). — *Kalimeris indica* subsp. *stenolepis* (Hand.-Mazz.) H. Y. Gu, Ann. Missouri Bot. Gard. 84: 791 (1997). *Typus*. CHINA, Fujian: Yenping Xian, 4 Aug. 1924, H. H. Chung 2895 (holo- W; iso- BM, MO, PE). *Kalimeris indica* f. *gracilis* J. Q. Fu, Bull. Bot. Res., Harbin 3: 112 (1983). *Typus*. CHINA, Gansu: Wen Xian, Bikou-gongshe, Zhu yuanba, 900 m, 9 Sep. 1959, Z. Y. Zhang 14791 (holo- WUK).

4. *Aster yomena* (Kitam.) Honda var. *angustifolius* (Nakai) Soejima & Igari, **comb. nov.**

Basionym: *Kalimeris pinnatifida* var. *angustifolia* Nakai, Bull. Natl. Sci. Mus. Tokyo 33: 26 (1953).
— *Kalimeris yomena* subsp. *angustifolia* (Nakai) H. Y. Gu, Ann. Missouri Bot. Gard. 84: 799 (1997).
Typus. JAPAN, Yamaguchi: Abu-gun, Jifuku-mura, Mt. Ookuraga-dake, 16 Oct. 1949, *T. Nakai* & *N. Maruyama s.n.* (lecto- TNS [2 sheets], designated by Gu & Hoch [1997]; isolecto- TI).

Aster pinnatifidus Makino f. *robustus* Makino in Bot. Mag. Tokyo 27: 115 (1913). *Typus*. JAPAN, Prov. Bungo: near Kuju, 29 Aug. 1911, *T. Makino s. n.* (MAK)

Asteromoea incisa (Fisch.) Koidz., Bot. Mag. Tokyo 37: 56 (1923), p. p. excl. type.

Kalimeris incisa (Fisch.) DC. ex Kitam., Mem. Coll. Sci. Kyoto Univ. ser. B. 13: 309 (1937), p. p. excl. type.

Aster incisus auct. non Fisch.: H. Hara, Enum. Sperm. Jap. 3: 131 (1952), p. p.; M. Ito & Soejima, Fl. Jap. 3b: 66 (1995), p. p. quoad pl. ex Japan.

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