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NEW GENERA FROM ASIAN *ASTER* (ASTERACEAE: ASTEREAE)

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ABSTRACT

Four new genera of Astereae subtribe Asterinae are described, based on species segegated from southeast Asian *Aster*. **Geothamnus** Nesom, **gen. nov.**, includes the single species ***Geothamnus batangensis*** (Bureau & Franch.) Nesom, **comb. nov. Iteroloba** Nesom, **gen. nov.**, includes the single species ***Iteroloba bipinnatisecta*** (Ludlow ex Grierson) Nesom, **comb. nov. Sinosidus** Nesom, **gen. nov.**, includes ***Sinosidus albescens*** (DC.) Nesom, **comb. nov.** (incl. 10 varieties), ***Sinosidus argyropholis*** (Hand.-Mazz.) Nesom, **comb. nov.**, ***Sinosidus fulgidulus*** (Grierson) Nesom, **comb. nov.**, ***Sinosidus hypoleucus*** (Hand.-Mazz.) Nesom, **comb. nov.**, ***Sinosidus lavandulifolius*** (Hand.-Mazz.) Nesom, **comb. nov.**, ***Sinosidus motuoensis*** (Y.L. Chen) Nesom, **comb. nov.**, ***Sinosidus paradoxus*** (Y. Ling) Nesom, **comb. et stat. nov.**, and ***Sinosidus polius*** (C.K. Schneid.) Nesom, **comb. nov. Griersonia** Nesom, **gen. nov.**, includes ***Griersonia fuscescens*** (Bureau & Franchet) Nesom, **comb. nov.**, ***Griersonia oblongifolia*** (Grierson) Nesom, **comb. nov.**, and ***Griersonia senecioides*** (Franch.) Nesom, **comb. nov.** Formal typification/synonymy and illustrations are provided. Lectotypes are designated for *Amphirhapis albescens*, *Aster lavandulifolius*, and *Aster staticifolius*.

Molecular-phylogenetic data and morphology indicate that various species of southeast Asian *Aster* are outside the bounds of those currently to be treated as *Aster* sensu stricto (summaries in Nesom 2020a, 2020b). Of the four new genera described here, the segregation of three is supported by molecular and morphological data; the fourth (*Iteroloba*) has not been sampled molecularly and its recognition is based on its morphological isolation.

GEOTHAMNUS Nesom, **gen. nov. TYPE:** *Geothamnus batangensis* Nesom

Distinct in its low, caespitose habit from a woody taproot and subterranean, branching caudex, glandular stems and punctate leaf surfaces, leaves basal and lower cauline, solitary heads on subscapose stems, phyllaries relatively few, essentially linear, evenly thin-herbaceous, and equal-length, and thick-ribbed achenes with a multiseriate pappus of clavate-tipped bristles.

Geothamnus batangensis (Bureau & Franch.) Nesom, **comb. nov.** *Aster batangensis* Bureau & Franch., J. Bot. (Morot) 5: 50. 1891. **TYPE**: **CHINA**. **Sichuan**. "Se-Tchuen, entre Batang et Litang, 14 Jun 1890, *P.G.E. Bonvalot s.n.* with Prince Henri d'Orléans (holotype: P 00711628 image!; isotypes: P-2 sheets images!). Protologue: "Sur les montagnes entre Batang et Litang."

Aster staticifolius Franch. [as "staticefolius"], J. Bot. (Morot) 10: 370. 1896. *Aster batangensis* var. *staticifolius* (Franch.) Y. Ling, Fl. Reipubl. Popularis Sin. 74: 253. 1985. **LECTOTYPE** (designated here): **CHINA**. **Yunnan**. Les roches calcaires au dessus du Col de Yen-tze-hay (Lankong), 3500 m, 8 Jul 1886, *J.M. Delavay 157* (P 00711766 image!, photo-E!; isolectotypes: K-Fig. 2, P 0071165, A-photo and fragment of P 0071175).

Protologue: "Likiang ad rupes sub nivibus perpetuis (Delavay, n. 157); Hokin, supra collum Koua-la-po, alt. 3200 m (id.); ad collum Yen-tze-hay, (id.)." Other syntypes are at P: *Delavay*, 13 Jul 1886 (P 00711762); *Delavay*, 18 Sep 1883 (P 00711764); *Delavay*, 9 Jul 1884 (P 00711768)

Low subshrubs to perennial caespitose herbs from a woody taproot and branching caudex with rhizome-like branches; stems, peduncles, leaves, and involucres stipitate- or punctate-glandular. **Stems** scapiform, 3–15 cm tall, stipitate-glandular and strigose-hirsute. **Leaves** basal and lower cauline, obovate to oblanceolate, reduced to bracts on the distal half of the stem, margins entire, surfaces weakly punctate-

glandular, otherwise glabrate to sparsely hirsute-strigose. **Heads** terminal, solitary. **Involucres** broadly campanulate, 10–15 mm wide (pressed); epaleate; phyllaries in (1–)2(–3) subequal series, narrowly oblong-lanceolate to elliptic-lanceolate, loose and spreading, evenly thin-herbaceous, inner scarious and sometimes with a green apical patch, minutely stipitate glandular, otherwise glabrous to hirsute-strigose. **Ray florets** 12–26, ligules 12–22 mm long, purple to lavender-blue, not coiling. **Disk flowers** bisexual, fertile, corollas narrowly funnelform, 3.2–3.5 mm, lobes deltate-triangular, equal-length; anther thecae without tails, apical appendages broadly lanceolate and prominent. **Achenes** narrowly obovoid, compressed, 3.5–4 mm long, strigose-sericeous, eglandular, each margin and one of the faces with a thickened rib; pappus multiseriate, outermost series of short scales, inner of coarsely barbellate bristles 2–3 mm increasing in length to 5–5.5 mm, innermost weakly clavate at the apex.

Forest and thicket margins, openings in oak-spruce and spruce-fir forests, meadows, gravelly, stony, or scree slopes, cliff faces and ledges, stream banks and around seepages and streamlets, grazed pastures with juniper; 2500–4600 m. Southwestern and western Sichuan, eastern Xizang, northwestern Yunnan (mostly from Flora of China).

Geothamnus batangensis (as *Aster*) keys in the Flora of China (Chen et al. 2011) with *Aster* sect. *Alpigeni* because of its basal rosette, solitary heads on scapose stems, and equal-length phyllaries, but it differs from all of these species in its taprooted habit, without stolons or rhizomes but becoming caespitose through woody, rhizome-like caudex branches. Secondary growth of the caudex branches sometimes is pronounced, sometimes to the point of a cork-like outer layer and such features suggest that the ancestry of *G. batangensis* is with shrubby species. In combination with its solitary heads, glandular vestiture, and multiseriate pappus, this species is isolated among Asian Astereae and is segregated here at generic rank. Phylogenetic analyses based on molecular data (e.g., Li et al. 2012; Fu et al. 2019) show it in an unresolved position among species and species groups, apparently near *Myriactis*, placed by Nesom (2020a, 2020b) in the Asterothamnus branch of subtribe Asterinae.

Aster staticifolius was described by Franchet as differing from *Aster batangensis* in its less densely hairy stems, leaves, and phyllaries; Chen et al. (2011) recognized it at varietal rank, emphasizing the vestiture, but the two varieties as so identified are more or less congruent in geography and it seems likely that the variation in vestiture is populational rather than marking distinct evolutionary entities.

Figure 1. *Geothamnus batangensis*. Detail from *Delavay s.n.* (P 711762, syntype of *Aster staticifolius*)

Figure 2. *Geothamnus batangensis*. *Delavay 157* (K [ex P], isolectotype of *Aster staticifolius*).

Figure 3. *Geothamnus batangensis*. Sichaun, *Rock 17844* (US).

Figure 4. *Geothamnus batangensis*. Sichuan, *Kunming & Edinburgh Exped. 217* (E).

Figure 5. *Geothamnus batangensis*. Top and bottom: Sichuan, 15 July 2004. Photographs by Dave Boufford.

ITEROLOBA Nesom, **gen. nov.** **TYPE**: *Iteroloba bipinnatisecta* (Ludlow ex Grierson) Nesom

Distinct among Asian species in its low, perennial habit from a short, thick, woody taproot, basal rosette of bipinnatisect leaves, solitary heads on leafy stems, scarious phyllaries in 2(–3) series of equal length, bisexual disc flowers, and small achenes.

Iteroloba bipinnatisecta (Ludlow ex Grierson) Nesom, **comb. nov.** *Aster bipinnatisectus* Ludlow ex Grierson, Notes Roy. Bot. Gard. Edinb. 26: 144. 1964. **TYPE**: **CHINA**. **Xizang** (Tibet Autonomous Region). Xoka, "SE Tibet, Kongbo, Shoga Kong, 30° 00' N, 93° 48' E, rock faces, 10,500 ft," 20 Jul 1947, *F. Ludlow, G. Sherriff, and H.H. Elliot 14164* (holotype: BM, Figs. 1-4).

Perennial herbs from a thick, woody taproot, stem and leaves sparsely but prominently villous with loose white hairs 1–2 mm long, eglandular. **Stems** 2–8 cm tall, unbranched, arising from the multicipital caudex or very short caudex branches. **Leaves** basal and cauline, bipinnatisect, primary lobes 3–5 pairs, each with 3–8 pairs of linear, apiculate-tipped secondary segments 1–3 cm long; basal dense, blades 1–2 cm long, with a narrow petiole 1–2 cm long, base of petiolate dilated and clasping, old leaf bases and petioles persisting; cauline bipinnatisect but epetiolate and diminishing in size from the basal, continuing nearly to the heads. **Heads** solitary on leafy stems. **Involucres** 12–15 mm wide (pressed); phyllaries in 2(–3) series of equal length, linear-oblong to linear-oblanceolate or -lanceolate, thin, proximally stramineous with scarious margins, herbaceous and sometimes purplish on distal half, villous, eglandular. **Ray flowers** 20–35, tube 2.5–3 mm long, ligules 13–15 mm long, ca. 2 mm wide, "very pale mauve" (pale purple with a gray tint), not coiling. **Disc flowers** apparently bisexual and fertile, yellow, corollas narrowly funnelform-tubular, 5.5–6 mm long, lobes deltate-triangular, 1 mm long. **Achenes** ca. 1.5 mm long; pappus of slender, barbellate, acute-tipped bristles in 2 series, inner about as long as the disc corollas, outer ca. 1 mm long.

Apparently known only from the type collection.

As noted by Chen et al. (2011) these plants are distinct among Asian *Aster* in their repeatedly divided leaves in rosettes at the base of woody stems. The isolated position of *Iteroloba bipinnatisecta* shown in the phylogenetic arrangement of the subtribe (Fig. 1 in Nesom 2020a, 2020b) is speculative, even its placement as a member of subtribe Asterinae.

The mostly scarious phyllaries and the small achenes of *Iteroloba bipinnatisecta* are similar to those of *Erigeron*, but native Eurasian erigerons are relatively uniform in habit — with oblanceolate leaves often in a rosette from a fibrous-rooted rhizome — and probably are derived from a single (North American) lineage (e.g., Huber & Nilsson 1995; Farhani 2018). The short, thick, woody, taproot of *I. bipinnatisecta* is anomalous among Eurasian *Erigeron* — it suggests that the relationship of *Iteroloba* might be closer to *Psychrogeton* (Asterinae), which also is woody-taprooted with a basal rosette and solitary heads (although *Psychrogeton* characteristially has undivided leaves and functionally staminate disc flowers). Plants of *Chlamydites* also are monocephalous and produce a branching system of rhizomes but they apparently are not taprooted. For an alternative hypothesis evolutionarily and geographically further out, perhaps the ancestor of *Iteroloba* is from subtr. Brachyscominae.

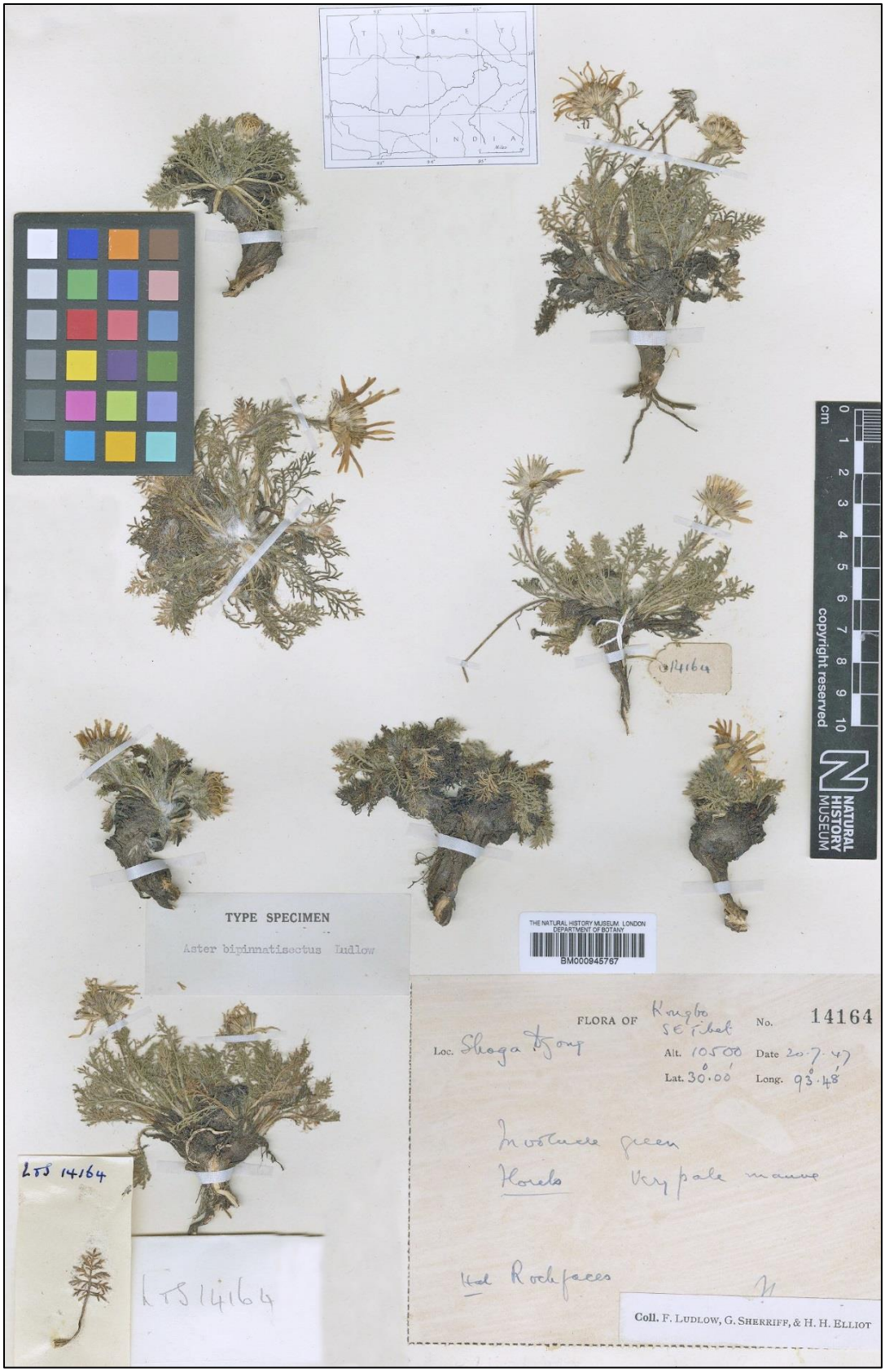

Figure 1. *Iteroloba bipinnatisecta*, holotype.

Figure 2. *Iteroloba bipinnatisecta*, single plant from holotype.

Figure 3. *Iteroloba bipinnatisecta*, details from holotype

Figure 4. *Iteroloba bipinnatisecta*, detail from holotype. Flat, epaleate receptacle and narrow, mostly scarious phyllaries in 2(–3) series of equal length.

SINOSIDUS Nesom, **gen. nov.** **TYPE:** *Sinosidus albescens* (DC.) Nesom
Aster ser. *Albescentes* Y. Ling, Fl. Reipubl. Popularis Sin. 74: 357, 179. 1985.

Distinct in their shrubby habit, leaves often closely gray- to white-tomentose abaxially and often sessile-glandular, relatively small, few-rayed heads in corymbs, keeled phyllaries in 4–5 strongly graduate series, and terete, multi-nerved achenes with apically clavate pappus bristles.

Shrubs. **Stems** many-branched, 0.2–3(–4) m. **Leaves** cauline, sessile to short-petiolate, blades broadly ovate to elliptic, oblong, lanceolate, or linear 0.5–8(–20) cm long, margins flat to revolute, entire to remotely apiculate, serrulate, or coarsely serrate, closely gray- to white-tomentose abaxially or sometimes glabrous, sometimes glandular beneath the tomentum with sessile, resinous glands, venation camptodromous to subbrochidodromous. **Heads** in terminal, corymboid clusters, the clusters often compound (clusters of clusters), heads rarely few or solitary (*S. polius*, *S. hypoleucus*), peduncles bracteate 5–50 mm long. **Involucres** campanulate to cylindric, 5–9 mm wide (pressed); phyllaries in 4–5 strongly graduate series, ovate-lanceolate to lanceolate, keeled (midvein distally swollen), outer distally green, proximally stramineous, margins scarious; receptacles epaleate. **Ray flowers** (4–)8–25, ligules 2–7 mm long, white to pale violet, pink, or purple, not coiling. **Disk flowers** bisexual, fertile, 4–6 mm long, lobes triangular, 1–2 mm long and recurving-coiling or sometimes shorter and somewhat erect, eglandular or glandular; anther thecae without tails. **Achenes** fusiform to narrowly obovoid, terete to slightly compressed, 1.5–3 mm long, 4–8-nerved, glabrate to short-strigose, eglandular or minutely glandular, the glands caducous but visible at least before fruit maturity; pappus of barbellate bristles, inner half the length to as long as the disc corollas, innermost with clavate tips, outer of setae 0.2–1 mm long.

The genus *Amphirhapis* was established by deCandolle (1836), with no type cited, as comprising six species — *A. albescens*, *A. cuspidata*, *A. heterotricha*, *A. peduncularis*, *A. pubescens*, and *A. rubricaulis*. *Amphirhapis albescens* (with "Wall. cat. n. 2974. comp. n. 84") cited in synonymy, was transferred to *Aster* by Handel-Mazetti in 1938 as *Aster albescens* (DC.) Wall. ex Hand.-Mazz. Nees in 1832 had earlier described *Aster peduncularis* Wall. ex Nees, the same species as de Candolle's *Amphirhapis peduncularis* and based on the same Wallich collection — now treated as *Cordiofontis peduncularis* (Nees) Nesom. Jeffrey (1982), however, typified *Amphirhapis* with *A. heterotricha* DC., synonym of a species now treated in the genus *Duhaldea* of the Inuleae (Anderberg 1991).

Recognition of these species at generic rank was suggested by Nesom (1994), based on morphology. Molecular-phylogenetic analyses (Li et al. 2012; Zhang et al. 2015; Fu et al. 2019) indicate that they comprise a monophyletic group in the Psychrogeton branch of Asterinae (Nesom 2020a, 2020b).

The species of *Sinosidus* vary greatly among themselves in leaf morphology. Formally described variants of *S. albescens* need taxonomic study, as does the whole genus.

1. **Sinosidus albescens** (DC.) Nesom, **comb. nov.** *Amphirhapis albescens* DC., Prodr. 5: 343. 1836. *Microglossa albescens* (DC.) C.B. Clarke, Comp. Ind., 59. 1876. *Aster albescens* (DC.) Wall. ex Hand.-Mazz., Acta Horti Gothob. 12: 205. 1938. **LECTOTYPE** (designated here): **NEPAL**. "In Nepalia ad Kamaon et Gossain-Than, in Hb. 1824, N. *Wallich 2974/84* (K-Wallich). DeCandolle also cited *Wallich 3066/176*, identified by Wallich as "Solidago salicifolia" but also a collection of *Sinosidus albescens*.

   Aster albescens is "a variable complex of intergrading populations of shrubs that extend from the western Himalaya to central and south-central China. Ten varietal names have been assigned to segregates of this complex in China, based primarily on pubescence, gland characters, and size of the leaves, and pubescence and shape of the involucres" (Boufford & Chen 2009). Ten infraspecific taxa are recognized in the recent Flora of China treatment (Chen et al. 2011) — no attempt is made here to evaluate their evolutionary validity.

a. **Sinosidus albescens** var. **albescens** *Aster albescens* var. *albescens*

b. **Sinosidus albescens** var. **discolor** (Y. Ling) Nesom, **comb. nov.** *Aster albescens* var. *discolor* Y. Ling, Fl. Reipubl. Popularis Sin. 74: 358. 1985. **TYPE**: **Sichuan**. *Wang 7896*.

c. **Sinosidus albescens** var. **glandulosus** (Hand.-Mazz.) Nesom, **comb. nov.** *Aster albescens* var. *glandulosus* Hand.-Mazz., J. Bot. (Morot) 76: 284. 1938. **TYPE**: **Xizang**. *Chamdo 10752*.

d. **Sinosidus albescens** var. **gracilior** (Hand.-Mazz.) Nesom, **comb. nov.** *Aster albescens* var. *gracilior* (Hand.-Mazz.) Hand.-Mazz., Acta Horti Gothob. 12: 206. 1938. *Aster limprichtii* var. *gracilior* Hand.-Mazz., Symb. Sin. 7: 1093. 1936. **TYPE**: **Sichuan**. *Handel-Mazzetti 7350*.

e. **Sinosidus albescens** var. **glabratus** (Diels) Nesom, **comb. nov.** *Aster albescens* var. *glabratus* (Diels) Boufford & Y.S. Chen, Harvard Pap. Bot. 14: 43. 2009. *Aster harrowianus* var. *glabratus* Diels, Notes Roy Bot. Gard. Edinb. 5: 184. 1912. **TYPE**: **Yunnan**. *Forrest 2508*. Synonym: *Aster albescens* var. *levissimus* Hand.-Mazz.

f. **Sinosidus albescens** var. **limprichtii** (Diels) Nesom, **comb. nov.** *Aster albescens* var. *limprichtii* (Diels) Hand.-Mazz., Acta Horti Gothob. 12: 206. 1938. *Aster limprichtii* Diels, Repert. Spec. Nov. Regni Veg. Beih. 12: 503. 1922. **TYPE**: **Xizang**. *Limpricht 2226*.

g. **Sinosidus albescens** var. **megaphyllus** (Y. Ling) Nesom, **comb. nov.** *Aster albescens* var. *megaphyllus* Y. Ling, Fl. Reipubl. Popularis Sin. 74: 358. 1985. **TYPE**: **Sichuan**. *Z. He and Z.L. Zhou 13318*.

h. **Sinosidus albescens** var. **pilosus** (Hand.-Mazz.) Nesom, **comb. nov.** *Aster albescens* var. *pilosus* Hand.-Mazz., Acta Horti Gothob. 12: 207. 1938. **TYPE**: **Yunnan**. *Rock 5164*.

i. **Sinosidus albescens** var. **rugosus** (Y. Ling) Nesom, **comb. nov.** *Aster albescens* var. *rugosus* Y. Ling, Fl. Reipubl. Popularis Sin. 74: 358. 1985. **TYPE**: **Sichuan**. *Soulie 1893*.

j. **Sinosidus albescens** var. **salignus** (Franch.) Nesom, **comb. nov.** *Aster albescens* var. *salignus* (Franch.) Hand.-Mazz., Acta Horti Gothob. 12: 207. 1938. *Inula cuspidata* var. *saligna* Franch., Nouv. Arch. Mus. Hist. Nat., sér. 2, 10: 37. 1888. **TYPE**: **Xizang**. *J.P.A. David s.n.*

2. **Sinosidus argyropholis** (Hand.-Mazz.) Nesom, **comb. nov.** *Aster argyropholis* Hand.-Mazz., Acta Horti Gothob. 12: 208. 1938. **TYPE**: **CHINA**. **Sichuan**. Szechuan bor., Tatien, frutex fere metralis in declivo aprico, 2 Jul 1922, *H. Smith 2258* (UPS, Fig. 7).

Aster argyropholis var. *niveus* Y. Ling, Fl. Reipubl. Popularis Sin. 74: 358. 1985. **CHINA**: **Sichuan**. Descending to Li-fan Hsien, roadside, 2700 m, 8 Jul 1930, *F.T. Wang 21626* (holotype: PE image, Fig. 8).

Among numerous collections of *Aster argyropholis* (PE), the distinction of var. *niveus* seems arbitrary. *Aster argyropholis* var. *paradoxus* (below) is distinctive and apparently known only from the type collection.

3. **Sinosidus paradoxus** (Y. Ling) Nesom, **comb. et stat. nov.** *Aster argyropholis* var. *paradoxus* Y. Ling, Fl. Reipubl. Popularis Sin. 74: 358. 1985. **CHINA**. **Sichuan**. Ma-er-kang (Barkam) (Marcon), 2700 m, 18 Jul 1951, *C. Li 23091* (holotype: PE image, Fig. 12; isotype: KUN image, Fig. 13).

4. **Sinosidus fulgidulus** (Grierson) Nesom, **comb. nov.** *Aster fulgidulus* Grierson, Notes Roy. Bot. Gard. Edinb. 26: 110. 1964. **TYPE**: **CHINA**. **Xizang**. Southeast Tibet, Tangme, Po Tsangpo-Yirong [confluence], 7000 ft, 3 Jun 1947, *F. Ludlow, G. Sherriff, and H.H. Elliot 13074* (holotype: E image, Fig. 14; isotype: BM).

5. **Sinosidus hypoleucus** (Hand.-Mazz.) Nesom, **comb. nov.** *Aster hypoleucus* Hand.-Mazz., J. Bot. British and Foreign 76: 285. 1938. **TYPE**: **CHINA**. **Xizang**. Kyimdong Dzong, an undershrub

of the hot cliffs, 11,000-12,000 ft, 14 Jul 1935, *F. Kingdon-Ward 11993* (holotype: BM image, Fig. 15).

Wang et al. (2019) have characterized the chloroplast genome of *Sinosidus hypoleucus*.

6. **Sinosidus lavandulifolius** (Hand.-Mazz.) Nesom, **comb. nov.** *Aster lavandulifolius* Hand.-Mazz., Notizbl. Bot. Gart. Berlin-Dahlem. 13: 609. 1937. **LECTOTYPE** (designated here): **CHINA**. **Sichuan**. Plants of the Muli Kingdom, watershed of the Shou-Chu River and Shou-Chu Valley, in dry gorge, 2435-2900 m, Jun 1928, *J.C.F. Rock 16273* (W; isolectotype: US, Fig. 16). The protologue cited duplicates from B and W.

7. **Sinosidus motuoensis** (Y.L. Chen) Nesom, **comb. nov.** *Aster motuoensis* Y.L. Chen, Bull. Bot. Res., Harbin 8: 12. 1988. **TYPE**: **CHINA**. **Xizang**. Motuo, in prato lapidoso secus marginem rivuli, 1100 m, Dec 1982, S.*Z. Cheng & B.S. Li 2181* (holotype: PE, Fig. 17).

8. **Sinosidus polius** (C.K. Schneid.) Nesom, **comb. nov.** *Aster polius* C.K. Schneid. in Sargent, Pl. Wilson. 3: 459. 1917. **TYPE**: **CHINA**. **Sichuan**. Western Szech'uan, near Monkong Ting, valley of Hsiao-chin Ho, 2200-2700 m, Jun 1908, *E.H. Wilson 2233* (holotype: A; isotype: US image, Fig. 18).

Fu et al. (2019) have provided a detailed update on *Aster polius*, with a description, phylogenetic analysis, drawings, and photographs. They note that *Sinosidus polius* is known only from rocky slopes in a restricted area of Xiaojin County, Sichuan.

Figure 1. *Sinosidus albescens*. Sichuan. Photo by Susan Kelley, "Biodiversity of the Hengduan Mountains" website.

Figure 2. *Sinosidus albescens*. Valley of Flowers, Uttarakhand, India. Photo by Thingnam Girija, "Flowers of India" website.

Figure 3. *Sinosidus albescens*. Tibet. Photo by Bruce Bartholomew, "Biodiversity of the Hengduan Mountains" website.

Figure 4. *Sinosidus albescens*. Nepal, *DNEP3 BY4* (E).

Figure 5. *Sinosidus albescens*. Yunnan, *1984 Sino-Amer. Bot. Exped. 1211* (US).

Figure 6. *Sinosidus albescens*. Yunnan, *Rock 5164* (US).

Figure 7. *Sinosidus argyropholis*. Holotype (UPS).

Figure 8. *Sinosidus argyropholis*. Sichuan. Holotype (PE) of *Aster argyropholis* var. *niveus*.

Figure 9. *Sinosidus argyropholis*. Sichuan. *Li Xin 75124* (PE).

Figure 10. *Sinosidus argyropholis*. Sichuan. *Zhao Qingsheng 1569* (PE).

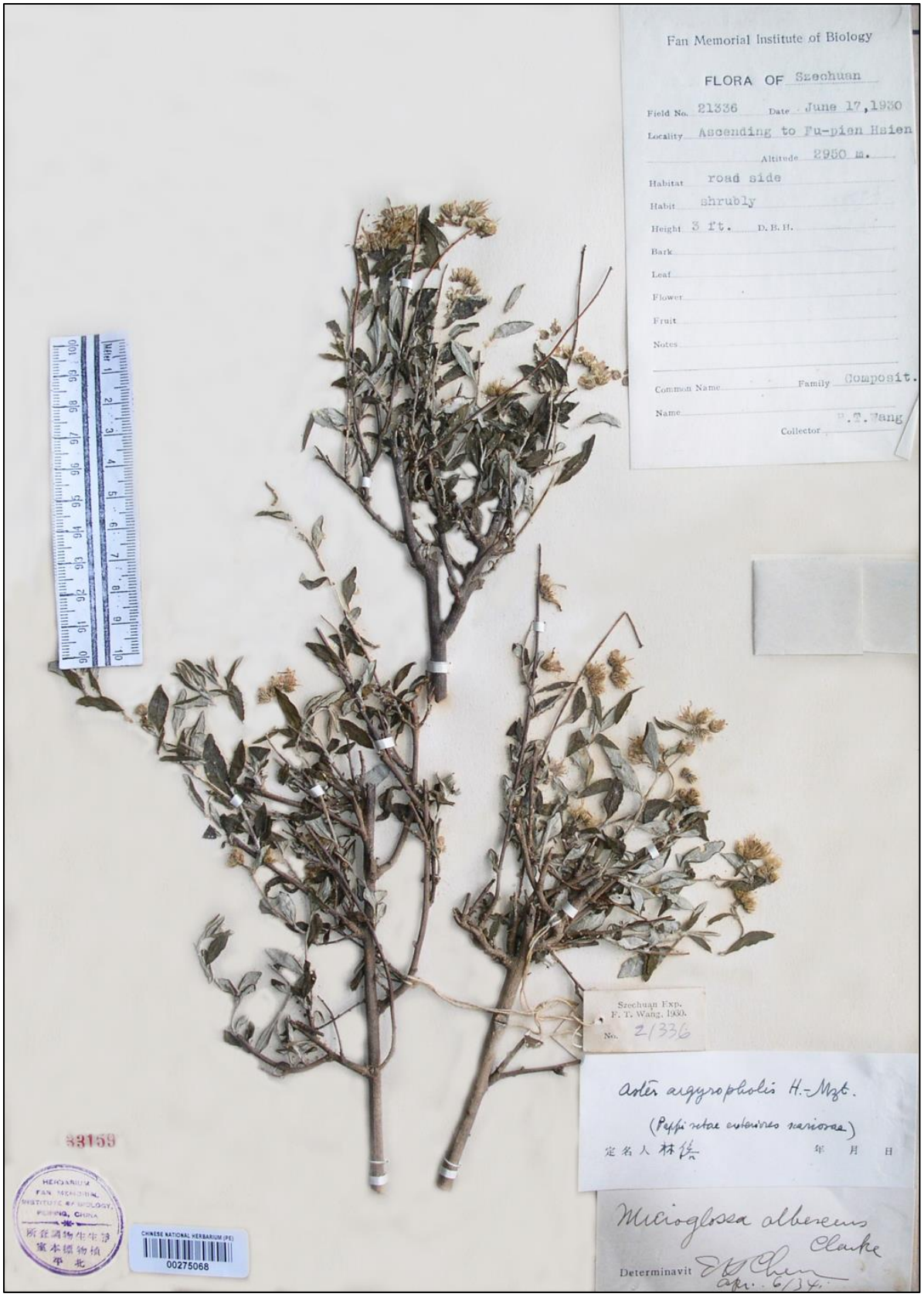

Figure 11. *Sinosidus argyropholis*. Sichuan. *Wang 21336* (PE).

Figure 12. *Sinosidus paradoxus*. Sichuan. Holotype (PE) of *Aster argyropholis* var. *paradoxus*.

Figure 13. *Sinosidus paradoxus*. Sichuan. Isotype (KUN) of *Aster argyropholis* var. *paradoxus*.

Figure 14. *Sinosidus fulgidulus*. Tibet. Holotype (E).

Figure 15. *Sinosidus hypoleucus*. Tibet. Holotype (BM).

Figure 16. *Sinosidus lavandulifolius*. Sichuan. Isolectotype (US).

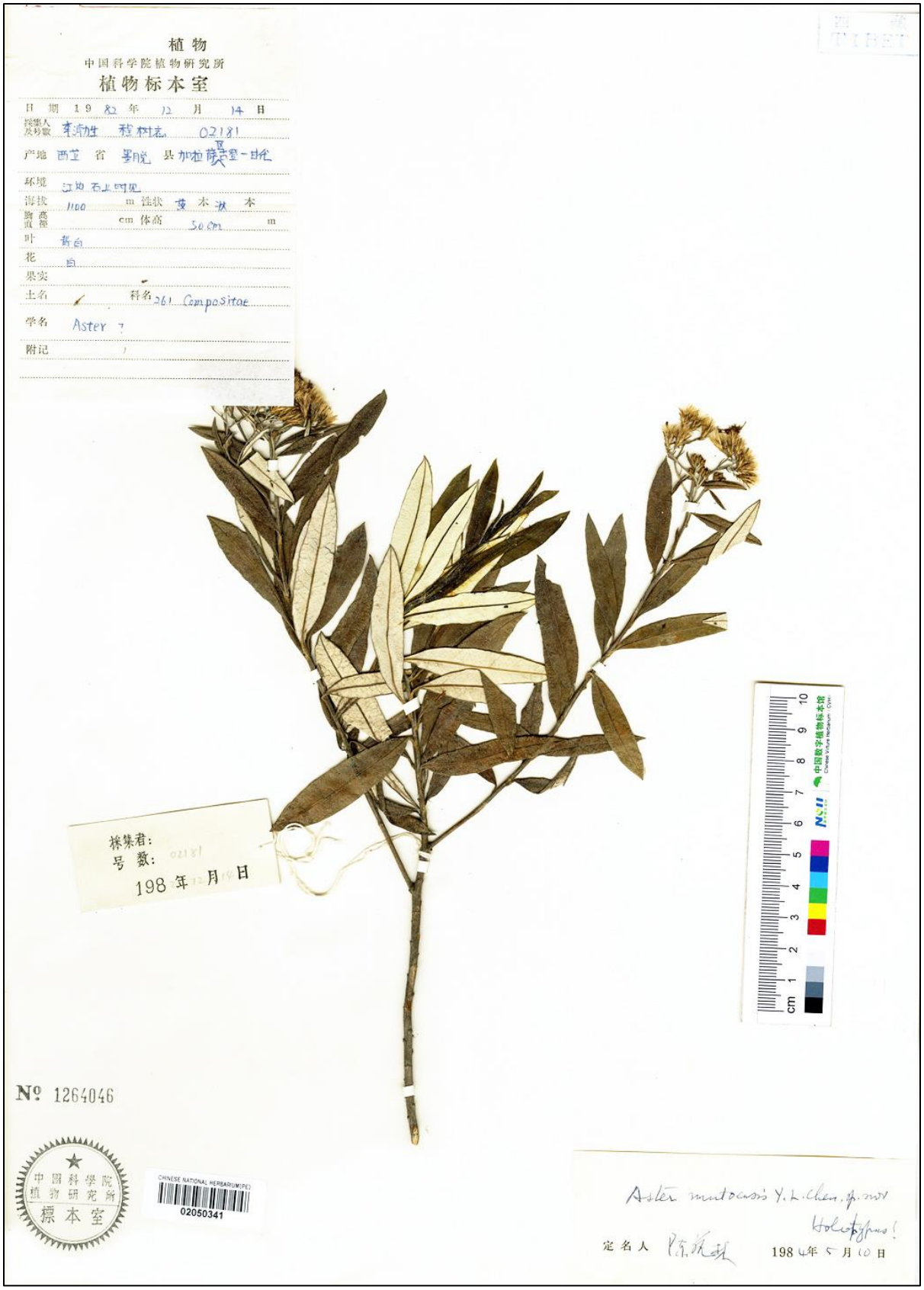

Figure 17. *Sinosidus motuoensis*. Tibet. Holotype (PE).

Figure 18. *Sinosidus polius*. Sichuan. Isotype (US).

GRIERSONIA Nesom, **gen. nov. TYPE:** *Griersonia fuscescens* (Bureau & Franchet) Nesom

Perennial herbs from fibrous-rooted rhizomes; stems, leaves, peduncles, and phyllaries prominently stipitate-glandular, hirsutulous to hirsute or hispidulous-hirsute. **Stems** 15–60 cm. **Leaves** basal and cauline or basal withering by flowering, cauline (basal withered) or mostly basal (cauline reduced in size), blades ovate to elliptic, base rounded or truncate to attenuate, margins shallowly serrate. **Capitula** in dense (*G. fuscescens*) to loose (*G. oblongifolia*, *G. senecioides*) corymbs, peduncles from a region of foreshortened internodes. **Involucres** hemispheric to campanulate, 12–14 cm wide (pressed); phyllaries in 3(–4) equal to subequal series, linear-lanceolate to oblanceolate-oblong, outer green at least distally, inner scarious, apex acute. **Ray florets** 15–25, tube 2–3.5 mm long, ligules purplish to bluish, not reflexing or coiling. **Disk florets** 5–7.5 mm long, lobes ovate to triangular, spreading, sometimes tip recurved. **Achenes** narrowly obovate to oblanceolate, compressed, 3–3.5 mm long, 2–4-nerved (2 lateral nerves and one on each face), strigose, sessile-glandular; pappus 3–4-seriate, longest bristles as long as the disc corollas, clavate-tipped, outer bristles 0.5–1.2 mm long.

The genus is named for A.J.C. Grierson (1929-1990), specialist in Asteraceae at the Royal Botanic Garden Edinburgh from 1951 until his death (see Hedge & Long 1994). He published a revision of *Psychrogeton* and contributed treatments of many genera of Asteraceae for the Flora of Turkey. He was author in 1980 of Compositae in the Revised Handbook to the Flora of Ceylon, made contributions in 1982 to Flora Iranica, and was a major contributor to the the Flora of Bhutan. His study of Himalyayan asters provides baseline information for study of the genus.

1. Leaves cauline (basal withered), blades broadly ovate, base truncate to a narrow petiole; heads 7–35 ..... **Griersonia fuscescens**
1. Leaves mostly basal, cauline reduced in size distally, blades elliptic to elliptic-oblanceolate or elliptic-lanceolate, base attenuate to a petiole or petiolar region or epetiolate; heads 3–12.
   2. Basal leaves with sharply delimited petioles; phyllaries linear-lanceolate ..... **Griersonia oblongifolia**
   2. Basal leaves attenuate to petiolar region; phyllaries oblong-oblanceolate ..... **Griersonia senecioides**

1. Griersonia fuscescens (Bureau & Franchet) Nesom, **comb. nov.** *Aster fuscescens* Bureau & Franchet, J. Bot. (Morot). 5: 49. 1891. **TYPE**: **CHINA**. **Sichuan**. Se-tchuen, environs de Ta-tsien-lou, [1896?], *Prince H. d'Orléans s.n.* (holotype: P image).

Aster doronicifolius H. Lév., Repert. Spec. Nov. Regni Veg. 12: 283. 1913. **TYPE**: **CHINA**. **Yunnan**. "Pâturages du haut plateau de Ta-Hai, 3200 m," Jul 1902, *E.E. Maire s.n.* (holotype: E image, Fig. 4).

Sichuan, Yunnan; 2700–4200 m.

Grierson (1964), followed by Ling (1985) and Chen et al. (2011), included *Aster fuscescens* var. *scaberoides* as part of the species. Especially in phyllary morphology, however, this entity (species) does not appear to belong with the *Griersonia* taxa. Nor does it appear to fit within *Cordiofontis* or *Cardiagyris*, which have cordate-leaved species. Var. *scaberoides* is a distinct entity known from a number of collections in Yunnan.

Aster fuscescens var. *scaberoides* C.C. Chang, Bull. Fan Mem. Inst. Biol., Bot. 6: 46. 1935. **TYPE**: **CHINA**. **Xizang**. SE Tibet, Tsarong, open alpine meadows on the Salwin-Kiu Chiang divide, NW of Si-chi-to, 28° 48'N, 98° 15' E, 14,000 ft, Oct 1922, *G. Forrest 22823* (holotype: K image).

2. Griersonia oblongifolia (Grierson) Nesom, **comb. nov.** *Aster fuscescens* var. *oblongifolius* Grierson, Notes Roy. Bot. Gard. Edinburgh. 26: 93. 1964. **TYPE**: **MYANMAR**. Upper Burma, neighborhood of forest region N of Tahawndam, Upper Adung Valley, on meadow clad scree chutes and in gullies in the forest belt where Picea and Larch appear, 10,000-11,000 ft, 27 Sep 1931, *F. Kingdon-Ward 10127* (holotype: BM, Fig. 7).

Griersonia oblongifolia apparently is known only from two collections, both made by Kingdon-Ward in September 1931. The type is from close to the Tibetan border; the other is from a closely adjacent locality at the border: **CHINA**. **Xizang**: Tibetan side of Namni La Pass, 28° 35' N, 98° E, 3350 m, 3 Sep 1931, *Kingdon-Ward 10025* (BM, as cited by Grierson). Chen et al. (2011) described the geographic distribution based on the two collections cited by Grierson. 3050–3350 m.

3. Griersonia senecioides (Franch.) Nesom, **comb. nov.** *Aster senecioides* Franch., J. Bot. (Morot). 10: 381. 1896. **TYPE**: **CHINA**. **Yunnan**. Collines ombragées au dessus de Ta-pin-tze, 7 Sep 1882, *R.P. Delavay 606* (holotype: P 00711751 image, Fig. 8, typification as indicated by P annotation; isotypes: P-3 sheets images).

Aster senecioides var. *latisquamus* Y. Ling, Fl. Reipubl. Popularis Sin. 74: 360, 252. 1985. **TYPE**: **CHINA**. **Yunnan**. Heqing Xian, Jiangyig, in the forest, 14 Sep 1929, *R.C. Ching 24629* (holotype: PE image).

Southwest Sichuan, north and northwest Yunnan; 2000–3000 m.

Chen et al. (2011) noted that "Two varieties of *Aster senecioides* have been recognized. However, upon examination of specimens, the width of the scarious phyllary margin is identical, and phyllary width and ray floret lamina width overlap significantly."

Figure 1. *Griersonia fuscescens* involucres.

Figure 2. *Griersonia* involucres. Top: *G. oblongifolia* (BM holotype). Bottom: *G. senecioides* (P isotype).

Figure 3. *Griersonia fuscescens*. Yunnan. Cultivated at Edinburgh (E).

Figure 4. *Griersonia fuscescens*. Yunnan. Holotype of *Aster doronicifolius* (E).

Figure 5. *Griersonia fuscescens*. Yunnan. *Rock 9716* (US).

Figure 6. *Griersonia fuscescens.* Yunnan, *Rock 17272* (US).

Figure 7. *Griersonia oblongifolia*. Holotype, BM.

Figure 8. *Griersonia senecioides*. Yunnan. Holotype of *Aster senecioides* (P).

Figure 9. *Griersonia senecioides*. Sichuan. *Rock 18329* (US).

Figure 10. *Griersonia senecioides.* Sichuan. *Boufford et al. 42847* (P).

Figure 11. *Griersonia senecioides.* Yunnan. *1984 Sino-Amer. Bot. Expedition 1467* (US). Showing tendency for peduncles to arise from a region of foreshortened internodes, characteristic of the genus.

Figure 12. *Griersonia senecioides*. Sichuan. A plant from the collection locality of *Bouffourd et al. 42847* of Figure 10.

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