

***METAMYRIACTIS* (ASTERACEAE, ASTEREAE),
A NEW GENUS OF SOUTHEAST ASIAN ASTERS**

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ABSTRACT

Metamyriactis Nesom, **gen. nov.**, segregated from *Aster*, includes 5 species: *Metamyriactis helenae* (Merrill) Nesom, **comb. nov.**, *Metamyriactis nigromontana* (Dunn) Nesom, **comb. nov.**, *Metamyriactis pandurata* (Nees ex Walpers) Nesom, **comb. nov.**, *Metamyriactis pycnophylla* (Franch. ex W.W. Smith) Nesom, **comb. nov.**, *Metamyriactis sikkimensis* (Hook. f.) Nesom, **comb. nov.**, and *Metamyriactis veitchiana* (Hutch. & Drummond ex Zhang & Gao) Nesom, **comb. nov.** *Metamyriactis pandurata* is common and widespread at low to medium elevations in central China, while the others are mostly Himalayan at higher elevations. The genus is characterized particularly by a herbaceous-rhizomatous habit, zig-zag stems, clasping to subclasping leaf bases, minutely glandular stems, leaves, and disc corollas, and small, narrowly obovate, densely glandular achenes. Phylogenetic analyses based on molecular data indicate that *M. pandurata* and *M. pycnophylla* are closely related to each other and as a pair most closely related to *Myriactis*. Lectotypes are designated for *Aster fordii*, *Aster candelabrum*, *Aster sikkimensis*, and *Erigeron panduratus*.

Molecular analyses (Li et al. 2012) indicate that the Chinese taxa *Aster auriculatus*, *A. panduratus*, and *A. pycnophyllus* are closely related among themselves and as a group most closely related to the genus *Myriactis*. This group of species is part of a clade that includes *Psychrogeton*, *Neobrachyactis*, *Callistephus*, and six other species groups recognized at generic rank (Nesom 2020a).

Not only is the association of *Myriactis* with *Aster* unexpected but also the morphological distance between *Aster auriculatus/panduratus* and *A. pycnophyllus* has not previously led to a hypothesis of their close relationship. Grierson (1964), however, pointed to a close morphological relationship among *Aster pycnophyllus*, *A. helenae*, *A. nigromontanus*, and *A. sikkimensis*, noting (p. 112) that "they all have flexuose [zig-zag] stems, distinctly veined leaves, and ligules that have two well-marked lateral veins." Similarity of *A. nigromontanus* and *A. sikkimensis* to *A. auriculatus/panduratus* links the latter to this group. These three have essentially sessile leaves, often with a clasping to subclasping base, while leaves of *A. pycnophyllus* and *A. helenae* have truncate to rounded-obtuse blade bases but are distinctly petiolate. Ling (1985) included *A. pycnophyllus* with *A. nigromontanus* and *A. sikkimensis* as the members of his ser. *Sikkimenses*. His ser. *Auriculati* included *A. auriculatus*, *A. panduratus*, and *A. sphaerotus* (representing a single variable and widespread species, as recognized here) and *A. veitchianus* (a distinct, narrowly endemic species).

In any case, this group of species can be recognized as a natural group among Asian asters, especially in their combination of herbaceous and rhizomatous habit, zig-zag stems, pervasive glandularity, relatively small heads and short rays, foveolate to alveolate receptacles, and small, compressed, glandular achenes. They are treated here at generic rank as the new genus *Metamyriactis*, with recognition from molecular evidence that they apparently are the sister genus of *Myriactis* (one other genus, the Hawaiian *Helodeaster*, is closely related to *Myriactis*; see Nesom 2020b).

In his *Aster* ser. *Auriculati*, Ling (1985) also included *A. trichoneurus* and *A. manshanensis*. Leaf and involucre morphology of these, however, suggest they are closer to *A. sampsonii* and *A. maackii* of the *Amellus* group of Asterinae (Nesom 2020a).

Aster alatipes Hemsl. (Figs. 30-32) has clasping leaf bases, glandular stems, leaves, involucre and disc corollas, and small, glandular achenes and might be suspected of close relationship with *Metamyriactis pandurata*, but the involucral morphology of *A. alatipes* (phyllaries strongly scarious-indurate, graduate in length, oblong-elliptic with rounded apices) is distinct from that of the species placed here in *Metamyriactis*.

METAMYRIACTIS Nesom, **gen. nov.** TYPE: *Metamyriactis pycnophylla* (Franch. ex W.W. Smith) Nesom

Aster [sect. *Aster*] ser. *Auriculati* Y. Ling, Fl. Reipubl. Pop. Sin. 74: 358. 1985. TYPE: *Aster auriculatus* Franch.

Aster [sect. *Orthomeris*] ser. *Sikkimenses* Y. Ling, Fl. Reipubl. Pop. Sin. 74: 358. 1985. TYPE: *Aster sikkimensis* Hook. f.

Distinct among Asian asters in the combination of its rhizomatous habit, zig-zag stems, stems, leaves, phyllaries, and disc corollas minutely glandular, leaves epetiolate or with a broadly winged petiole and clasping base (*M. pandurata*, *M. veitchiana*, *M. nigromontana*, *M. sikkimensis*) or distinctly short-petiolate (*M. pycnophylla*, *M. helenae*), relatively small heads and short rays, foveolate to alveolate receptacles, and narrowly oblanceolate achenes 1.8–3 mm long, strongly compressed, 2(–4)-ribbed, strigose and minutely stipitate-glandular.

Perennial herbs from a short, thick, fibrous-rooted rhizome/caudex and longer, thinner rhizomes or (in *M. pandurata*) stolons up to 15 cm long; stems, leaves, and phyllaries stipitate-glandular to punctate-glandular, moderately to densely hirsute-villous. **Stems** (5–)20–80(–100) cm tall, simple, distally branching, zig-zag at nodes, sometimes proximally lignescent (*M. nigromontana*, *M. sikkimensis*). **Leaves**, proximal small and withered by anthesis, epetiolate or with a broadly winged petiole, clasping to subclasping. **Heads** 1 or usually in loose to dense corymboid clusters; involucre shallowly hemispheric, 4–12 mm wide (pressed); phyllaries in 3–4 subequal series, mostly herbaceous, apically acute to acuminate; receptacles epaleate, foveolate to alveolate. **Ray flowers** (10–)20–60, ligules 4–9(–10) mm long, white to blue or purple. **Disc flowers** bisexual, fertile, corollas 3.5–5 mm long, sometimes becoming purple, tube filiform, abruptly expanded into the limb, lobes triangular-deltate, often glandular. **Achenes** narrowly obovate, 1.8–3 mm long, strongly compressed, 2(–4)-ribbed, strigose and minutely stipitate-glandular apically or over the whole surface; pappus of bristles in 3–4 series of subequal length, often reddish, innermost about as long as the disc corollas, apically acute or slightly clavate, outermost much shorter, 0.2–0.6 mm long.

1. Leaves with a narrow, clearly delimited petiole; involucre 4–6 mm wide (pressed).
 2. Internodes 25–45 mm long; distal leaves narrowly ovate, base rounded to obtuse; Xizang, Yunnan, Assam, n Myanmar **Metamyriactis pycnophylla**
 2. Internodes 4–10 mm long; distal leaves lanceolate, base attenuate; ne Myanmar **Metamyriactis helenae**
1. Leaves essentially sessile (sometimes short-petiolate in *M. sikkimensis*), with a truncate to rounded or obtuse base; involucre 6–12 mm wide (pressed).
 3. Cauline leaves mostly 10–18 cm long, distal only slightly reduced in size, not bracteate; rays usually blue to pink or purple; involucre 6–8 mm wide (pressed).
 4. Longest phyllaries 5–5.5 mm long; disc corollas 5 mm long; ray flowers 20–30; Yunnan **Metamyriactis nigromontana**
 4. Longest phyllaries 3.5–4 mm long; disc corollas 3.5–4 mm long; ray flowers 30–60; Sikkim, Nepal, s Xizang **Metamyriactis sikkimensis**
 3. Cauline leaves mostly 3–8 cm long, distal absent or much-reduced and becoming bracteate; rays white to light pink, light blue, or light purple; involucre 10–12 mm wide (pressed).

5. Cauline leaves more than 15, basal withered by anthesis; abaxial leaf surface glandular; heads (1–)3–30; phyllaries glandular; widespread in China (see below)
 **Metamyriactis pandurata**
5. Cauline leaves usually fewer than 10, basal present at anthesis; abaxial leaf surface without glands; heads 1–4; phyllaries glabrous; endemic to E'mei and Yinjin counties, Sichuan
 **Metamyriactis veitchiana**

1. Metamyriactis pycnophylla (Franch. ex W.W. Smith) Nesom, **comb. nov.** *Aster pycnophyllus* Franch. ex W.W. Smith, Notes Roy. Bot. Gard. Edinb. 8: 332. 1915. *Aster harrowianus* var. *pycnophyllus* (Franch. ex W.W. Sm.) H. Lév., Cat. Pl. Yun-Nan, 40. 1915. **TYPE: CHINA. Yunnan.** Tali Range eastern flank, 25° 40' N, shady ledges of cliffs in side valleys, 10,000–11,000 ft, Sept 1906, *G. Forrest 4001* (holotype: E image, Fig. 1). Figs. 1-5.

2. Metamyriactis helenae (Merrill) Nesom, **comb. nov.** *Aster helenae* Merrill, Brittonia 4: 185. 1941. **TYPE: MYANMAR.** N Burma, Kang-fang, amongst mossy stones on the fringe of forest lining the river, at just about the high water mark, 5500 ft, 5 Dec 1938, *F.K. Ward 81* (holotype: NY image, Fig. 6).

3. Metamyriactis pandurata (Nees ex Walpers) Nesom, **comb. nov.** *Aster panduratus* Nees ex Walpers, Nov. Actorum Acad. Caes. Leop.-Carol. Nat. Cur. 19 (Suppl. 1): 258. 1843. **TYPE: CHINA. [Guangdong].** "Lintin" [= Nei/Inner Lingding Island], [1831], *F.J.F. Meyen s.n.* (B, not seen). Figs. 7-19.

Merrill (1937, p. 74) noted that "Doctor Mattfeld examined Nees' type in the Berlin Herbarium and states that it represents the same species as Hongkong herb. 2824, distributed as *A. Fordii* Hemsl."

Aster striatus Champion in Benth., Hooker's J. Bot. 4: 233. 1852. **TYPE: CHINA. Guangdong.** Hong-kong, [no date], *J.G. Champion s.n.* (holotype: K image).

Aster fordii Hemsl., J. Linn. Soc., Bot. 23: 410. 1888. **LECTOTYPE** (designated here): **CHINA. Guangdong.** "Lo Fau Shan: Com. Hort Bot. Hongkong 11/83," 800 ft, Aug 1883, *C. Ford 88* (K image). Also cited in the protologue: "Hupeh: *A. Henry 984, 2494, 2910, 3229.*"

Aster auriculatus Franch., J. Bot. (Morot). 10: 376. 1896. **TYPE: CHINA. Yunnan.** In collibus, ad imam basin montis Tsang-chan, 13 Jun 1889, *P.J.M. Delavay 4157* (holotype: P, photo and fragments-E image).

Aster candelabrum Vaniot, Bull. Acad. Int. Géogr. Bot. 12(167–168): 498. 1903. **TYPE: CHINA. [Guizhou.]** Prov. Kouy-tchéou, environs de Kouy-Yang, sur les montagnes du collège, 30 Aug 1897, *E. Bodinier 1915* (holotype: E 413431 image). **Protologue:** "Chine, Kouy-tchéou; environs de Kouy-Yang. C. sur les montagnes du collège. *Item*, aux environs de Gan-pin. Léon Martin legit, 30 août 1897. Herbar Bodinier, no. 1915." The protologue appears to refer to two collections but the wording is repeated on the label of the type, added in a different-colored ink to the original information and also with the addition of "L. Martin" as collector. Thus it is clear enough that the protologue refers only to the single sheet and that Bodinier made the collection.

Aster argyi H. Lév., Bull. Géogr. Bot. 25: 14. 1915. **TYPE: CHINA. Jiangsu.** "Kiang-Sou, Wousi-Long-Tse," [no date], *Père C. d'Argy s.n.* (holotype: E image).

Erigeron panduratus C.-C. Chang, Sunyatsenia 6: 17. 1941 (not *Aster panduratus* Nees ex Walpers 1843). *Aster sphaerotus* Y. Ling [nom. nov.], Fl. Reipubl. Pop. Sin. 74: 145. 1985. **LECTOTYPE** (designated here): **CHINA. Guangxi.** "Tze-Yuen Hsien, Mao-Er Shan, herb in woods," 28 Jul 1937, *Z.S. Chung 83430* (IBK 191566 image; isolectotypes: A image, Fig. 10, IBK 191567 image).

Leaves cauline, gradually becoming larger distally, largest at midstem or above, becoming bracteate in the inflorescence, broadly oblanceolate to oblong-oblanceolate, mostly 3–8 cm long, 1–2.5 cm wide, base cordate or auriculate, sessile and clasping to subclasping, margins entire to serrate or dentate, sometimes coarsely so, apex acute to obtuse. **Heads** 1 or 2–10(–30) in loose clusters. **Involucres** 10–12 mm wide (pressed), phyllaries oblong-lanceolate to elliptic-lanceolate, apex acuminate or abruptly narrowed, minutely stipitate-glandular, stramineous with a dark midvein, outermost with broader midvein or midregion. **Ray flowers** 18–30(–40), ligules 5–9 mm long, white to light pink or light blue or purple. **Achenes** 1.8–3 mm long; pappus bristles 4–5 mm long. $2n=18$ (Meng et al. 2016).

Open forests, mixed forests, thickets, grasslands on slopes, canal sides, roadsides, field margins; 100–3000 meters. **China**: Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hubei, Henan, Jiangsu, Jiangxi, Sichuan, Zhejiang, Xizang (Zayü), Yunnan; apparently adventive in **Thailand** (fide *Kewscience*, Plants of the World Online).

There is little difference in the morphological descriptions of *Aster auriculatus*, *A. panduratus*, and *A. sphaerotus* in the treatment of *Aster* for the Flora of China (Chen et al. 2011, following Ling 1985) and their geographical distributions as summarized in FOC are overlapping. The type of *Aster sphaerotus* has a different aspect, perhaps in part because of anthocyanin development (Fig. 4), but it is within the morphological range of *A. panduratus/auriculatus*. Observations here do not corroborate putative distinctions in involucre and achene size between *A. sphaerotus* and the others (see details with ruler in Figs. 10, 11, and 19). These taxa were separated in the FOC by contrasts in the key below.

- a. Phyllaries 2–3-seriate, subequal, outer usually leaflike; rays white *Aster auriculatus*
- a. Phyllaries 3–4 seriate, unequal, leaflike in upper part; rays blue or purple.
 - b. Involucres 7–8(–10) mm; achenes 2.7 mm or more *Aster sphaerotus*
 - b. Involucres ca. 5 mm; achenes ca. 1.5 mm *Aster panduratus*

Among these three (and other synonyms), only a single, widespread species is recognized here, with variability shown in Figs. 6-18.

4. *Metamyriactis veitchiana* (Hutch. & Drummond ex Zhang & Gao) Nesom, **comb. nov.** *Aster veitchianus* Hutch. & Drummond ex Zhang & Gao, *Phytotaxa* 152: 53. 2013. **TYPE: CHINA. Sichuan.** Mt. E'mei, Qingyingge, 950 m, 8 Jun 1933, X.B. Peng 6049 (holotype: PE, image in Zhang et al. 2013; isotype: IBK image, Fig. 20). See Zhang et al. (2013) for detailed comments on nomenclature. Figs. 19-21.

5. *Metamyriactis nigromontana* (Dunn) Nesom, **comb. nov.** *Aster nigromontanus* Dunn, J. Linn. Soc., Bot. 35: 501. 1903. **TYPE: CHINA. Yunnan.** Mengtze, N Mts, 8000 ft, A. Henry 11302 (holotype: K presumably, not seen; isotypes: E image-Fig. 22, MO image). **Protologue:** "Obtained by Henry's native collector Ho on the summit of Great Black Mountain at 8000 ft. near Mengtze." Figs. 23-24.

6. *Metamyriactis sikkimensis* (Hook. f.) Nesom, **comb. nov.** *Aster sikkimensis* Hook. f., Curtis's Bot. Mag. 77: t. 4557. 1851. **LECTOTYPE** (designated here): **INDIA. Sikkim.** Singalelah, [ca. 21 May 1848, fide Hooker's Himalayan Journal], J.D. Hooker s.n. (K 102210 image, Fig. 24; possible isolectotypes: E, BM, K-many, L, M, MPU, P-2 sheets — images of all). All of the sheets distributed outside of K have the printed label with only Sikkim as locality, but Hooker collected the species at "Chola, 9000 ft" and Lachoong, 10,000 ft" (see Fig. 25) as well as at Singalelah (the lectotype), so the provenance of the "possible isolectotypes" is unknown. Figs. 25-29.

In the Flora of British India, J.D. Hooker (1881) attributed authorship of the species to "Hook. f. & Thoms.," crediting himself and his Himalayan collecting companion, but there is no mention of Thomson

in the protologue and "W.J.H." (W.J. Hooker) is credited as supplying the protologue's technical description. The protologue, written by John Smith (except for Hooker's description), notes that plants were "Raised from seeds sent by Dr. Hooker to the Royal Gardens of Kew from the alpine regions of Sikkim." Grierson (1964) cited cultivated specimens ("Hort. Kew, 1851, (syntype K, E)), but images of these apparently are not online and, although no collections were cited in the protologue, it is assumed here that Hooker intended his Sikkim collections as type material. It is assumed here, but not with certainty, that Smith's attribution of the protologue description to W.J. Hooker rather than to J.D. Hooker was in error.

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Figure 1. *Metamyriactis pycnophylla*. Yunnan, holotype (E).



Figure 2. *Metamyriactis pycnophylla*. Along the Myanmar-Yunnan border, Collector 1346 (E).



Figure 3. *Metamyriactis pycnophylla*. Yunnan, McLarin 235 (E).



Figure 4. *Metamyriactis pycnophylla*. Yunnan, Rock 7615 (US).



Figure 5. *Metamyriactis pycnophylla*. Yunnan, Forrest 16108 (E).



Figure 6. *Metamyriactis helenae*. Myanmar, holotype (NY).



Figure 7. *Metamyriactis pandurata*. HongKong Herbarium <<https://www.herbarium.gov.hk/>>



Figure 8. *Metamyriactis pandurata*. HongKong Herbarium <<https://www.herbarium.gov.hk/>>



Figure 9. *Metamyriactis pandurata*. Photo by 翁明毅, 2012, "Leaves of Flora in Taiwan" folder, Flickr.



Figure 10. *Metamyriactis pandurata*. Guangxi, isolectotype of *Erigeron panduratus*, Chung 83430 (A).



Figure 11. *Metamyriactis pandurata*. Yunnan, Rock 9038 (US).



Figure 12. *Metamyriactis pandurata*. Zhejiang, Ching 9087 (US).



Figure 13. *Metamyriactis pandurata*. Guangdong, Hu 5684 (US).

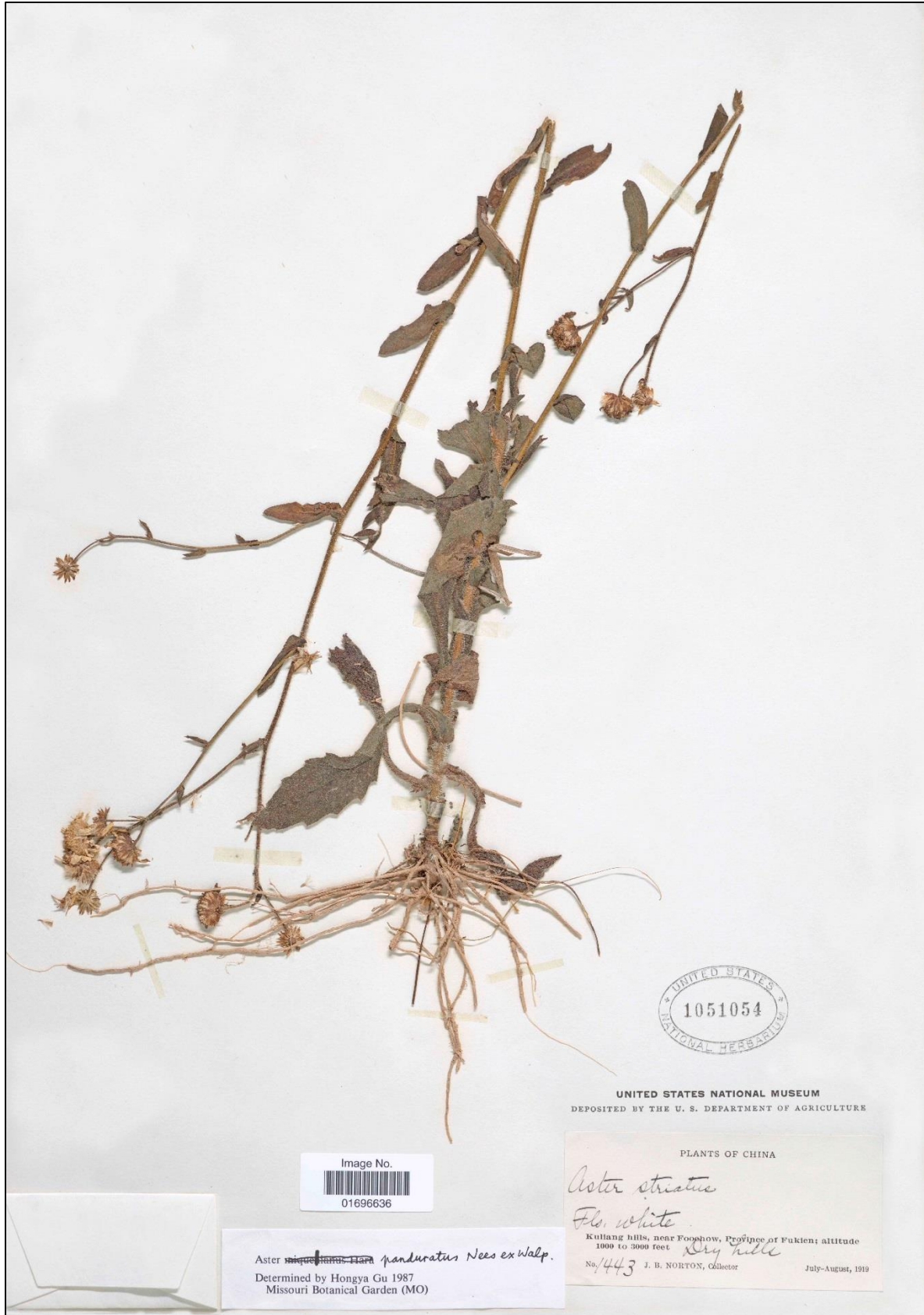


Figure 14 *Metamyriactis pandurata*. Fujian, Norton 1443 (US).



Figure 15. *Metamyriactis pandurata*. Yunnan, Yu 19116 (E).



Figure 16. *Metamyriactis pandurata*. Yunnan, Sino-British Expedition 1136 (E).



Figure 17. *Metamyriactis pandurata*. Guizhou, Teng 90337 (L).



Figure 18. *Metamyriactis pandurata*. Guangdong, Hu 12227 (US).



Figure 19. *Metamyriactis pandurata*. Yunnan, Henry 9445A (US).

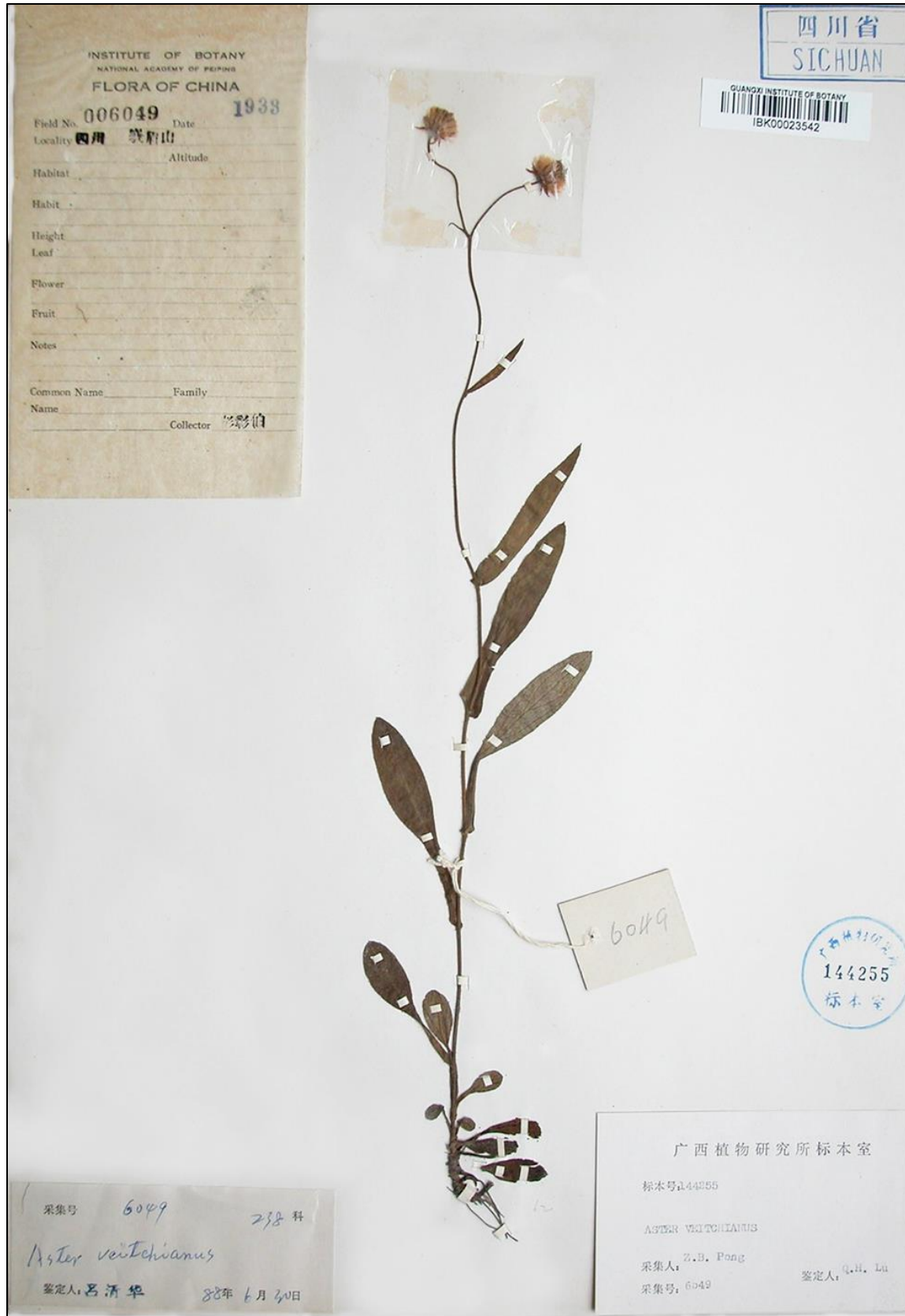


Figure 20. *Metamyriactis veitchiana*. Sichuan, isotype of *Aster veitchianus* (IBK).



Figure 21. *Metamyriactis veitchiana*. Sichuan, Yang 54953 (IBSC).

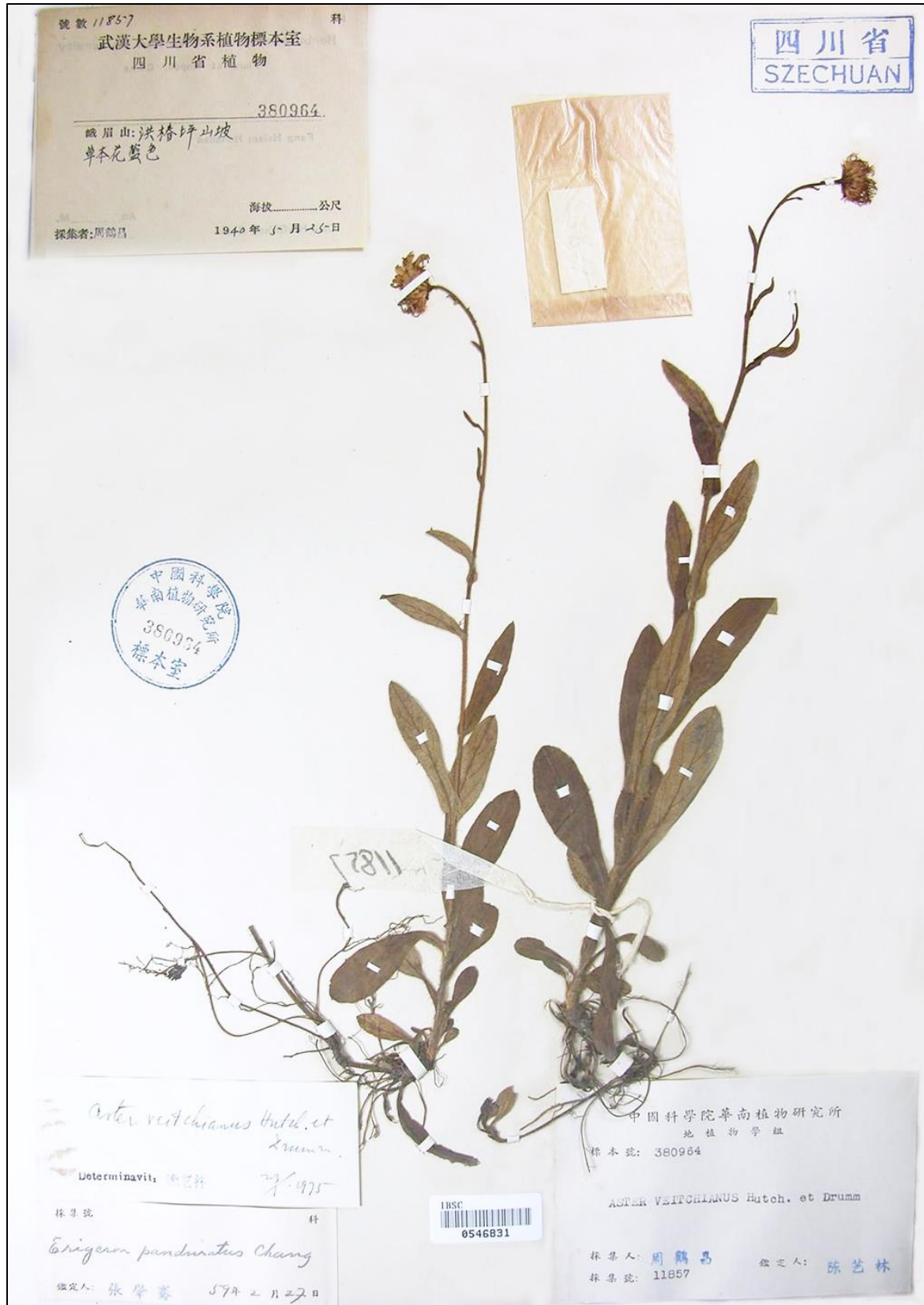


Figure 22. *Metamyriactis veitchiana*. Sichuan, Fang 11857 (IBSC).



Figure 23. *Metamyriactis nigromontana*. Yunnan, isotype (E).

Figure 24. *Metamyriactis nigromontana*. Yunnan (PE).



Figure 25. *Metamyriactis sikkimensis*. Sikkim, lectotype (K).



Figure 26. *Metamyriactis sikkimensis*. Sikkim (Lachoong, right; Chola, left), Hooker s.n. (K).



Figure 27. *Metamyriactis sikkimensis*. Sikkim (sw of Lachung), Ribu & Rhomoo 6711 (E).



Figure 28. *Metamyriactis sikkimensis*. Langtang, Sikkim. Photo by David Ritscher, Oct 2019, iNaturalist.



Figure 29. *Metamyriactis sikkimensis*. Langtang, Sikkim. Photo by David Ritscher, 16 Oct 2019, iNaturalist.



Figure 30. *Aster alatipes*. Holotype (K).



Figure 31. *Aster alatipes*. Isotype (GH).



Figure 32. *Aster alatipes*. From the holotype.