

**Gesneriaceae, pp. 361-448. In:**

**The endemic genera of seed plants of China. Beijing, China:  
Science Press.**

**REFNO: 2562**

**KEYWORDS:**

**Allocheilos, Allostigma, Ancylostemon, Bournea, Briggsiopsis, Calcareoboea, Cathayanthe, China, Chiritopsis, Dayaoshania, Deinocheilos, Didymostigma, Dolicholoma, Endemism, Gyrocheilos, Gyrogyne, Hemiboea, Hemiboeopsis, Isometrum, Lagarosolen, Metabriggsia, Metapetrocosmea, Petrocodon, Primulina, Pseudochirita, Rhabdothamnopsis, Schistolobos, Tengia, Thamnocharis, Tremacron, Whytockia**

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# THE ENDEMIC GENERA OF SEED PLANTS OF CHINA

Tsun-shen Ying, Yu-long Zhang  
and David E. Boufford

A Project Supported by  
the National Natural Science Foundation  
of China



SCIENCE PRESS, Beijing  
1993

### Family 34. Gesneriaceae

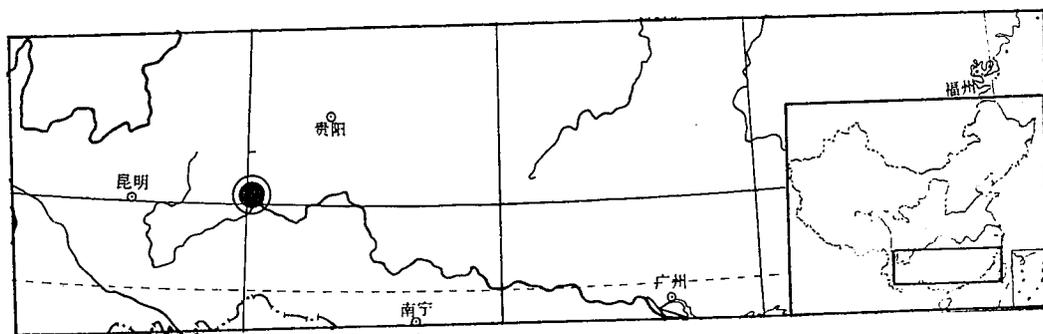
The Gesneriaceae include approximately 140 genera and 2,000 species, mostly distributed in tropical and subtropical regions of the world. In China the family is represented by 56 genera, including 28 endemic genera, and 416 species. The Gesneriaceae are the richest family in number of endemic genera in China.

101. *Allocheilos* W. T. Wang, Acta Phytotax. Sin. 21: 321-324. 1983. Figure 101. Type species: *Allocheilos cortusiflorum* W. T. Wang.

**Description:** Perennial herbs with slender rhizomes. Leaves basal, suborbicular or ovate-orbicular, crenate, upper surface appressed-villose, lower surface densely brown pubescent; petiole complanate; 0.3-4 cm long, villose. Scapes 1-3, sparsely villose. Cymes 2-5 flowered; bracts opposite, linear, puberulous; pedicel glandular pubescent; calyx campanulate, divided to the base, lobes 5, linear-lanceolate, outer surface brown pubescent; corolla funnel-shaped, bilabiate, upper lip undivided, triangular, lower lip 4-lobed, lobes triangular; stamens 2, filaments curved, narrowly linear, inserted on corolla tube near base; anthers coherent, apex of locules confluent; staminodes 2, small; disc annular. Ovary suboblong, densely brown pubescent; placentas 2, parietal, bifid; style 7 mm long, sparsely pubescent; stigma subcapitate. Capsule slender cylindrical, dehiscent. Flowering and fruiting times unknown. Monotypic.

**Ecology:** Unknown.

**Geography:** *Allocheilos* is restricted to Xingyi Xian, Guizhou. Map 101.



Map 101. ● *Allocheilos cortusiflorum* W. T. Wang.

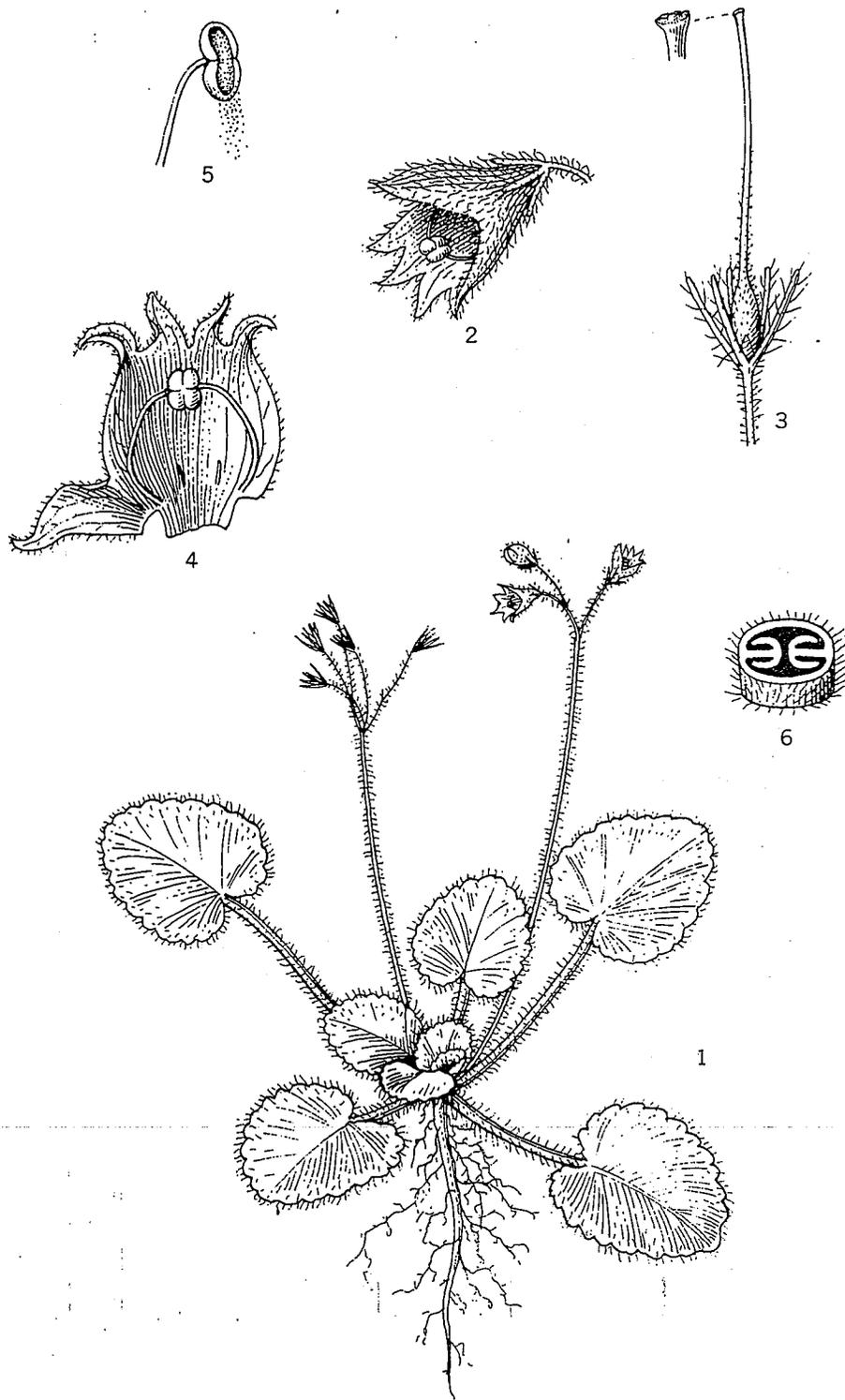


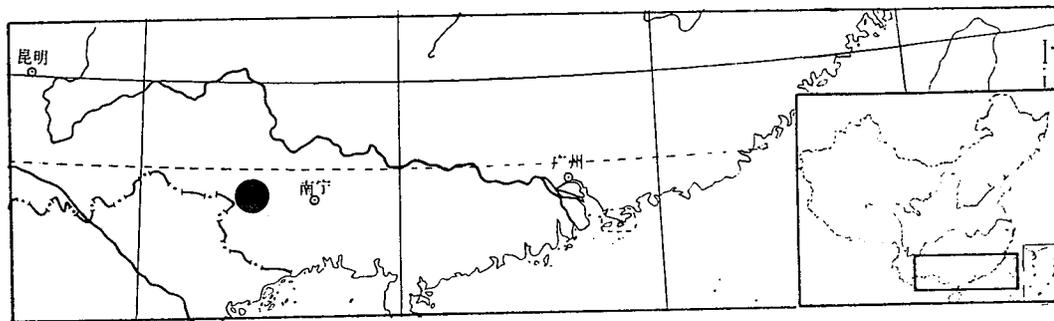
Figure 101. *Allocheilos cortusiflorum* W. T. Wang: 1, habit; 2, flower; 3, calyx and ovary; 4, corolla opened to show stamens and staminodes; 5, stamen; 6, cross section of ovary. (C. Z. Ji)

102. *Allostigma* W. T. Wang, Acta Phytotax. Sin. 22: 185. 1984. Figure 102. Type species:  
*Allostigma guangxiense* W. T. Wang.

**Description:** Perennial herbs. Stems 4-angled, densely pubescent. Leaves opposite, ovate to elliptic, serrate, lower surface densely yellow glandular punctate, both surfaces puberulous; petiolate. Cymes axillary; peduncles 4.5-10 cm long, pubescent; bracts opposite, linear, pubescent; pedicel 4-7 mm long, pubescent; calyx campanulate, 5-parted, lobes linear-lanceolate; corolla lavender, funnel-shaped, bilabiate, upper lip 2-parted, lower lip 3-lobed; stamens 2, inserted at middle of corolla tube; filaments slightly curved, wider at middle; anthers elliptic-globose, basifixed, connate at apex; staminodes 3, glabrous. Disc annular. Ovary linear, 1.2 cm long, puberulous; style puberulous; stigmas 2, unequal, apex subtruncate. Capsule slender cylindrical, puberulous. Seeds dark purple, ellipsoid, smooth. Fl. Sep; fruiting period unknown. Monotypic.

**Ecology:** *Allostigma* grows on limestone pavements; ca. 200 m.

**Geography:** *Allostigma* is restricted to Daxin Xian, Guangxi Province. Map 102.



Map 102. ● *Allostigma guangxiense* W. T. Wang.

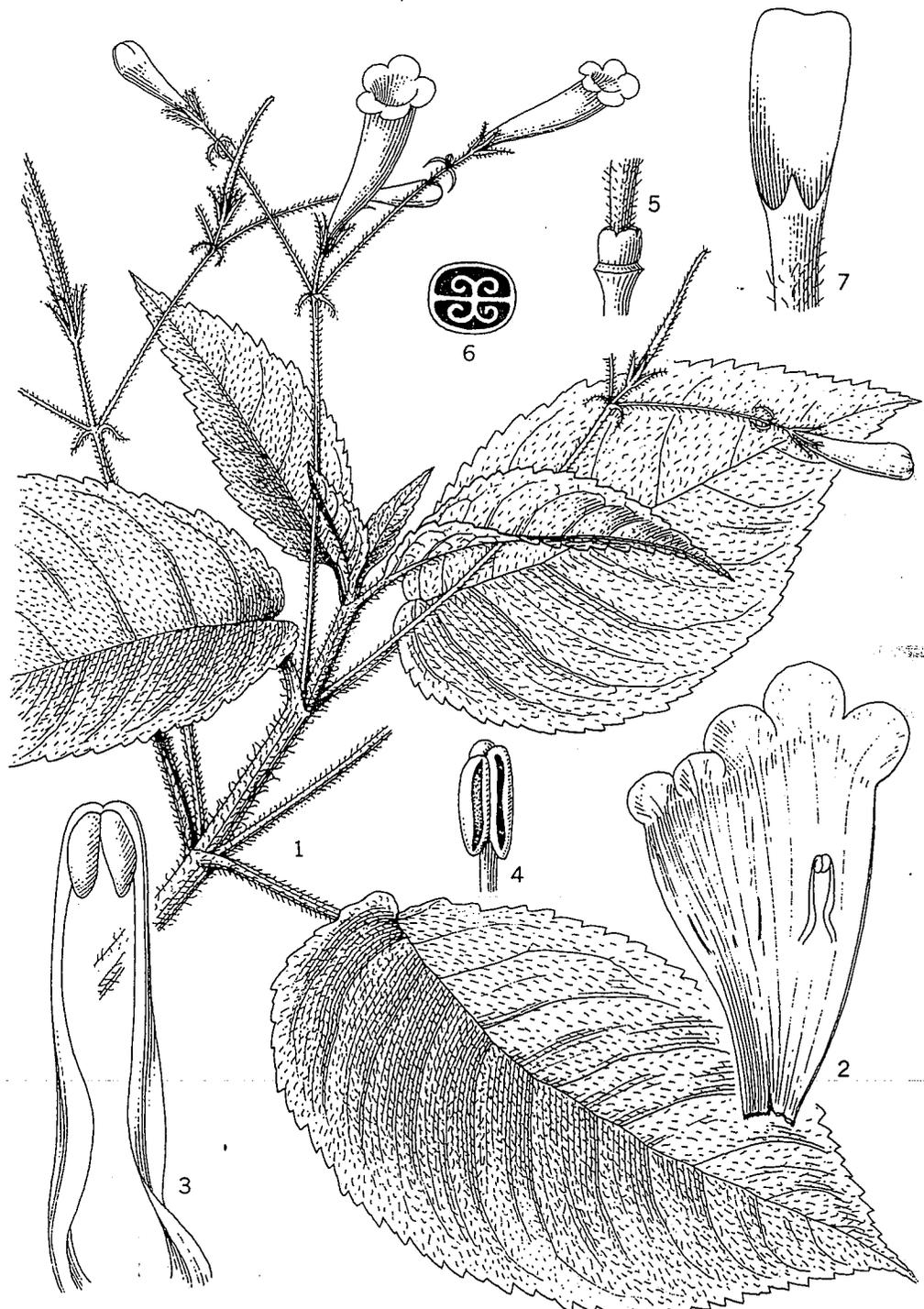


Figure 102. *Allostigma guangxiense* W. T. Wang: 1, upper portion of plant; 2, corolla opened to show stamens and staminodes; 3, stamens; 4, anther, adaxial view; 5, disc and lower portion of pistil; 6, cross section of ovary; 7, stigma. (C. Z. Ji)

103. *Ancylostemon* Craib, Notes Roy. Bot. Gard. Edinburgh 11: 233. 1919. Figure 103.1. Type species: *Ancylostemon concavus* Craib.

**Description:** Perennial herbs. Leaves basal, ovate, elliptic, elliptic-ovate or lanceolate, dentate, crenate or serrulate, pubescent on both surfaces; petiole pubescent. Scapes 1-5, pubescent. Cymes umbelliform, sometimes solitary; bracts linear, villose; calyx puberulous outside, divided to the base or to about the middle, 5-lobed, lobes linear-lanceolate or triangular; corolla purple, reddish-orange or yellow-whitish, tubular, bilabiate, upper lip 2-lobed or undivided, emarginate, lower lip 3- or rarely 5-lobed; stamens 4, glabrous, anthers didymous coherent; disc annular. Ovary superior, glabrous or puberulous; style linear; stigma bifid. Capsule slender cylindrical, glabrous, ca. 5 cm long. Seeds small. Fl. Jul-Aug; fr. Sep-Oct. *Ancylostemon* is a genus of 12 species.

#### Key to species

1. Corolla conspicuously 2-lipped; upper lip shorter than lower lip, emarginate or entire; lower lip pubescent outside.
  2. Flowers 11-15 mm long, yellowish-white; lower stamens exerted ..... 1. *A. humilis* W. T. Wang
  2. Flowers 2.8-3.5 cm long, yellow, orange-red or roseate; all stamens included.
    3. Calyx divided nearly to base, lobes 5, oblong, subentire; upper lip of corolla 2-lobed or 2-parted.
      4. Lower surface of leaves, petiole and peduncle tomentose; leaves oblong, 3-12 cm long; petiole 2.7-8 cm long .... 2. *A. notochlaenus* (H. Léveillé & Vaniot) Craib
      4. Lower surface of leaves, petiole and peduncle pubescent, but not tomentose.
        5. Corolla yellow; leaves ovate to rhomboid-ovate, 1.5-2.5 cm long ..... 3. *A. mairei* (H. Léveillé) Craib
        5. Corolla roseate; leaves narrowly elliptic or elliptic, 2.5-7.5 cm long ..... 4. *A. ronganensis* K. Y. Pan
    3. Calyx 5-parted  $\frac{1}{2}$  to  $\frac{2}{3}$  its length; lobes ovate to ovate-triangular; margin with 2-4 serrulations; upper lip of corolla undivided or 2-lobed.
      6. Pistil glabrous; lower lip of corolla with 3 equal lobes.
        7. Leaves ovate-oblong, rarely widely ovate or obovate, 3.5-14 cm long, base rounded, cordate or cuneate; upper lip of corolla undivided or retuse.
          8. Calyx divided to below middle, lobes ovate-lanceolate; filaments pubescent below middle ..... 5. *A. convexus* Craib
          8. Calyx parted to above middle, lobes triangular-lanceolate; filaments glabrous ..... 6. *A. aureus* (Franchet) Burt & Davidson
        7. Leaves ovate, 2.2-4 cm long, base cuneate; upper lip of corolla 2-lobed ..... 7. *A. gamosepalus* K. Y. Pan
      6. Pistil densely pubescent; lower lip of corolla with 3 unequal lobes ..... 8. *A. saxatilis* (Hemsley) Craib
  1. Corolla slightly 2-lipped, upper and lower lip equal in length; upper lip 2-lobed, lower lip brown hispid-villose outside.
    9. Leaves rhomboid to rhomboid-ovate, 1.5-3 cm long; corolla 4-5 times longer than calyx; lobes of calyx ovate-lanceolate, entire ..... 9. *A. rhombifolius* K. Y. Pan
    9. Leaves ovate to widely ovate 3.5-5.5 cm long; corolla 2-3 times longer than

calyx; lobes of calyx triangular, sometime serrulate.

10. Corolla ca. 2 times longer than calyx ..... 10. *A. vulpinus* Burt  
10. Corolla ca. 3 times longer than calyx ..... 11. *A. trichanthus* Burt & Davidson

An additional species, *Ancylostemon flabellatus* C. Y. Wu ex H. W. Li, could not be included in the key because of the absence of flowers. On vegetative characters it will key most closely to *A. rhombifolius* or *A. mairei*, but differs from them in having distinct, spatulate calyx lobes.

**Pollen:** Pollen grains of *Ancylostemon convexus* are 3-colporoidate, subprolate or prolate, circular-lobate in polar view. Size: P = (22.6-)24.2(-26.1)  $\mu\text{m}$ , E = (20-)22.4(-23.5)  $\mu\text{m}$ . Colpi long and rather narrow; colpus membrane thin, smooth, usually broken. Endoaperture (oroid) very indistinctly delimited. Exine 1.8  $\mu\text{m}$  thick, sexine as thick as nexine, with indistinct columellae (LM), ornate. "Muri" rather thin; "lumina" unequal in size, irregular in shape, sometimes angular. Figure 103.2.

The pollen of *Ancylostemon saxatilis* has been observed also. It differs from the pollen of *A. convexus* in its smaller size and coarser "muri."

**Ecology:** The species of *Ancylostemon* grow in forests, in wet places in fields and on rocks within forests and at forest margins; 1100-3800 m.

**Geography:** The species of *Ancylostemon* are in Gansu, Guizhou, Hubei, Shaanxi, Sichuan and Yunnan provinces. Map 103.

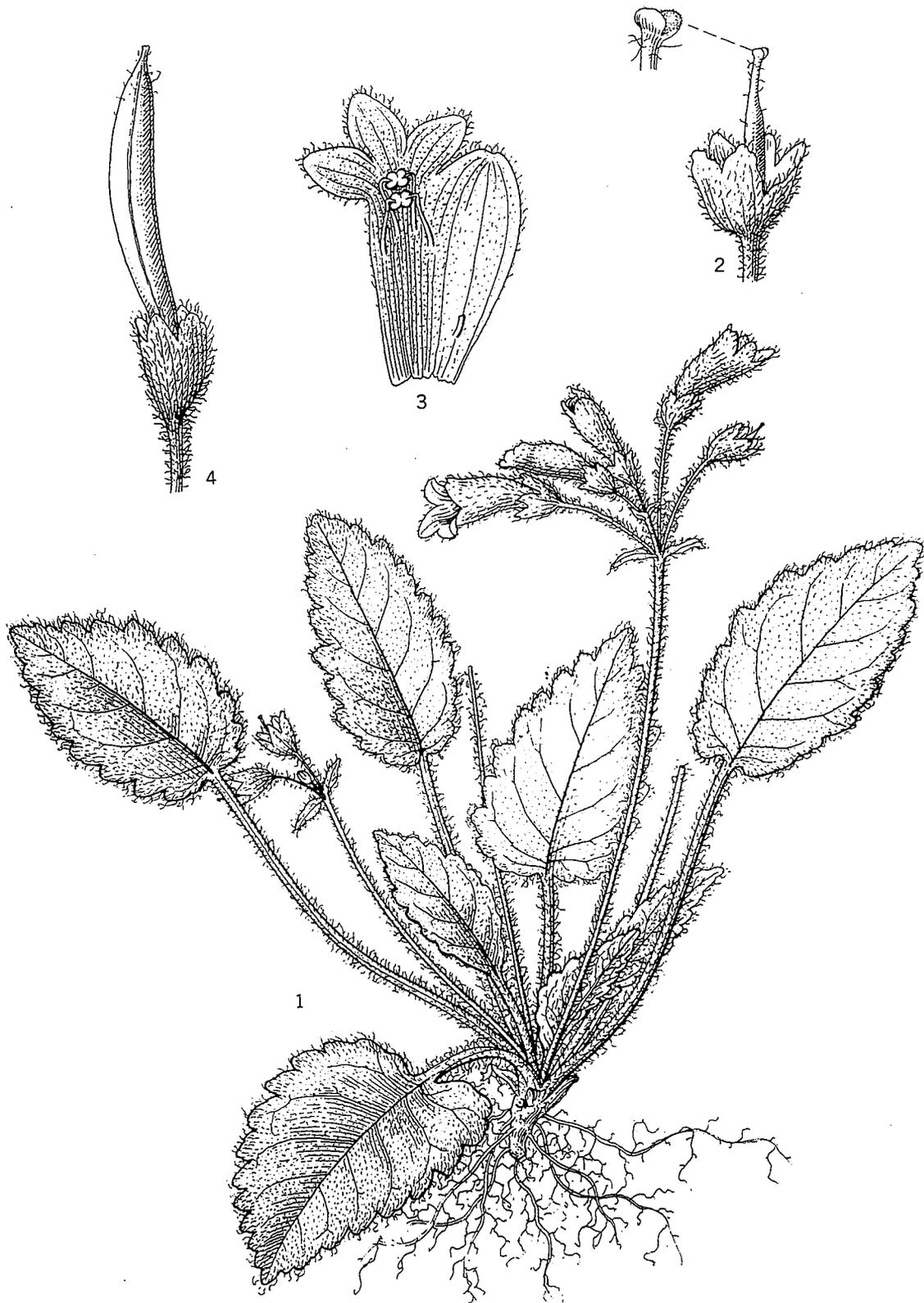


Figure 103.1. *Ancylostemon concavus* Craib: 1, habit; 2, calyx, pistil and enlargement of stigma; 3, corolla opened to show insertion of stamens; 4, fruit. (C. Z. Ji)

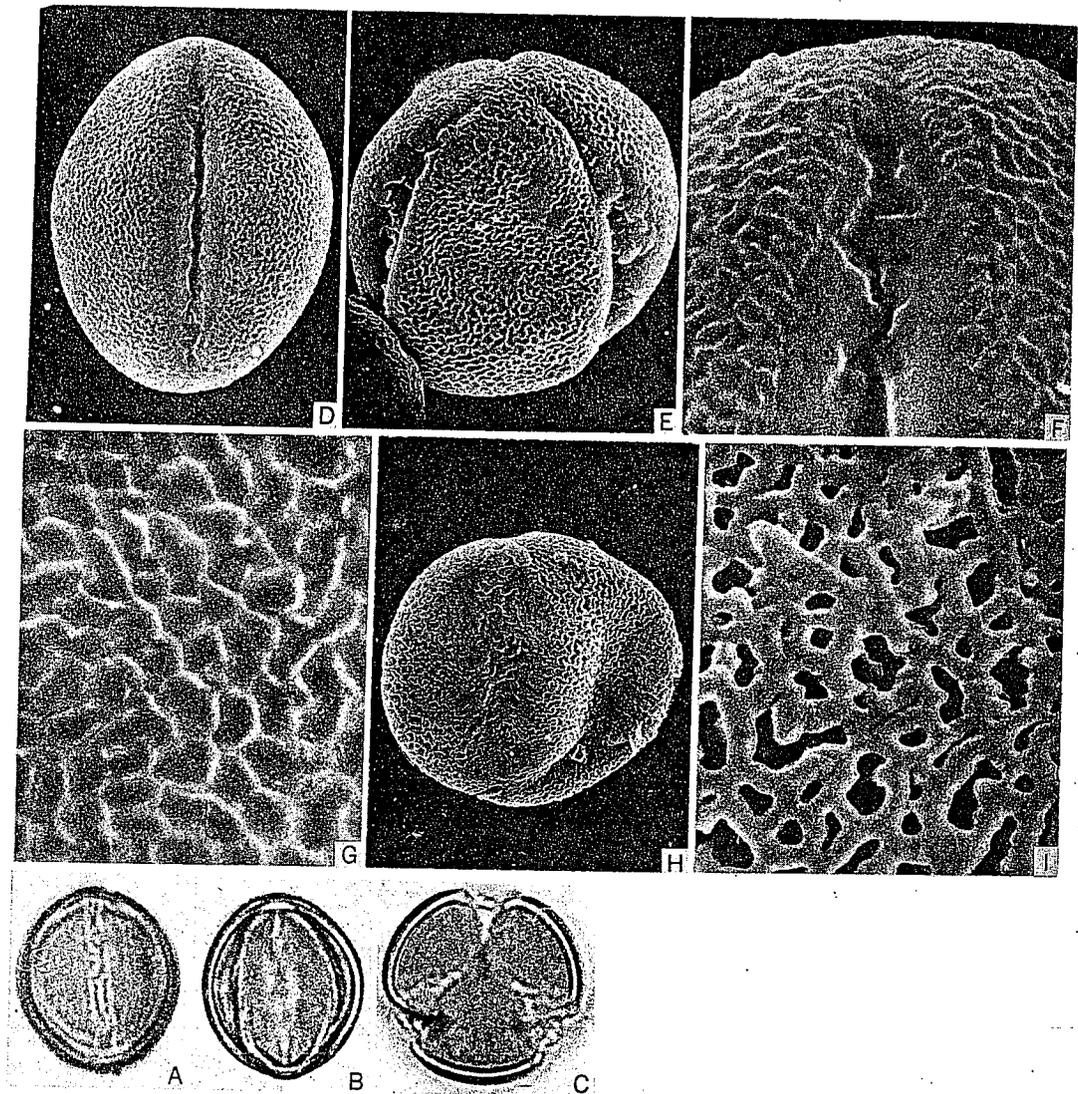
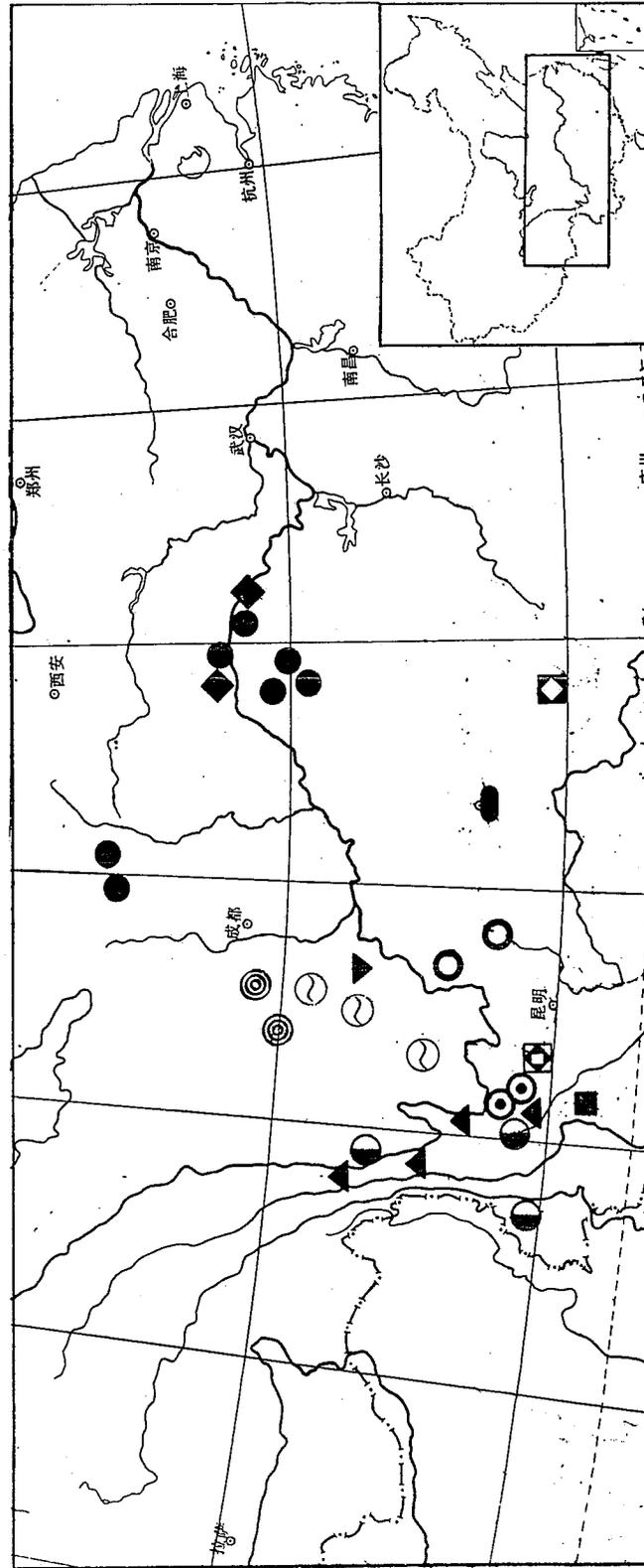


Figure 103.2. (A-I) *Ancylostemon* pollen. (A-G) *A. convexus* Craib (without collector 30452, PE); A, equatorial view showing aperture, LM X 1000; B, equatorial optical cross section, LM X 1000; C, polar view, LM X 1000; D, equatorial view showing aperture and ornamentation, SEM X 1800; E, oblique polar view, SEM X 1800; F, detail of aperture and ornamentation, SEM X 6000; G, detail of ornamentation, SEM X 9000; (H-I) *A. saxatilis* (Hemsley) Craib (without collector 93164, PE); H, equatorial view showing aperture and ornamentation, SEM X 1800; I, detail of ornamentation, SEM X 9000.

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Map 103. ▲ *Ancylostemon aureus* (Franchet) Burt & Davidson; ◐ *A. convexus* Craib; ■ *A. flabellatus* C. Y. Wu ex H. W. Li; ⊙ *A. gamosepalus* K. Y. Pan; ◆ *A. humilis* W. T. Wang; ○ *A. mairei* (H. Léveillé) Craib; ⊕ *A. notochlaenus* (H. Léveillé & Vaniot) Craib; ▼ *A. rhombifolius* K. Y. Pan; ● *A. ronganensis* K. Y. Pan; ◑ *A. saxatilis* (Hemsley) Craib; ◒ *A. trichanthus* Burt & Davidson; ⊙ *A. vulpinus* Burt.

104. *Bournea* Oliver, Hooker's Icon. Pl. 23: pl. 2254. 1893. Figure 104.1. Type species: *Bournea sinensis* Oliver.

**Description:** Perennial herbs. Leaves basal, ovate to oblong-ovate, 4-12 cm long, 2.5-8 cm wide, entire or sinuate, both surfaces strigose; petiole densely strigose. Scapes 2, densely strigose. Cymes umbelliform, unbranched; bracts linear-lanceolate, whorled; calyx campanulate, 4- or 5-lobed, lobes narrowly triangular, puberulous outside; corolla equalling calyx in length, purple, campanulate, 4- or 5-lobed, lobes equal, outer surface puberulous; stamens 4 or 5, alternate with corolla lobes, slightly exerted; filaments inserted in throat; anthers dorsifixed; disc cyathiform. Ovary slender cylindrical, unilocular, placentas 2, parietal; style short; stigma capitate. Capsule linear-oblongate, ca. 3 cm long, 2 valved. Fl. Sep-Oct; fr. Nov-Dec. A genus of two species.

#### Key to species

- 1. Leaves entire, upper surface remotely strigose; petiole and scapes densely strigose ..... 1. *B. sinensis* Oliver
- 1. Leaves crenate, upper surface glabrous, petiole and scapes densely villose ..... 2. *B. leiophylla* (W. T. Wang) W. T. Wang & K. Y. Pan

**Pollen:** Pollen grains of *Bournea sinensis* are 3-colporoidate, subspheroidal, subtriangular with convex sides in polar view. Size: P = (15.7-)17.3(-19.1)  $\mu\text{m}$ , E = (14.8-)17.1(-19.1)  $\mu\text{m}$ . Colpi short and rather broad, usually indistinctly delimited, with granular membrane. Endoaperture (oroid) indistinctly delimited. Exine 1.7  $\mu\text{m}$  thick, sexine as thick as nexine, finely verrucate-rugulate. Figure 104.2.

**Ecology:** *Bournea* grows on rocks in forests and other shady places and by the sides of streams; 300-1000 m.

**Geography:** *Bournea* is distributed in Guangdong and southwestern Fujian provinces. Map 104.

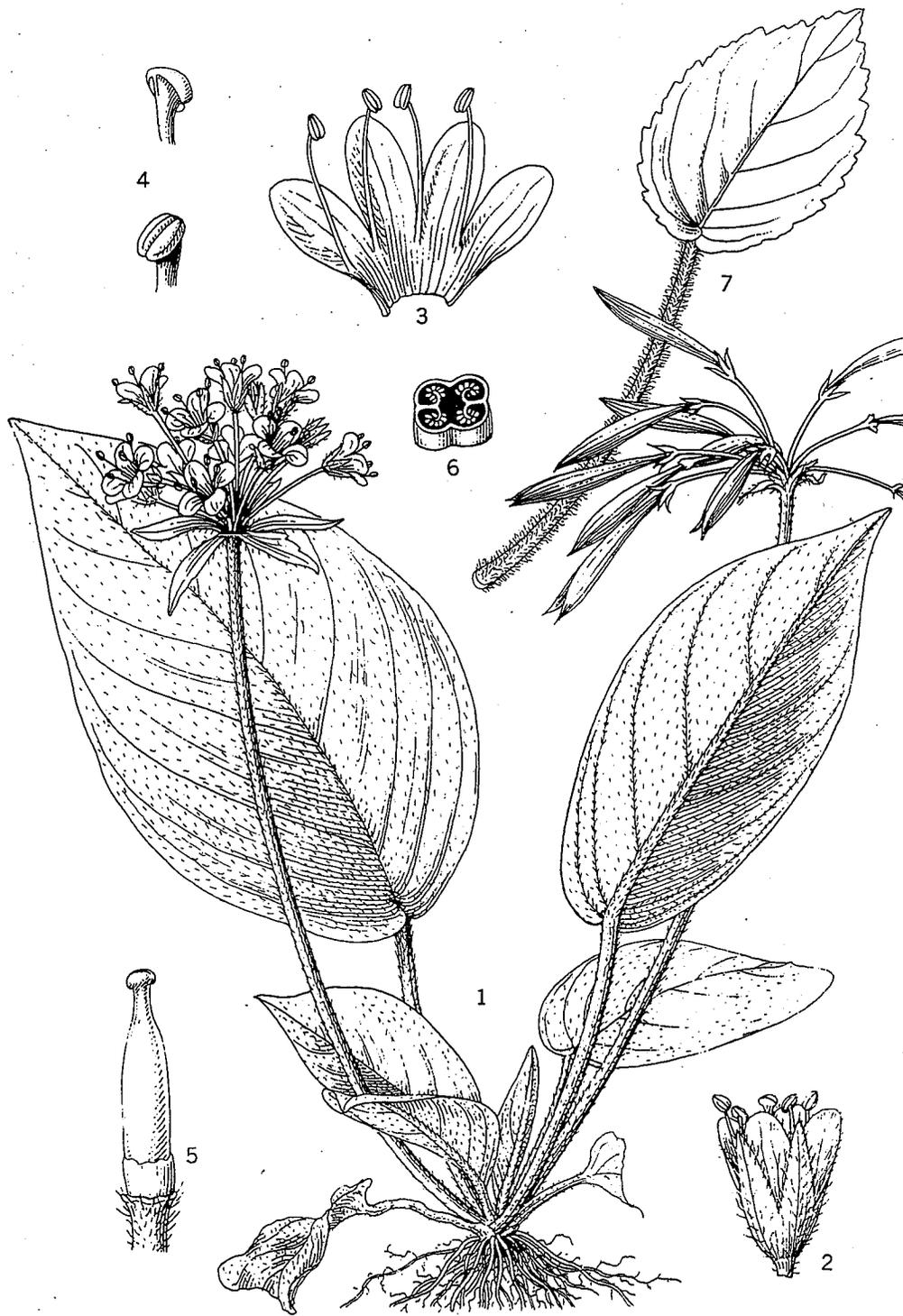


Figure 104.1. *Bournea sinensis* Oliver: 1, habit; 2, flower; 3, corolla opened to show insertion of stamens; 4, anthers; 5, pistil; 6, cross section of ovary. *B. leiophylla* (W. T. Wang) W. T. Wang & K. Y. Pan: 7, leaf. (C. Z. Ji)

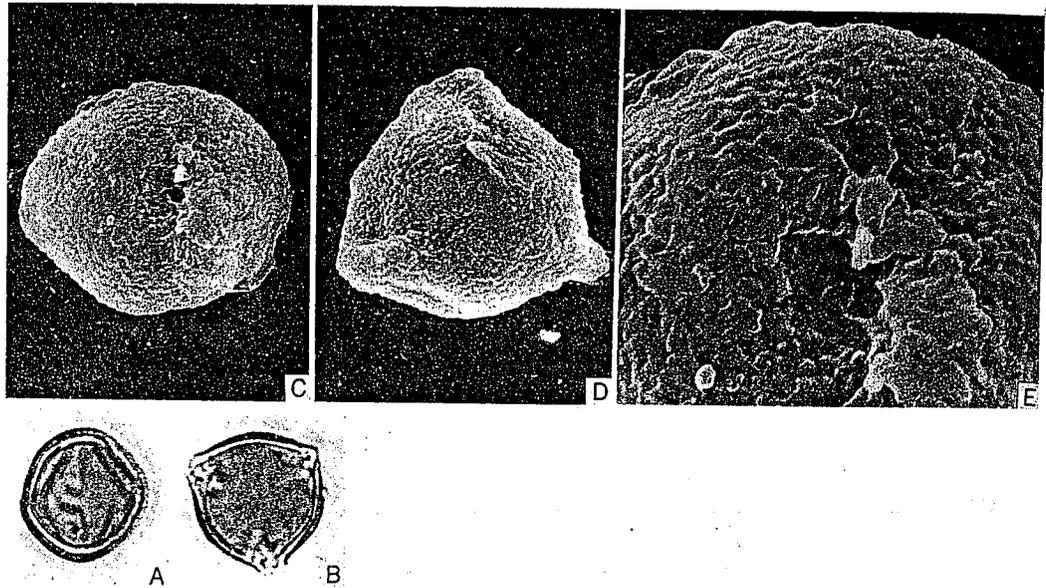
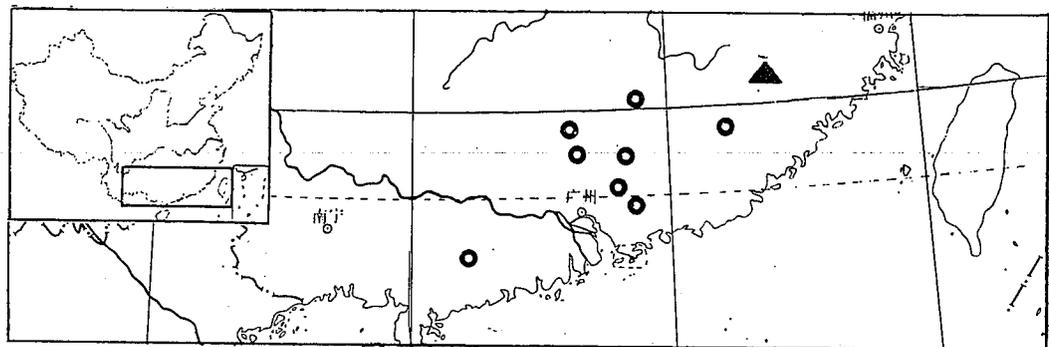


Figure 104.2. (A-E) *Bournea sinensis* Oliver. Pollen (without collector 6948, PE); A, equatorial view showing aperture, LM X 1000; B, polar optical cross section, LM X 1000; C, equatorial view showing aperture and ornamentation, SEM X 2400; D, oblique polar view, SEM X 2400; E, detail of aperture and ornamentation, SEM X 6000.



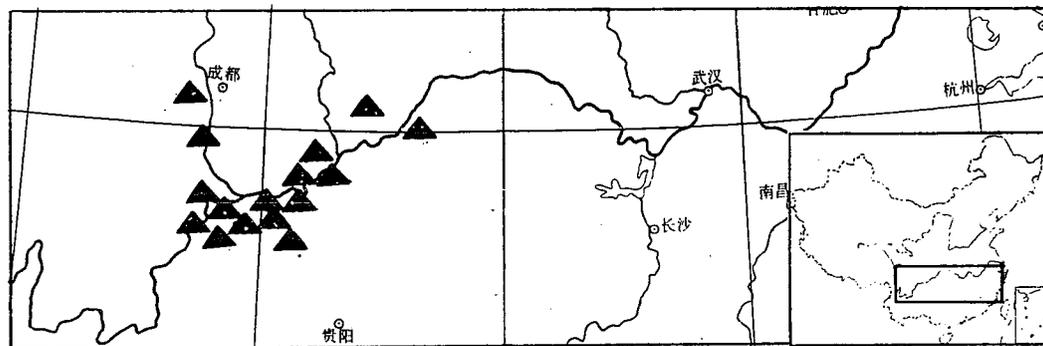
Map 104. ● *Bournea sinensis* Oliver.  
 ▲ *B. leiophylla* (W. T. Wang) W. T. Wang et K. Y. Pan

105. *Briggsiopsis* K. Y. Pan, Act. Phytotax. Sin. 23: 216. 1985. Figure 105. Type species: *Briggsiopsis delavayi* (Franchet) K. Y. Pan.

**Description:** Perennial herbs. Leaves basal, ovate or suborbicular, pubescent both surfaces, entire or repand; petiolate. Cymes axillary; bracts 2 opposite; scapes densely pubescent; pedicel pubescent; calyx campanulate, 5 divided to near base, lobes linear-lanceolate; corolla white, tubular-funnel-shaped, inner with purple striae, bilabiate, upper lip bifid, lower lip trifid; stamens 4, filaments inserted at middle of corolla tube; anthers basifixed, coherent at apex; staminode 1, inserted at base of corolla tube; disc annular, deeply 5-parted. Ovary oblong, placentation axile, 2-locular, one locule fertile; style longer than ovary; stigmas 2, obovoid. Capsule oblong, oblique, loculicidally dehiscent. Fl. Aug-Sep; fr. Sep-Oct. Monotypic.

**Ecology:** *Briggsiopsis* grows in forests, at stream sides and on rocks in shady places; 250-1500 m.

**Geography:** *Briggsiopsis* is in central and southern Sichuan and northern Yunnan provinces. Map 105.



Map 105. ▲ *Briggsiopsis delavayi* (Franchet) K. Y. Pan.

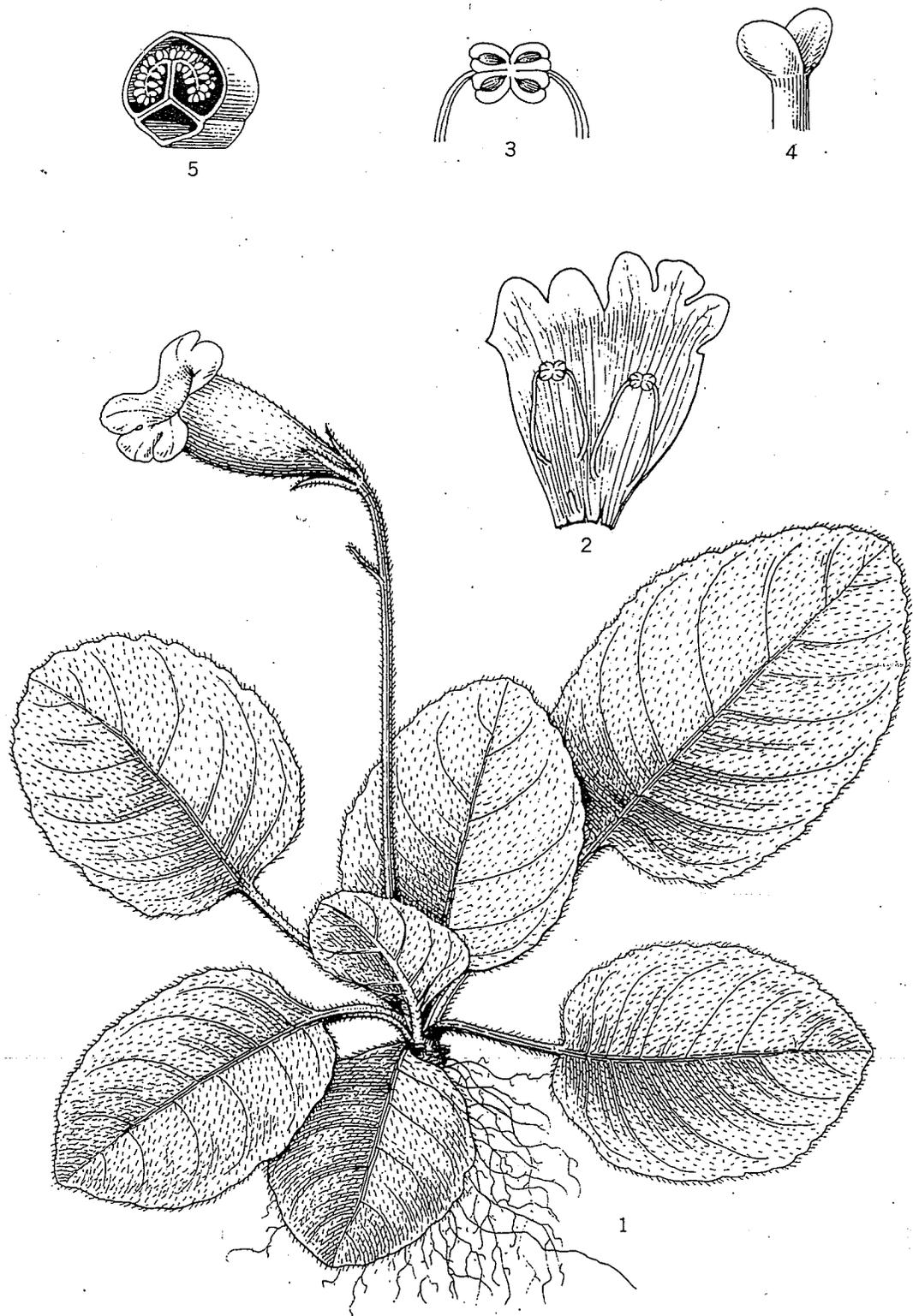


Figure 105. *Briggsiopsis delavayi* (Franchet) K. Y. Pan: 1, habit; 2, corolla opened to show stamens and staminodes; 3, stamens; 4, stigma; 5, cross section of ovary. (C. Z. Ji)

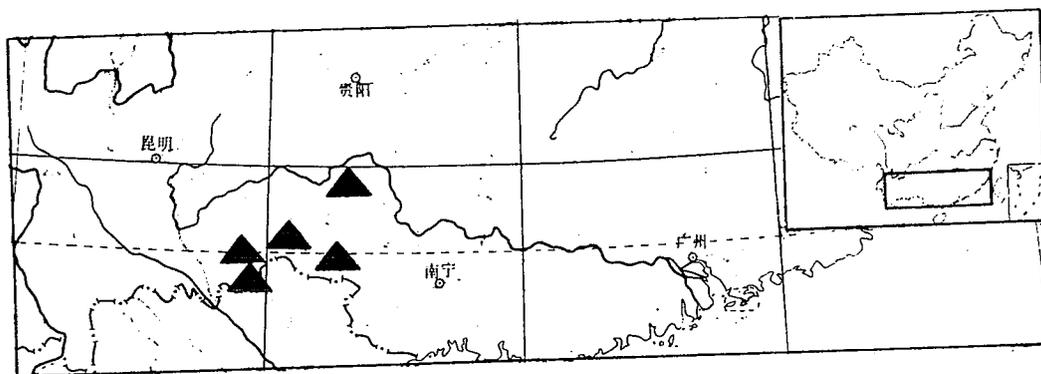
106. *Calcareoboea* C. Y. Wu & H. W. Li, Acta Bot. Yunnan. 4: 241. 1982. Figure 106.1. Type species: *Calcareoboea coccinea* C. Y. Wu & H. W. Li.

**Description:** Perennial herbs; rhizomes stout, elongate. Leaves basal, subcoriaceous, serrate. Inflorescence subumbellate, axillary, involucre leaf-like; bracts linear, small; pedicel short. Calyx deeply divided to near base, lobes 5, linear-lanceolate; corolla vermillion, narrowly funnel-shaped, inconspicuously bilabiate, upper lip wide, with 4 short teeth; lower lip narrow, entire, patent; stamens 2, filaments complanate, curved, inserted on upper corolla tube; anthers 2-locular, divaricate; staminodes small. Disc cyathiform, margin crenate. Ovary slender cylindrical; style shorter than ovary; stigma capitate, very small. Capsule slender cylindrical, 2-valved. Fl. Apr-Jun; fr. Oct. Monotypic.

**Pollen:** Pollen grains of *Calcareoboea coccinea* are 3-colporoidate, subspheroidal, subcircular in polar view. Size: P = (20-)23.1(-25.2)  $\mu\text{m}$ , E = (20-)22.6(-24.4)  $\mu\text{m}$ . Colpi rather long and broad, with narrower ends; colpus membrane with distinctly and irregularly tuberculate processes, distinctly protruding. Endoaperture (oroid) not apparent. Exine 1.7  $\mu\text{m}$  thick; sexine as thick as nexine, with distinct columellae (LM), finely reticulate. Muri coarse; lumina perforation-like, circular, elliptic or irregular in shape. Figure 106.2.

**Ecology:** *Calcareoboea* grows in broadleaved evergreen forests on limestone mountains and in rock crevices; 1000-1500 m.

**Geography:** *Calcareoboea* is restricted to southeastern Yunnan and western Guangxi provinces. Map 106.



Map 106. ▲ *Calcareoboea coccinea* C. Y. Wu & H. W. Li.

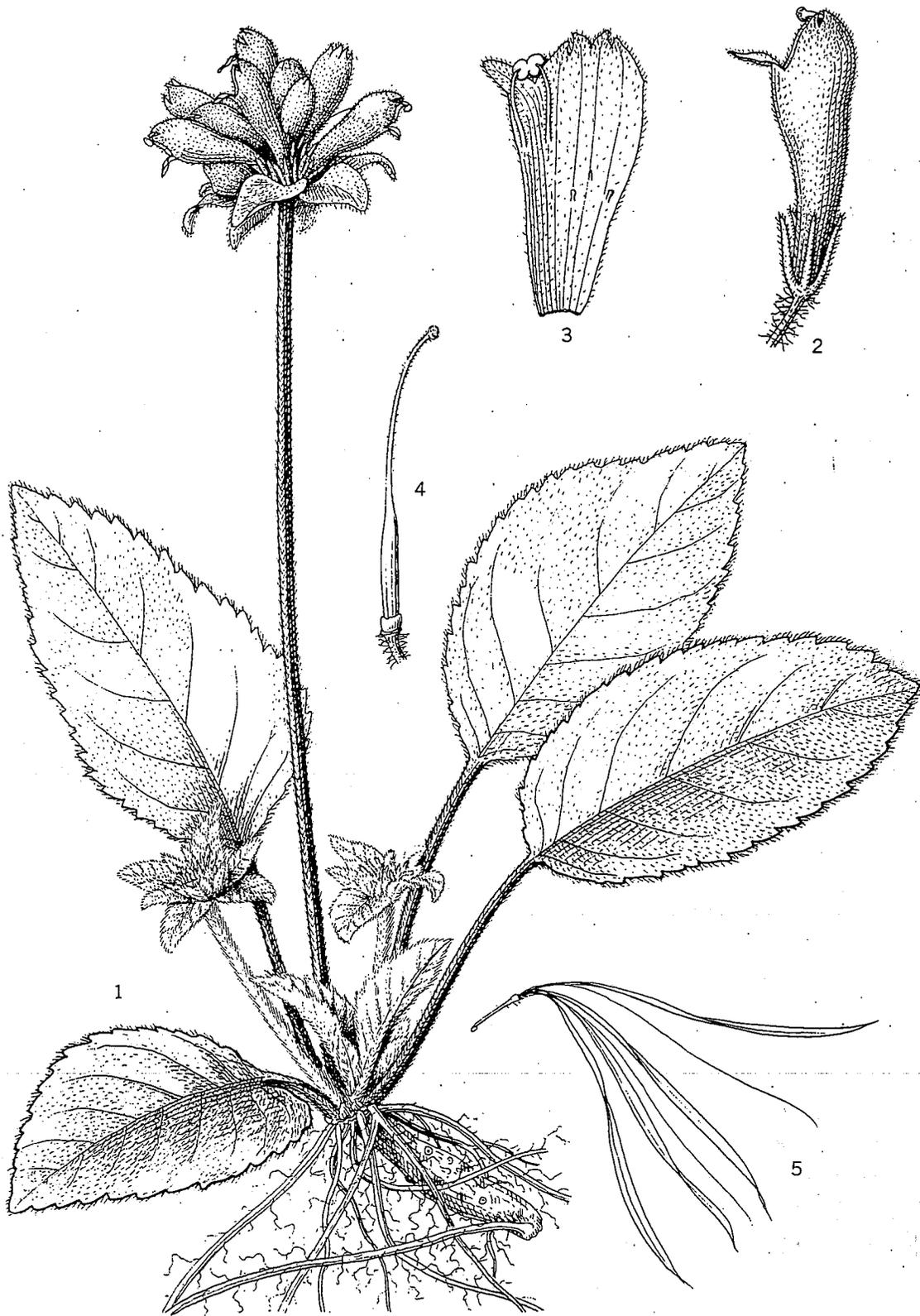


Figure 106.1. *Calcareoboea coccinea* C. Y. Wu & H. W. Li: 1, habit; 2, flower; 3, corolla opened to show insertion of stamens and staminodes; 4, pistil; 5, fruit. (C. Z. Ji)

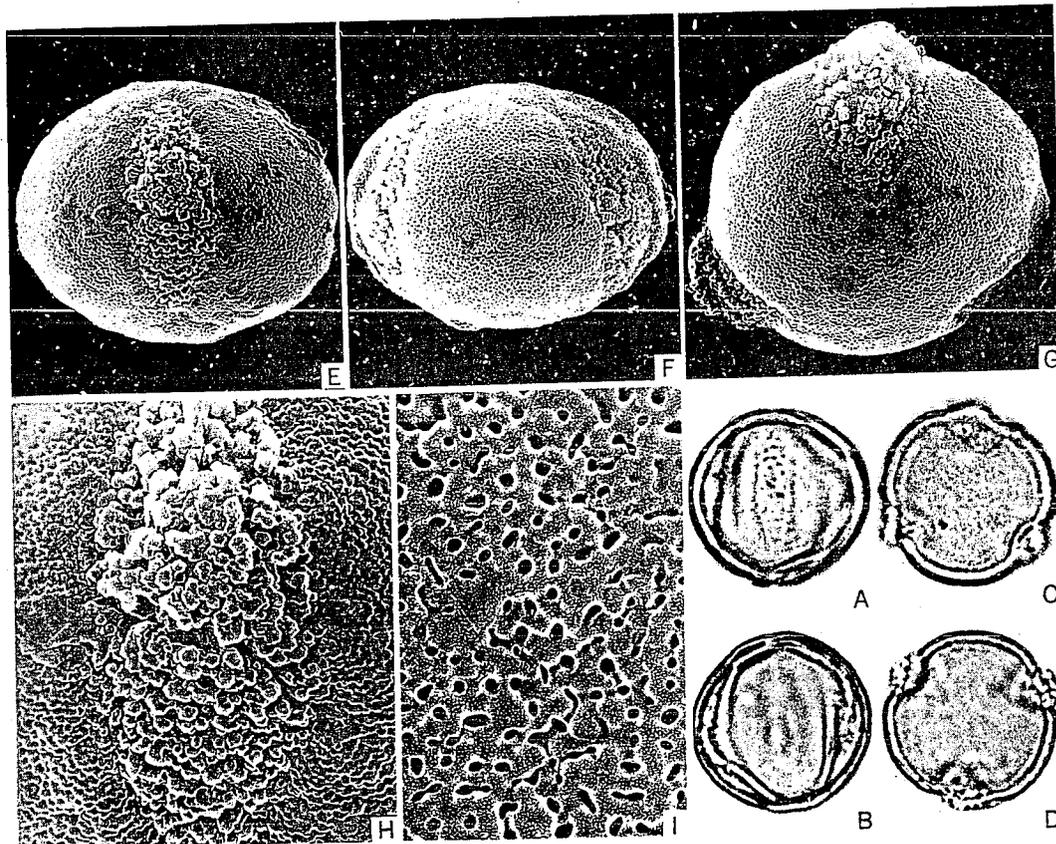


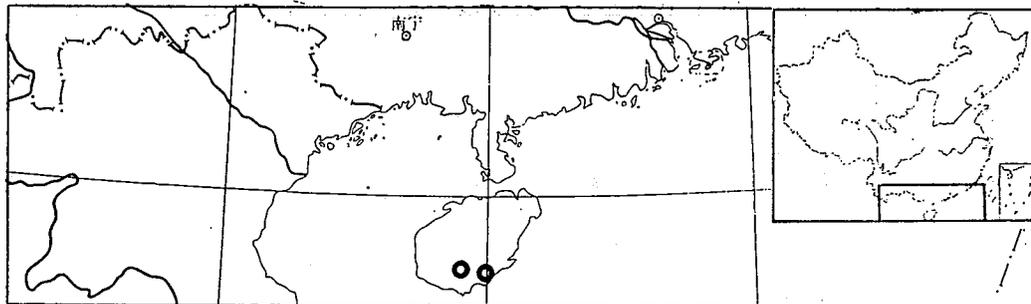
Figure 106.2. (A-I) *Calcareoboea coccinea* C. Y. Wu & H. W. Li. Pollen (*D. Feng 22421*, PE); A, equatorial view showing aperture, LM X 1000; B, equatorial optical cross section, LM X 1000; C, polar view, LM X 1000; D, polar optical cross section, LM X 1000; E, equatorial view showing aperture and ornamentation, SEM X 2400; F, equatorial view showing mesocolpium, SEM X 2400; G, oblique polar view, SEM X 2400; H, detail of aperture, SEM X 6000; I, detail of ornamentation, SEM X 15000.

107. *Cathayanthe* Chun, Sunyatsenia 6: 282, pl. 47. 1946. Figure 107. Type species: *Cathayanthe biflora* Chun.

**Description:** Perennial pubescent herbs. Rhizomes slender. Leaves membranaceous, obovate, narrowly obovate or elliptic, entire; petiole 6-10 cm long. Scape 1, erect, with 2 nodding flowers. Pedicel ca. 6 mm long; calyx campanulate, bilabiate, 5-lobed, upper lip undivided, lower lip 4-lobed, lobes lanceolate; corolla purple, tubular-campanulate, bilabiate, upper lip bifid, lower lip trifold, lobes elliptic, equal in size; stamens 4, included; filaments inserted at middle of corolla tube, curved, glandular pubescent; anthers coherent, apex confluent, connective apiculate at apex; staminodes absent; disc cyathiform. Ovary narrowly ellipsoid, glandular pubescent, parietal placenta bifid; style slender; stigma semiorbicular, depressed. Capsule narrowly ellipsoid, compressed, loculicidally dehiscent, with persistent style. Seeds brown, elliptic-fusiform, smooth. Fl. Nov-Jan; fr. Jan-Sep. Monotypic.

**Ecology:** *Cathayanthe* grows on rocks in wet valleys and ravines; ca. 500 m.

**Geography:** *Cathayanthe* is restricted to southern Hainan. Map 107.



Map 107. ● *Cathayanthe biflora* Chun.

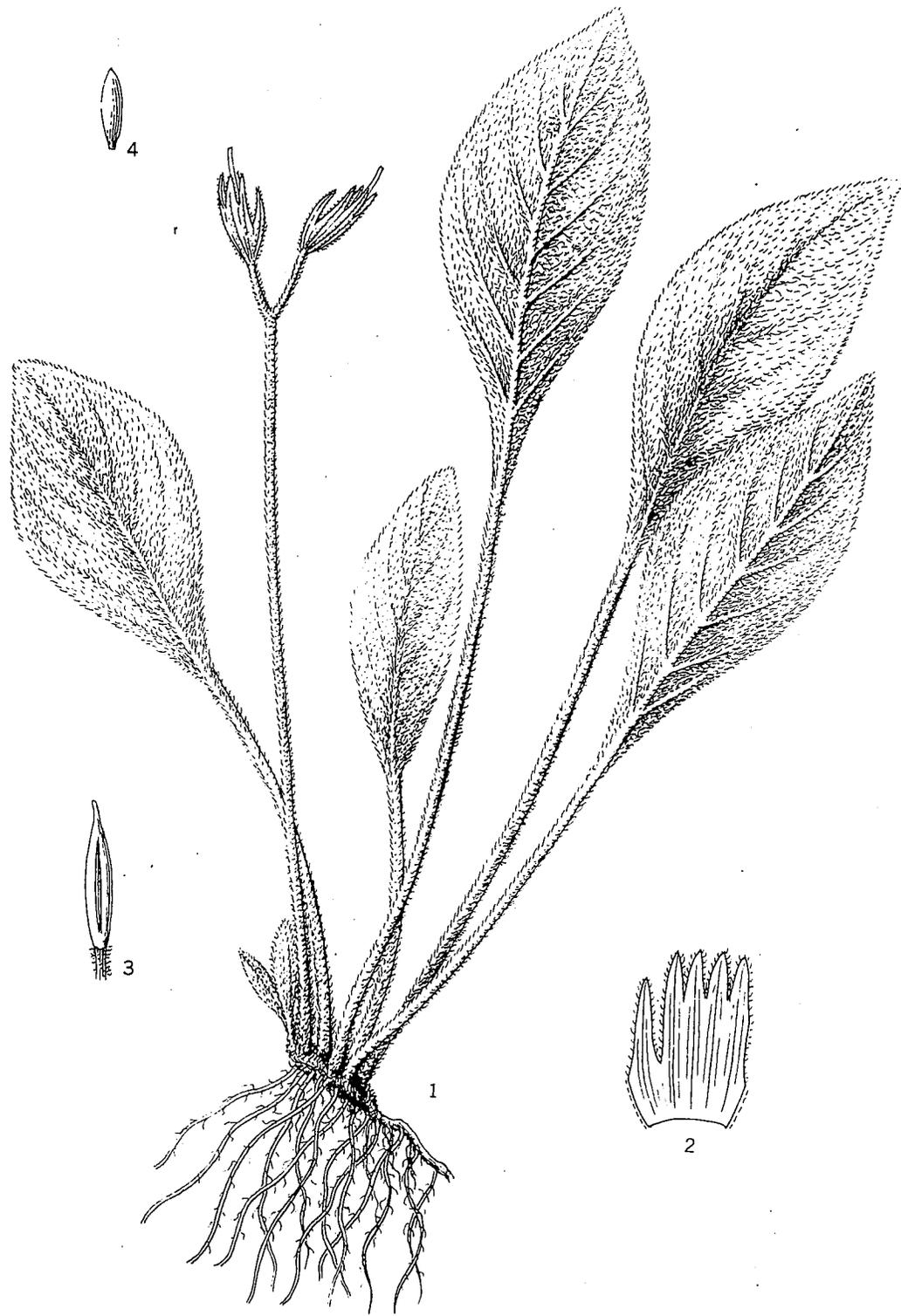


Figure 107. *Cathayanthe biflora* Chun: 1, habit; 2, calyx opened; 3, capsule; 4, seed. (J. F. Wang; in large part from Fl. Hainan. 3: 523, fig. 900. 1974.)

108. *Chiritopsis* W. T. Wang, Bull. Bot. Res., Harbin 1(3): 21. 1981. Figure 108.2. Type species: *Chiritopsis repanda* W. T. Wang.

**Description:** Perennial acaulescent herbs; rhizomes stout. Leaves basal, elliptic, rhomboid-ovate or rhomboid, undivided or bipinnatifid, both surfaces puberulous; long petiolate. Leaves of scapes equal in length, pubescent. Cymes branched; bracts 2. Pedicel densely puberulous; calyx campanulate, divided to the base, lobes 5, lanceolate; corolla pale yellow or white, tubular, bilabiate, upper lip bifid, lower lip trifid; stamens 2, glabrous; filaments inserted near base of corolla tube, linear-lanceolate, slightly curved; anthers coherent, confluent at apex; staminodes 2 or 3. Disc annular or interrupted. Ovary ovoid, shorter than style, puberulous; style slender; stigma bifid. Capsule ovoid, loculicidally dehiscent. Seeds small, ellipsoid. Fl. Apr-Sep; fr. Jul-Nov. A genus of eight species.

Key to species

1. Leaves undivided; staminodes 2 or absent.
  2. Leaves suborbicular; corolla pale purple; stigma linear, unlobed ..... 1. *C. mollifolia* D. Fang & W. T. Wang
  2. Leaves elliptic, ovate or cordate; corolla pale yellow or white; stigma flabellate or cuneate, bilobed.
    3. Leaves widely cuneate at base.
      4. Flowers congested; pedicel 0.5-2 mm long; corolla conspicuously bilabiate, upper lip ca. 2.5 times longer than upper lip; disc annular ..... 2. *C. confertiflora* W. T. Wang
      4. Flowers remote; pedicels 2-25 mm long; corolla slightly bilabiate; upper and lower lips equal in length; disc incised.
        5. Pedicels 2-8 mm long; style glabrous ..... 3. *C. repanda* W. T. Wang
        5. Pedicels 8-25 mm long; style pubescent ..... 4. *C. xiuningensis* X. L. Liu & X. H. Guo
    3. Leaves cordate at base.
      6. Blade 4-8.5 cm long, crenate; staminodes 2 ..... 5. *C. cordifolia* D. Fang & W. T. Wang
      6. Blade 3-4 cm long, entire or serrulate; staminodes absent ..... 6. *C. subulata* W. T. Wang
1. Leaves pinnately lobed to parted; staminodes 1 or 3.
  7. Leaves cordate-orbicular, pinnately lobed, base cordate; staminode 1 ..... 7. *C. lobulata* W. T. Wang
  7. Leaves ovate or rhomboid, pinnately parted, base widely cuneate; staminodes 3 ..... 8. *C. bipinnatifida* W. T. Wang

**Pollen:** Pollen grains of *Chiritopsis cordifolia* are 3-colporoidate, suboblate, subcircular in polar view. Size: P = (14.8-)16(-17.4)  $\mu\text{m}$ , E = (17.4-)18.3(-19.1)  $\mu\text{m}$ . Colpi rather long and narrow, with granulate membrane. Endoaperture (oroid) indistinctly delimited. Exine 1.7  $\mu\text{m}$  thick, sexine and nexine indistinguishable (LM), finely reticulate. Muri rather coarse, with sparse spinulate processes; lumina small, circular, subcircular or elliptic, unequal in size. Figure 108.1.

The pollen of *Chiritopsis bipinnatifida* is similar to that of *C. cordifolia*, but *C. repanda* differs from both in its rugulate ornamentation.

**Ecology:** *Chiritopsis* grows on rocks along streams and in wet valleys; 100-260 m.

**Geography:** *Chiritopsis* occurs in Guangxi, northern Guangdong and in southern Anhui. Map 108.

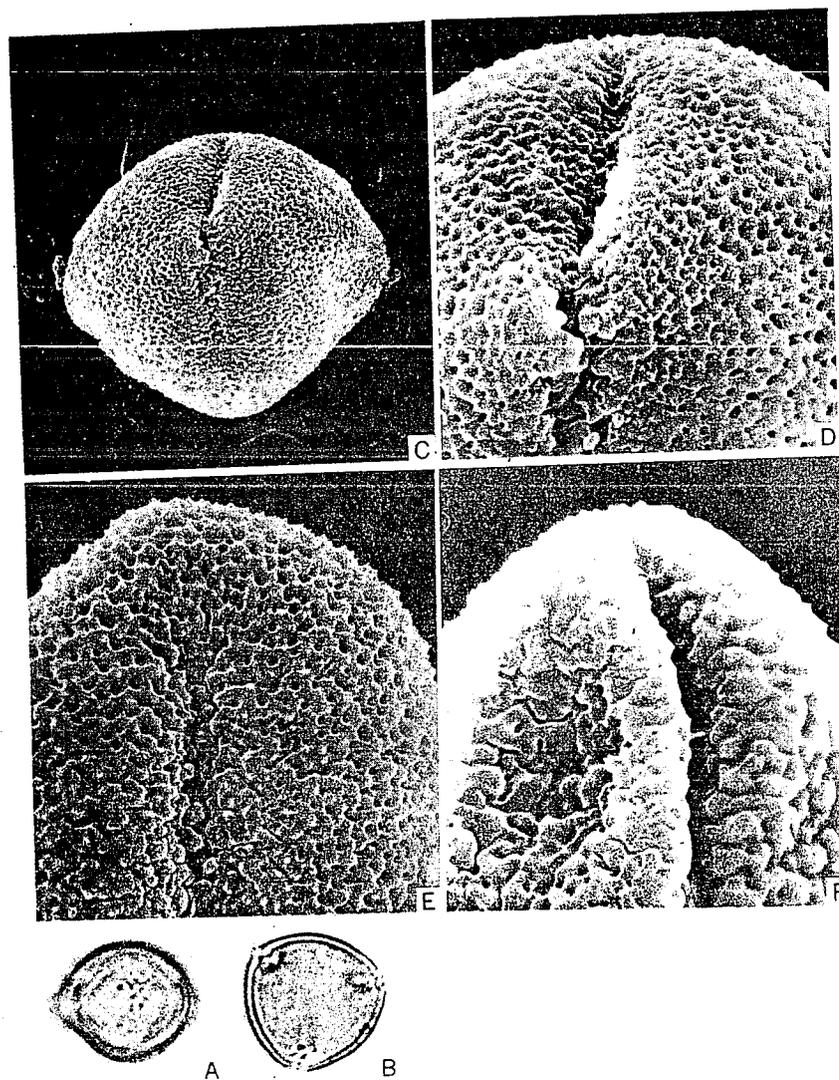


Figure 108.1. (A-F) *Chiritopsis* pollen. (A-D) *C. cordifolia* D. Fang & W. T. Wang (D. H. Qin 51260, PE); A, equatorial view showing aperture, LM X 1000; B, polar optical cross section, LM X 1000; C, equatorial view showing aperture and ornamentation, SEM X 2400; D, detail of ornamentation, SEM X 6000; E, *C. bipinnatifida* W. T. Wang (without collector 6-1575; PE), detail of ornamentation, SEM X 6000; F, *C. repand* W. T. Wang (Y. Y. Yang 6517, PE), detail of ornamentation, SEM X 6000.

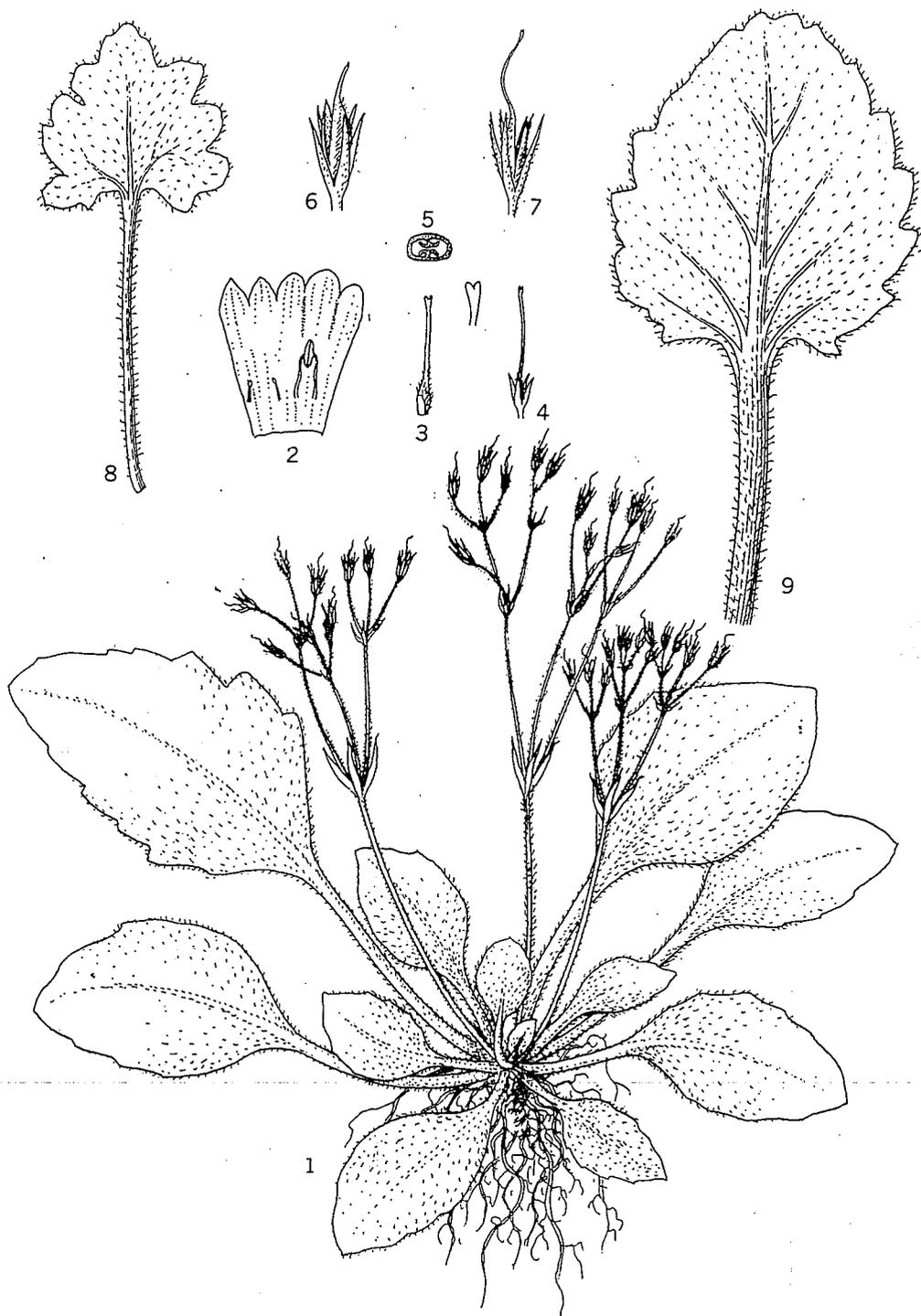
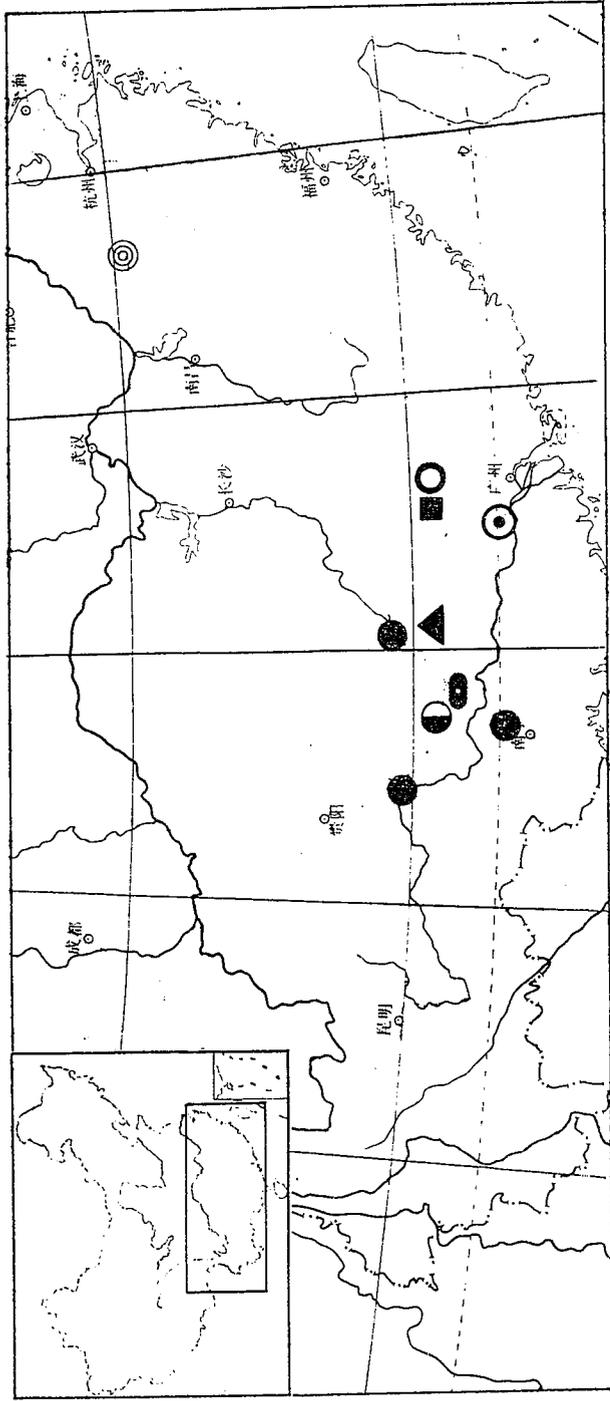


Figure 108.2. *Chiritopsis repanda* W. T. Wang: 1, habit; 2, corolla opened to show stamens and staminodes; 3, disc and pistil; 4, calyx and pistil; 5, cross section of ovary; 6, 7, persistent calyx and capsule. *C. lobulata* W. T. Wang: 8, leaf. *C. cordifolia* D. Fang & W. T. Wang: 9, leaf. (J. F. Wang)



Map 108. ▲ *Chiritopsis bipinnatifida* W. T. Wang; ■ *C. confertiflora* W. T. Wang; ● *C. cordifolia* D. Fang & W. T. Wang; ○ *C. lobulata* W. T. Wang; ⊙ *C. mollifolia* D. Fang & W. T. Wang; ● *C. repanda* W. T. Wang; ⊙ *C. subulata* W. T. Wang; ⊙ *C. xiningensis* X. L. Liu & X. H. Guo.

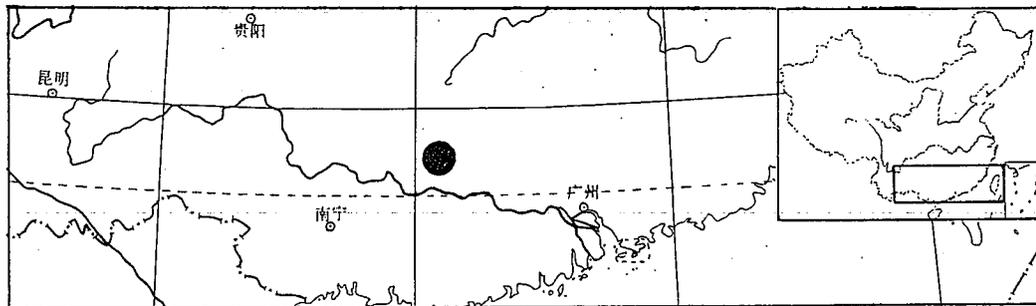
109. *Dayaoshania* W. T. Wang, Acta Phytotax. Sin. 21: 319. 1983. Figure 109.1. Type species: *Dayaoshania cotinifolia* W. T. Wang.

**Description:** Rhizomatous, perennial herbs. Leaves cauline, widely elliptic, orbicular-ovate or suborbicular, entire or inconspicuously obtuse-serrulate, both surfaces white puberulous, petiolate. Scapes 2-4, densely puberulous, 1-2 flowered; bracts 2, opposite; pedicel densely puberulous; calyx campanulate, divided to the base, lobes 5, narrowly triangular, outer surface densely puberulous; corolla pale purple or white, remotely puberulous outside, bilabiate, upper lip bifid, lower lip trifid or sometimes bifid, tube campanulate; stamens 1 or 2; filaments inserted at base of corolla, narrowly linear; anthers dorsifixed, dark purple, locules longitudinally dehiscent; staminodes 2 or absent; disc annular. Ovary slender cylindrical, densely puberulous, parietal placentas 2; style slender, sparsely puberulous; stigma bifid. Capsule slender cylindrical, puberulous. Fl. Sep; fr. Oct. Monotypic.

**Pollen:** Pollen grains of *Dayaoshania cotinifolia* are 3-colporoidate, subspheroidal, circular-lobate in polar view. Size: P = (17.4-)20(-21.8)  $\mu\text{m}$ , E = (17.4-)19.1(-20)  $\mu\text{m}$ . Colpi long and slightly broad; colpus membrane with irregular granular processes, protruding in the middle. Endoaperture (oroid) indistinctly delimited. Exine 1.6  $\mu\text{m}$  thick, sexine as thick as nexine, finely reticulate. Muri rather coarse; lumina small, subcircular, elliptic or irregular in shape, unequal in size. Figure 109.2.

**Ecology:** *Dayaoshania* grows in forests on slopes; 860-1200 m.

**Geography:** *Dayaoshania* is restricted to Jinxiu Yaozu Zizhi Xian in Guangxi Province. Map 109.



Map 109. ● *Dayaoshania cotinifolia* W. T. Wang.

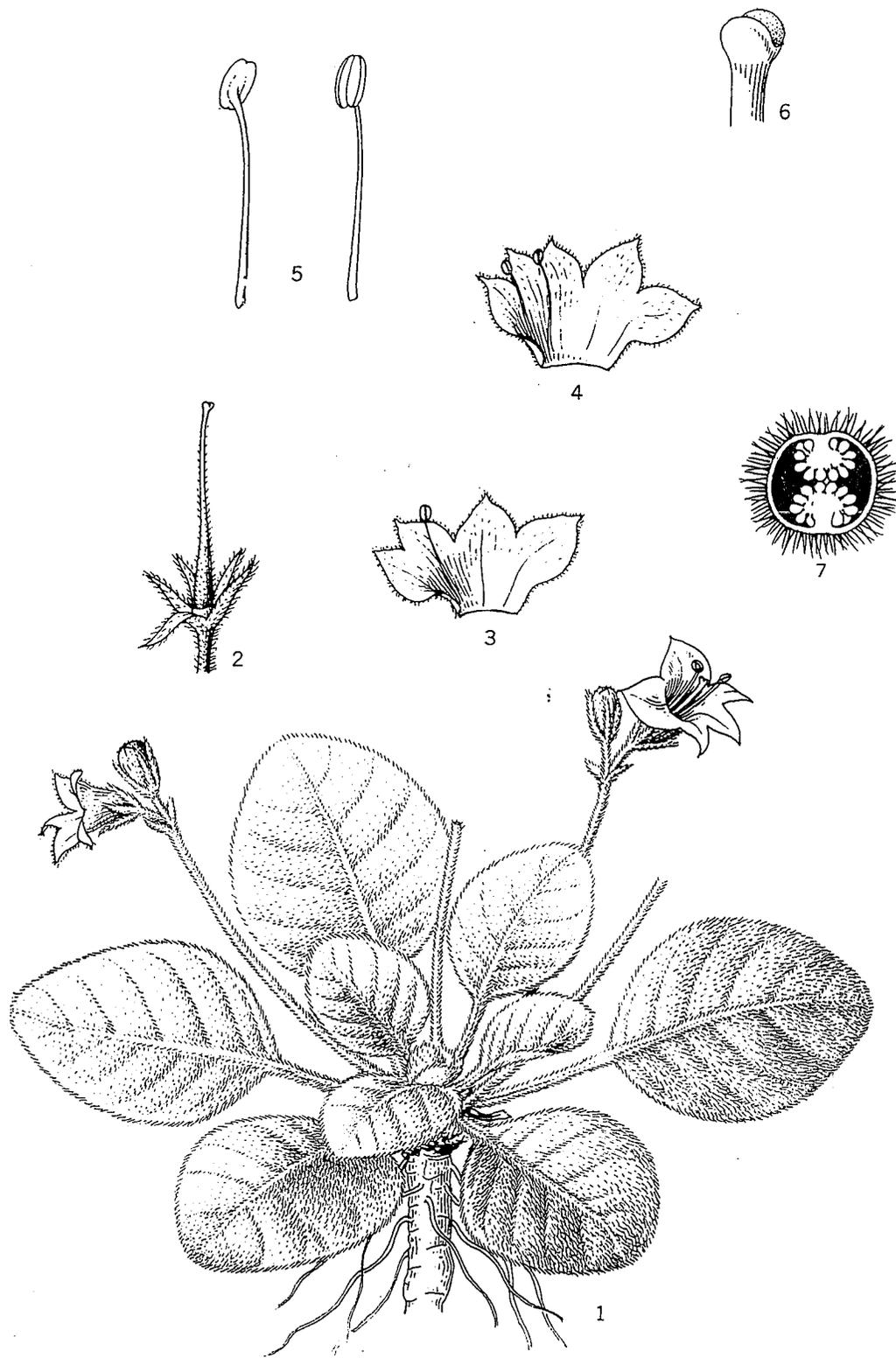


Figure 109.1. *Dayaoshania cotinifolia* W. T. Wang: 1, habit; 2, calyx and pistil; 3, 4, corollas opened showing variable numbers of stamen; 5, stamens; 6, stigma; 7, cross section of ovary. (C. Z. Ji)

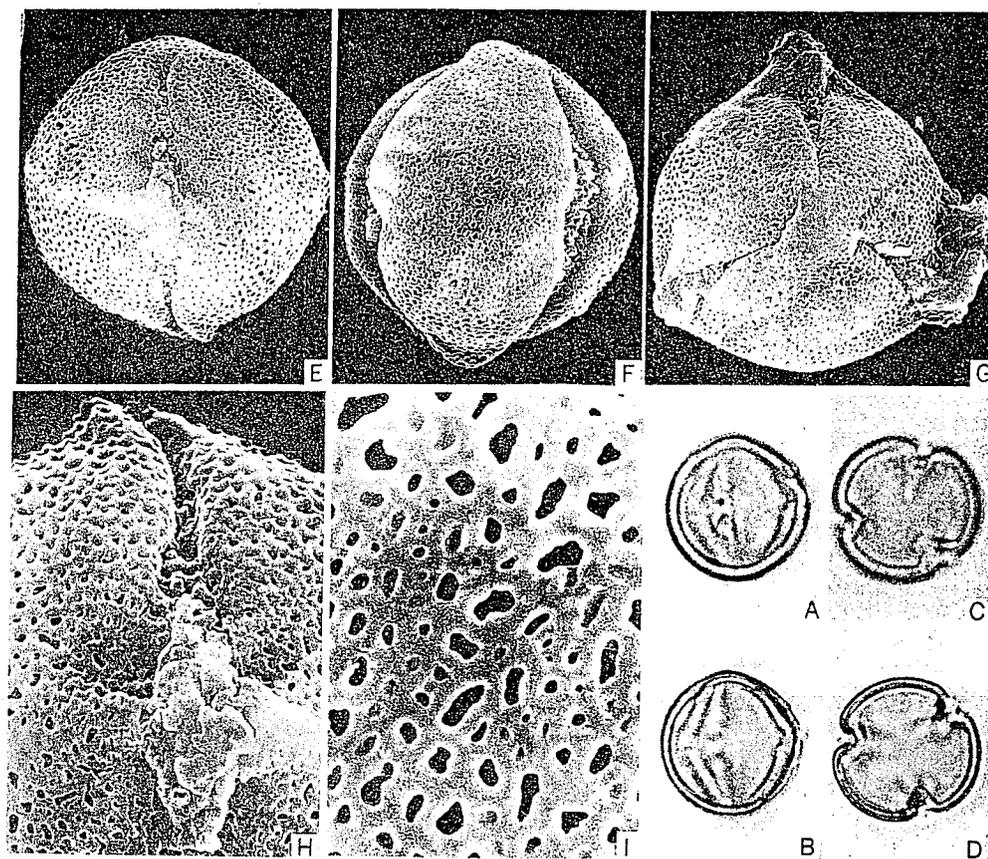


Figure 109.2. (A-I) *Dayaoshania cotinifolia* W. T. Wang. Pollen (*Dayaoshan Team 10930*, PE.) A, equatorial view showing aperture, LM X 1000; B, equatorial optical cross section, LM X 1000; C, polar view, LM X 1000; D, polar optical cross section, LM X 1000; E, equatorial view showing aperture and ornamentation, SEM x 2400; F, equatorial view showing mesocolpium, SEM X 2400; G, polar view, SEM X 2400; H, detail of aperture and ornamentation, SEM X 6000; I, detail of ornamentation, SEM X 12000.

110. *Deinocheilos* W. T. Wang, Guihaia 6: 1. 1986. Figure 110.1. Type species: *Deinocheilos sichuanense* W. T. Wang.

**Description:** Perennial acaulescent herbs. Leaves basal, dentate, petiolate. Scapes equalling leaves in length. Inflorescence a cyme; bracts 2; calyx campanulate, divided to the base, lobes 5, linear; corolla white or pale purple, tubular or funnel-shaped, bilabiate, upper lip triangular or semiorbicular, undivided, lower lip trifid. Stamens 2, exerted; filaments inserted at middle of corolla tube, narrowly linear, 1-nerved; anthers basifixed, apex coherent or not; staminodes 3 or absent; disc cyathiform. Ovary slender cylindrical, parietal placentas 2, bifid; style shorter than ovary; stigma small, complanate-capitate. Capsule slender cylindrical, loculicidally dehiscent. Seeds small, fusiform, smooth. Fl. Jun-Aug; fr. Aug-Sep. A genus of two species.

#### Key to species

1. Leaves coriaceous, lower surface glabrous; calyx lobes entire; apex of anthers coherent; staminodes 3 ..... 1. *D. sichuanense* W. T. Wang
1. Leaves herbaceous or papery, lower surface brown wooly; calyx lobes with 1 or 2 teeth; apex of anthers separated; staminodes absent ..... 2. *D. jiangxiense* W. T. Wang

**Uses:** Plants of *Deinocheilos* are used medicinally to treat traumatic injuries and rheumatism.

**Pollen:** Pollen grains of *Deinocheilos jiangxiense* are 3-colporoidate, subspheroidal, subcircular in polar view. Size: P = (17.4-)18.5(-19.1)  $\mu\text{m}$ , E = (17.4-)18.9(-20.9)  $\mu\text{m}$ . Colpi rather long and slightly broad, with narrow ends, sometimes constricted in the middle; colpus membrane with irregularly tuberculate processes. Endoaperture (oroid) indistinctly delimited. Exine 1.7  $\mu\text{m}$  thick, sexine as thick as nexine, with indistinct columellae (LM), finely reticulate. Muri coarse with sparse spinulate processes; lumina small, subcircular, elliptic or irregular in shape, unequal and decreasing gradually in size towards colpus margins and polar areas. Figure 110.2.

**Ecology:** *Deinocheilos* grows on rocks in forested areas at ca. 1200 m.

**Geography:** *Deinocheilos* is in Sichuan and Jiangxi provinces. Map 110.

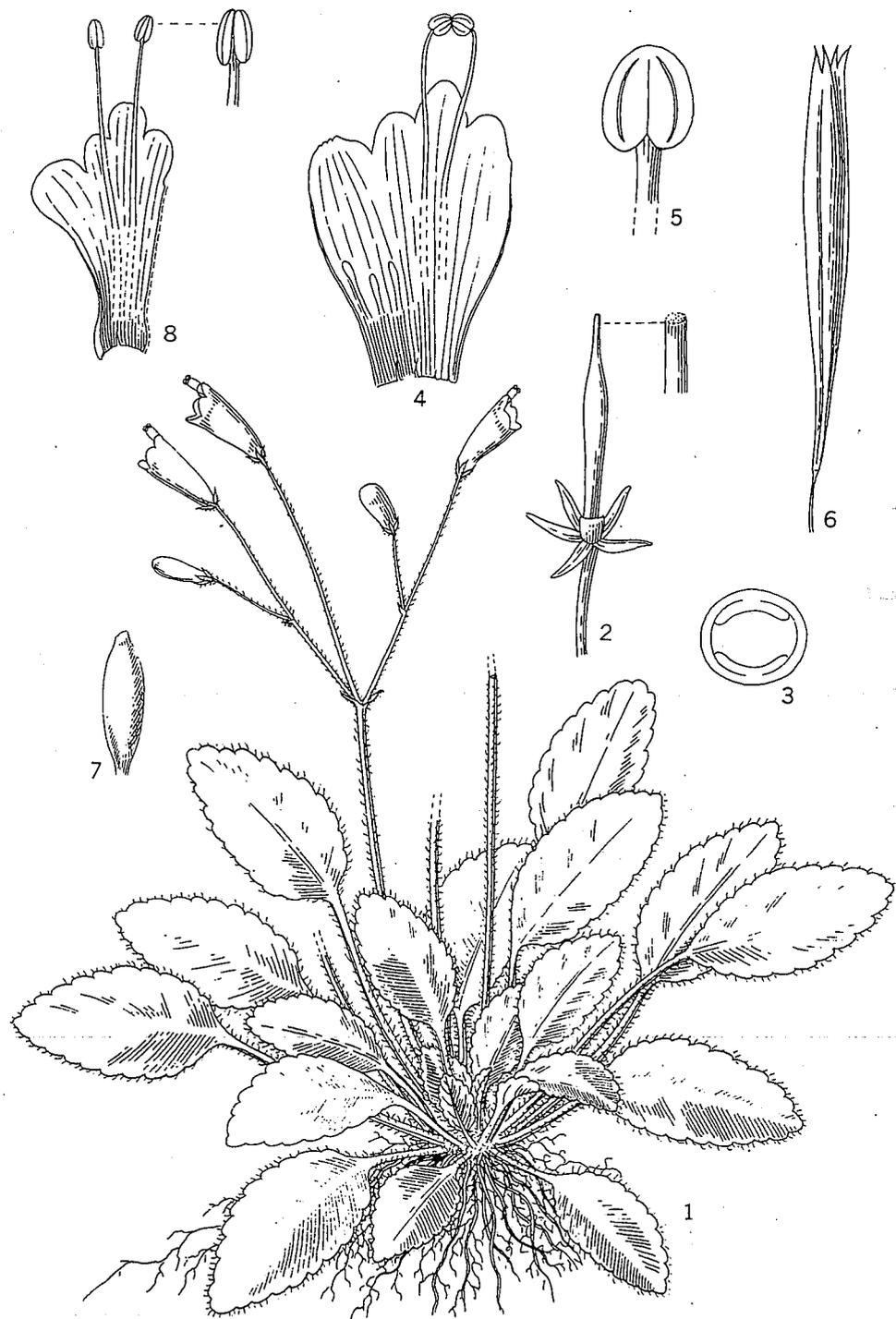


Figure 110.1. *Deinocheilos sichuanense* W. T. Wang: 1, habit; 2, calyx and pistil; 3, cross section of ovary; 4, corolla opened to show staminodes and stamens; 5, upper filament and anther; 6, fruit; 7, seed. *D. jiangxiense* W. T. Wang: 8, corolla opened to show stamens. (J. F. Wang)

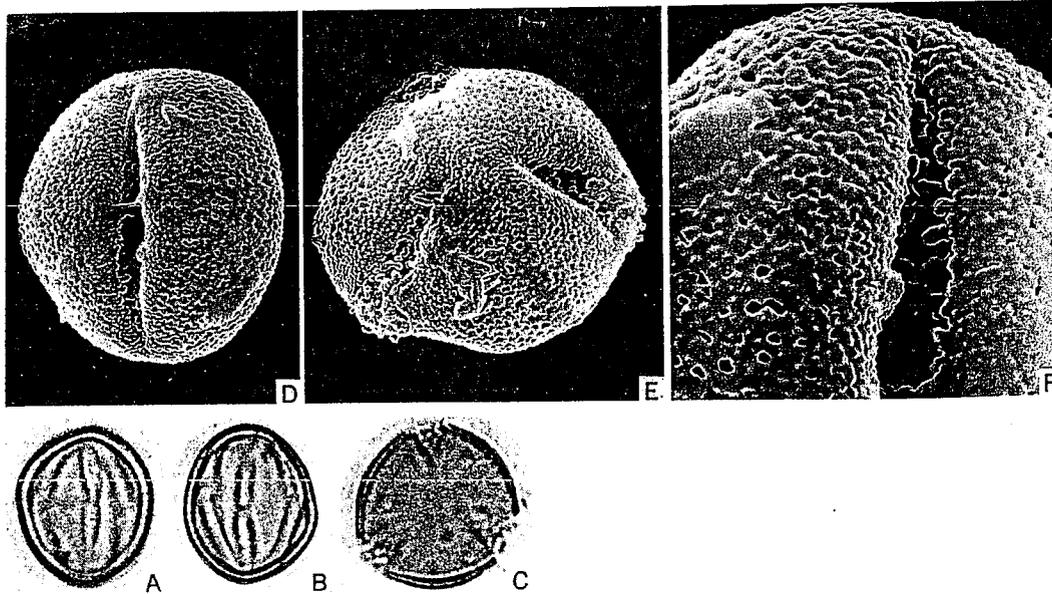
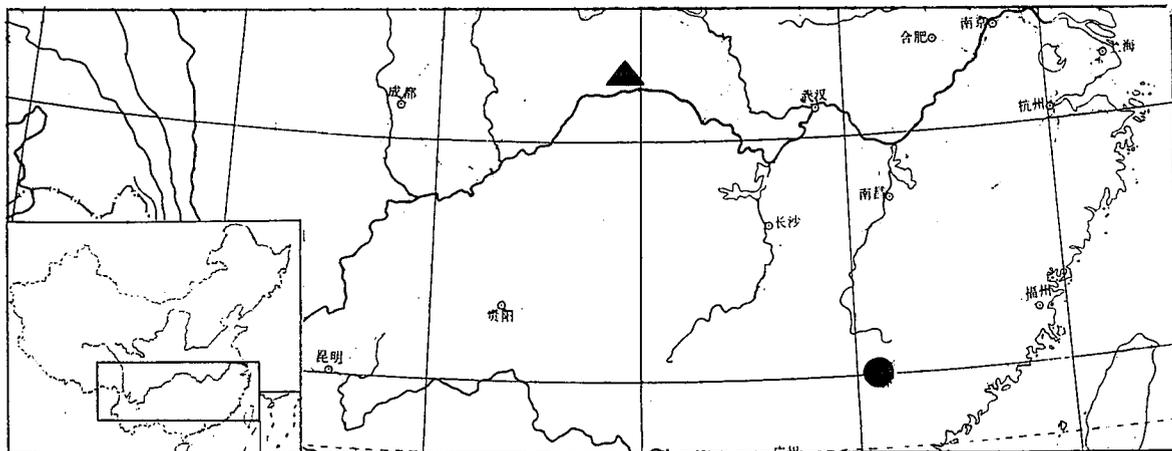


Figure 110.2. (A-F) *Deinocheilos jiangxiense* W. T. Wang. Pollen (*Dept. Biol., Jiangxi Teachers Col. s. n., PE*); A, equatorial view showing aperture, LM X 1000; B, equatorial optical cross section, LM X 1000; C, polar optical cross section, LM X 1000; D, equatorial view showing aperture and ornamentation, SEM X 2400; E, oblique polar view, SEM X 2400; F, detail of aperture and ornamentation, SEM X 6000.



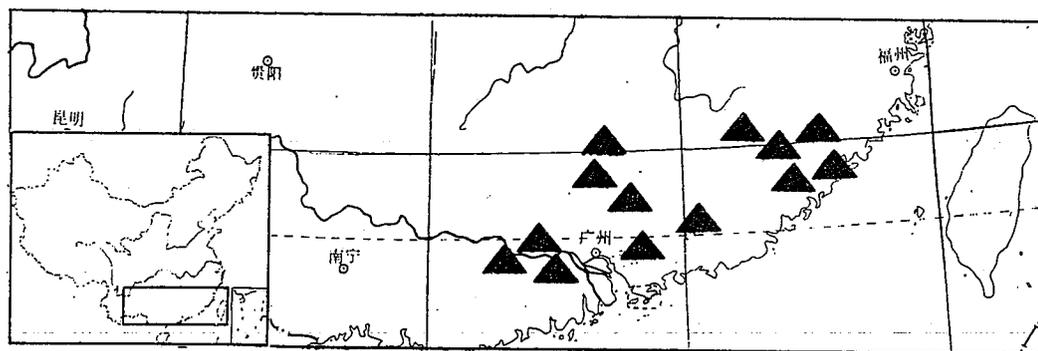
Map 110. ● *Deinocheilos jiangxiense* W. T. Wang; ▲ *D. sichuanense* W. T. Wang.

111. *Didymostigma* W. T. Wang, Acta Phytotax. Sin. 22: 188. 1984. Figure 111. Type species: *Didymostigma obtusum* (Clarke) W. T. Wang.

**Description:** Annual herbs. Stems 4-angled, pubescent. Leaves opposite, ovate, pubescent on both surfaces, serrulate; petiole pubescent. Cymes axillary; peduncled; bracts similar to leaves in shape, opposite, pubescent; pedicel 3-7 mm long, pubescent; calyx narrowly campanulate, divided to base, lobes 5, linear-lanceolate; corolla pale purple, bilabiate, upper lip bifid, lower lip trifid; stamens 2, inserted above middle of corolla tube; filaments slightly curved, linear, subequal in width, 1-nerved; anthers ellipsoid, basifixed, apex coherent, locules parallel, not confluent; staminodes 2, linear. Disc cyathiform. Ovary slender cylindrical, remotely pubescent, parietal placentas 2, ovules numerous; style slender; stigmas 2, equal. Capsule slender cylindrical, ca. 4 cm long, puberulous, loculicidally dehiscent. Seeds ellipsoid, smooth. Fl. Jun-Oct; fr. unknown. Monotypic.

**Ecology:** *Didymostigma* grows in forests and along trails and roadsides in forested areas; 650-1200 m.

**Geography:** *Didymostigma* occurs in Guangdong and Fujian provinces. Map 111.



Map 111. ▲ *Didymostigma obtusum* (Clarke) W. T. Wang.

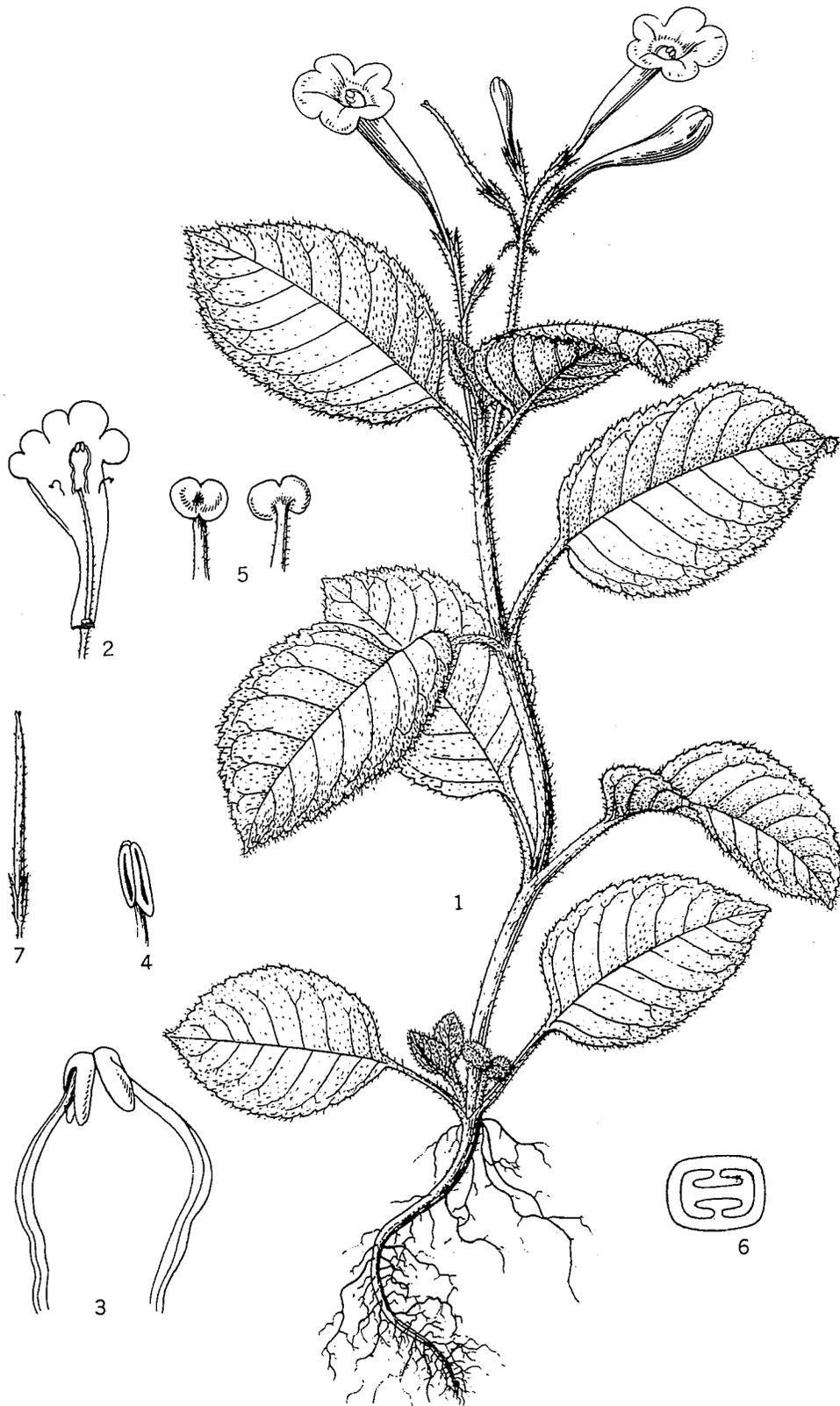


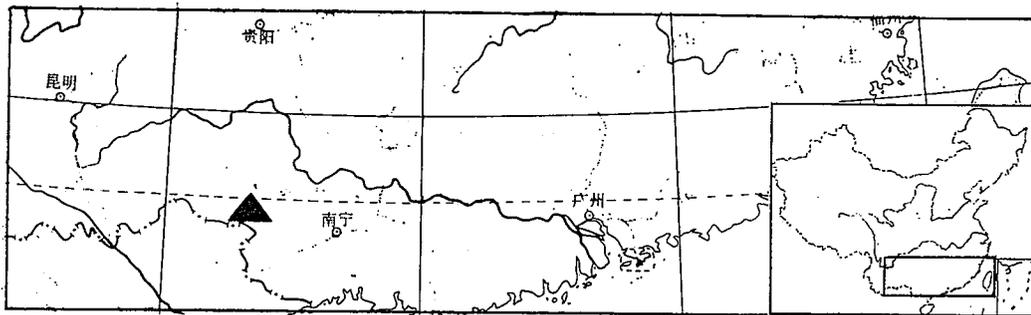
Figure 111. *Didymostigma obtusum* (Clarke) W. T. Wang: 1, habit; 2, corolla opened to show stamens and staminodes; 3, stamens; 4, anther, adaxial view; 5, stigma; 6, cross section of ovary; 7, capsule and persistent calyx. (S. Q. Cai)

112. *Dolicholoma* D. Fang & W. T. Wang, Bot. Res. Acad. Sin. 1: 18. 1983. Figure 112. Type species: *Dolicholoma jasminiflorum* D. Fang & W. T. Wang.

**Description:** Rhizomatous perennial herbs. Leaves basal, narrowly ovate or elliptic, both surfaces white pubescent, lower surface sometimes purple, margins ciliate; petiole white, glandular pubescent. Scapes 2-7, slender. Inflorescence a cyme; bracts 1-2, linear, pubescent; pedicel white pubescent; calyx campanulate, divided to base, lobes 5, narrowly linear; corolla rose pink, villose outside, puberulous above middle inside, bilabiate, upper lip bifid to near base, lower lip trifid, lobes narrowly triangular; stamens glabrous; filaments inserted near throat, ca. 1 mm long; anthers dorsifixed, apex coherent, locules confluent; staminodes 2, small, narrowly linear. Disc annular. Ovary narrowly ovoid, puberulous; parietal placentas 2; style slender, pubescent; stigma disciform. Capsule ellipsoid, 4-valved. Seeds narrowly elliptic, smooth. Fl. Apr; fr. Oct. Monotypic.

**Ecology:** *Dolicholoma* grows on rocks and in rock crevices in shady places in mountainous regions; 1200 m.

**Geography:** *Dolicholoma* is restricted to Guangxi Province. Map 112.



Map 112. ▲ *Dolicholoma jasminiflorum* D. Fang & W. T. Wang.

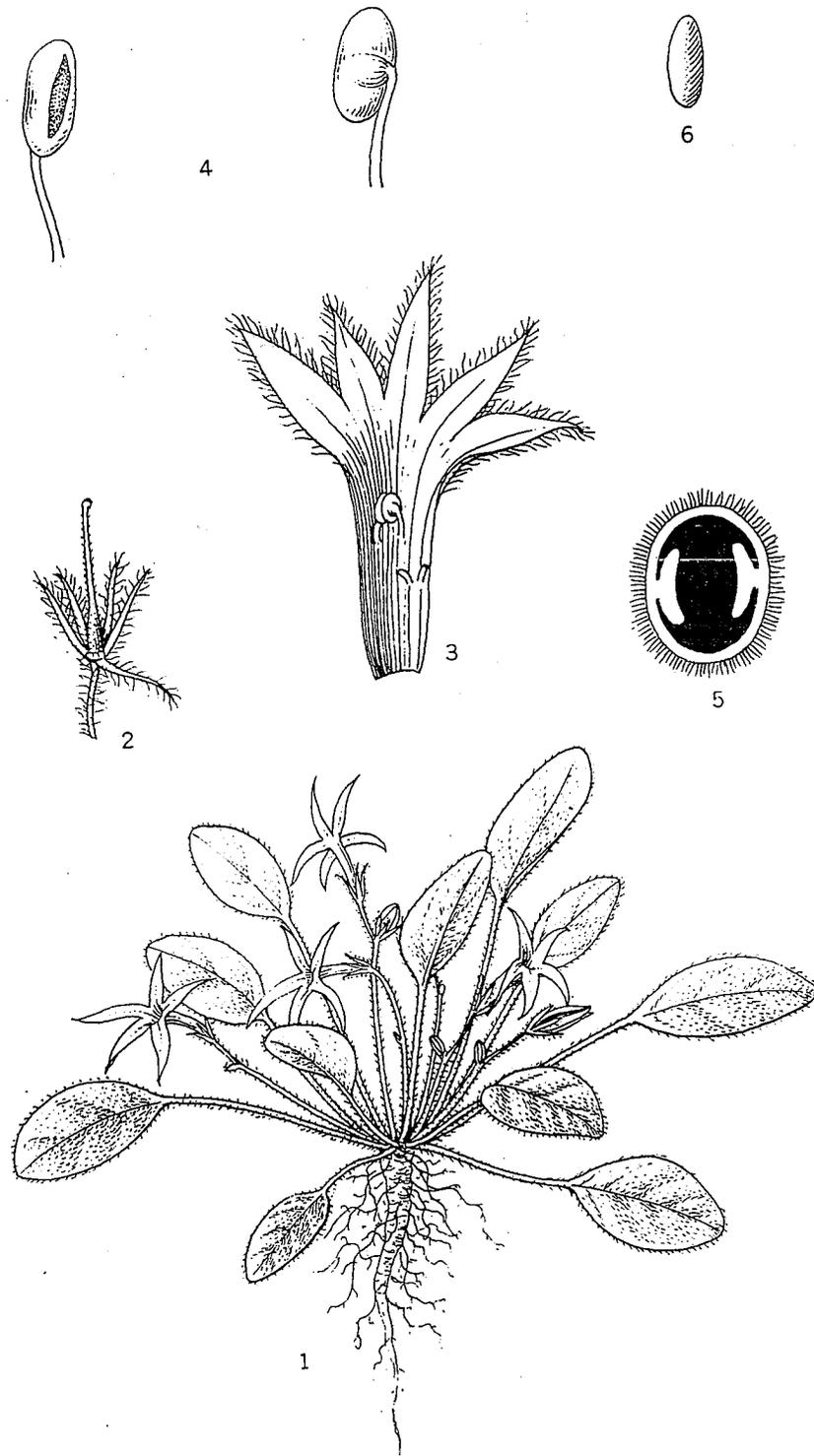


Figure 112. *Dolicholoma jasminiflorum* D. Fang & W. T. Wang: 1, habit; 2, calyx and pistil; 3, corolla opened to show stamens and staminodes; 4, stamens, adaxial and abaxial views; 5, cross section of ovary; 6, seed. (C. Z. Ji)

113. *Gyrocheilos* W. T. Wang, Bull. Bot. Res., Harbin 1(3): 28. 1981. Figure 113.1. Type species: *Gyrocheilos chorisepalum* W. T. Wang.

**Description:** Perennial acaulescent herbs; rhizomes stout. Leaves basal, coriaceous or papery, cordate or kidney-shaped, doubly dentate, both surfaces pubescent or strigose, palmately nerved; petiole 3-24 cm long. Cymes branched; bracts 2, opposite; pedicel glabrous; calyx broadly campanulate, divided, lobes 5, or 2-5-parted, lobes linear or oblong; corolla purple or rose pink, bilabiate, upper lip semiorbicular, undivided, lower lip trifid, glabrous; stamens 2, glabrous; filaments linear-lanceolate; anthers ellipsoid, coherent, locules confluent; staminodes 2, small, narrowly linear or clavate. Disc annular. Pistil exserted; ovary slender cylindrical, glabrous; style equalling ovary in length; stigma capitate. Capsule slender cylindrical, 1.5-3 cm long, glabrous. Seeds fusiform. Fl. Mar-May; fr. Jun-Sep. A genus of four species.

#### Key to species

1. Calyx pubescent on outer surface; leaves widely ovate ..... 1. *G. lasiocalyx* W. T. Wang
1. Calyx glabrous on outer surface or remotely pubescent at apex.
  2. Leaves kidney-shaped, apex rounded, upper surface with short and long hairs; staminodes narrowly linear.
  2. Leaves cordate, apex acute, upper surface with hairs equal in length; staminodes clavate, rarely narrowly linear.
    3. Calyx 5-divided ..... 2a. *G. chorisepalum* W. T. Wang var. *chorisepalum*
    3. Calyx 4-parted ..... 2b. *G. chorisepalum* var. *synsepalum* W. T. Wang
    4. Upper surface of leaves with very short hairs (0.1-0.2 mm long), lower surface strigose only along nerves; petiole and scape strigose; calyx 5-divided ..... 3. *G. microtrichum* W. T. Wang
    4. Leaves densely long hairs (0.6-1.6 mm long); petiole and scape with spreading hairs; calyx 2-5-parted.
      5. Calyx 5-parted; staminodes clavate .....  
..... 4a. *G. retrotrichum* W. T. Wang var. *retrotrichum*
      5. Calyx 2-4-parted; staminodes narrowly linear .....  
..... 4b. *G. retrotrichum* var. *oligolobum* W. T. Wang

**Pollen:** Pollen grains of *Gyrocheilos retrotrichum* are 3-colporoidate, prolate, circular-lobate in polar view. Size: P = (14.8-)16.6(-18.3)  $\mu\text{m}$ , E = (9.6-)11.7(-14.8)  $\mu\text{m}$ . Colpi long and narrow, constricted in the middle, with indistinct membrane. Endoaperture (oroid) indistinctly delimited. Exine ca. 1  $\mu\text{m}$  thick, sexine and nexine indistinguishable (LM), minutely granulate. Exine surface uneven. Figure 113.2.

**Ecology:** *Gyrocheilos* grows in forests, in wet places in valleys and on rocks beside streams; 450-1600 m.

**Geography:** *Gyrocheilos* is in Guangxi and Guangdong provinces. Map 113.

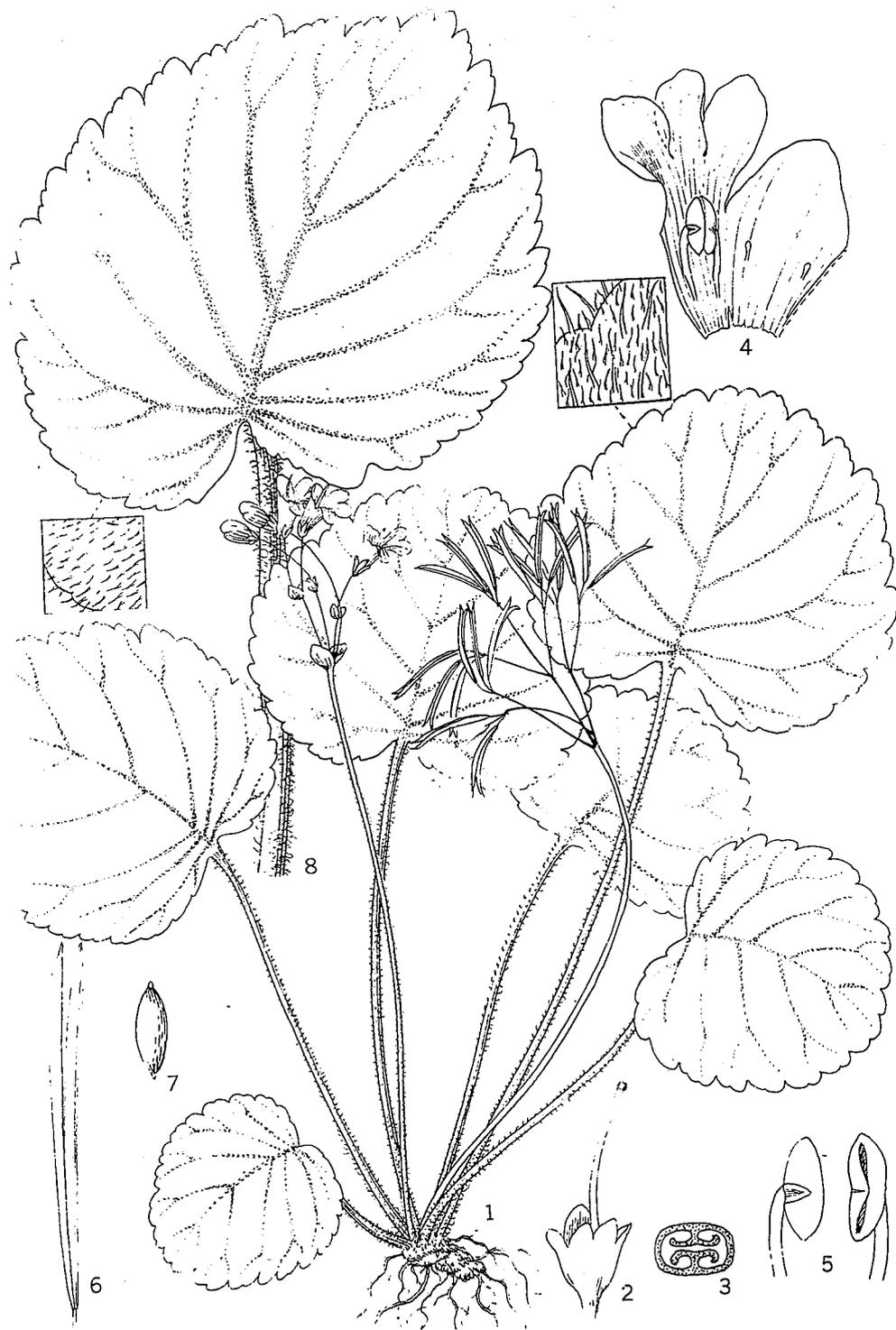


Figure 113.1. *Gyrocheilos chorisepalum* W. T. Wang: 1, habit; 2, calyx and pistil; 3, cross section of ovary; 4, corolla opened to show stamens and staminodes; 5, anthers; 6, fruit; 7, seed. *G. retrotrichum* W. T. Wang: 8, leaf. (J. F. Wang)

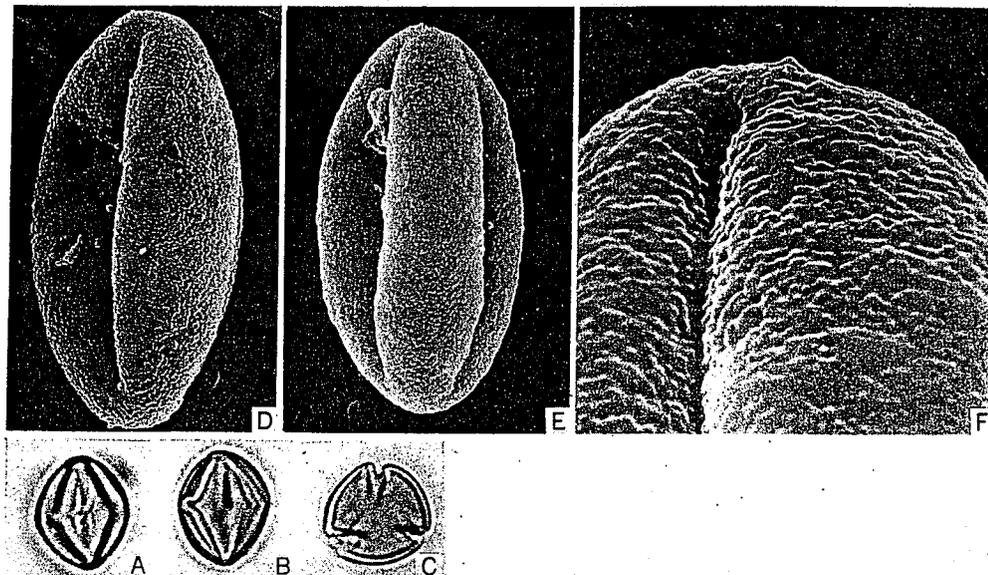
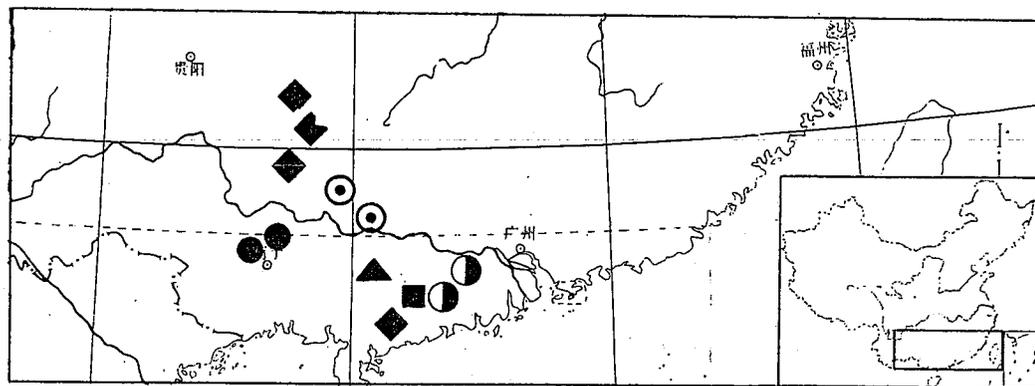


Figure 113.2. (A-F) *Gyrocheilos retrotrichum* W. T. Wang var. *retrotrichum*. Pollen (X. P. Gao 51222, PE); A, equatorial view showing aperture, LM X 1000; B, equatorial optical cross section, LM X 1000; C, polar optical cross section, LM X 1000; D, equatorial view showing aperture and ornamentation, SEM X 3600; E, equatorial view showing mesocolpium, SEM X 3600; F, detail of aperture and ornamentation, SEM X 12000.



Map 113. ● *Gyrocheilos chorisepalum* W. T. Wang var. *chorisepalum*; ▲ *G. chorisepalum* var. *synsepalum* W. T. Wang; ⊙ *G. lasiocalyx* W. T. Wang; ■ *G. microtrichum* W. T. Wang; ◐ *G. retrotrichum* W. T. Wang var. *retrotrichum*; ◆ *G. retrotrichum* var. *oligolobum* W. T. Wang.

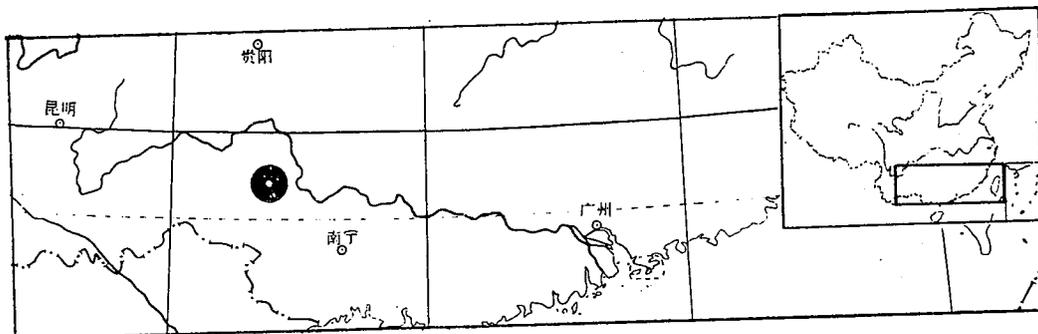
114. *Gyogyne* W. T. Wang, Bull. Bot. Res., Harbin 1(3): 41. 1981. Figure 114.1. Type species: *Gyogyne subaequifolia* W. T. Wang.

**Description:** Perennial herbs; rhizomes short. Stems pale brown puberulous, erect. Leaves opposite, ovate, 4-8 cm long, 3.4-5.8 cm wide, upper surface remotely pubescent, lower surface puberulous along nerves, dentate; petiole sparsely puberulous. Inflorescence a terminal cyme, peduncles ca. 1 cm long, pubescent; pedicel 1.5-4 mm long; calyx widely campanulate, outer surface remotely puberulous, inner surface glabrous, 5-lobed, lobes triangular; corolla 10 mm long, base saccate, outer surface puberulous, inner surface glabrous, bilabiate, upper lip bifid, lower lip trifid; stamens 4, glabrous; filaments 1.2 mm long, inserted near base of corolla tube; anthers divergent, locules subparallel; apex of connective mucronate; staminode 1, small. Disc annular. Ovary compressed globose, glabrous; parietal placentas 2; style slender, 4 times longer than ovary; stigma depressed globose. Fruit unknown. Fl. Jun; fr. Monotypic.

**Pollen:** Pollen grains of *Gyogyne subaequifolia* are 3-colporoidate, subspheroidal, subcircular in polar view. Size: P = (15.7-)16.4(-17.4)  $\mu\text{m}$ , E = (17.4-)17.9(-19.1)  $\mu\text{m}$ . Colpi long and rather narrow, slightly but distinctly delimited, with granular membrane. Endoaperture (oroid) indistinctly delimited. Exine 1.5  $\mu\text{m}$  thick, sexine and nexine indistinguishable (LM), verrucate-rugulate. Figure 114.2.

**Ecology:** *Gyogyne* grows in shady places on slopes; ca. 300 m.

**Geography:** *Gyogyne* is restricted to western Guangxi Province. Map 114.



Map 114. ● *Gyogyne subaequifolia* W. T. Wang.

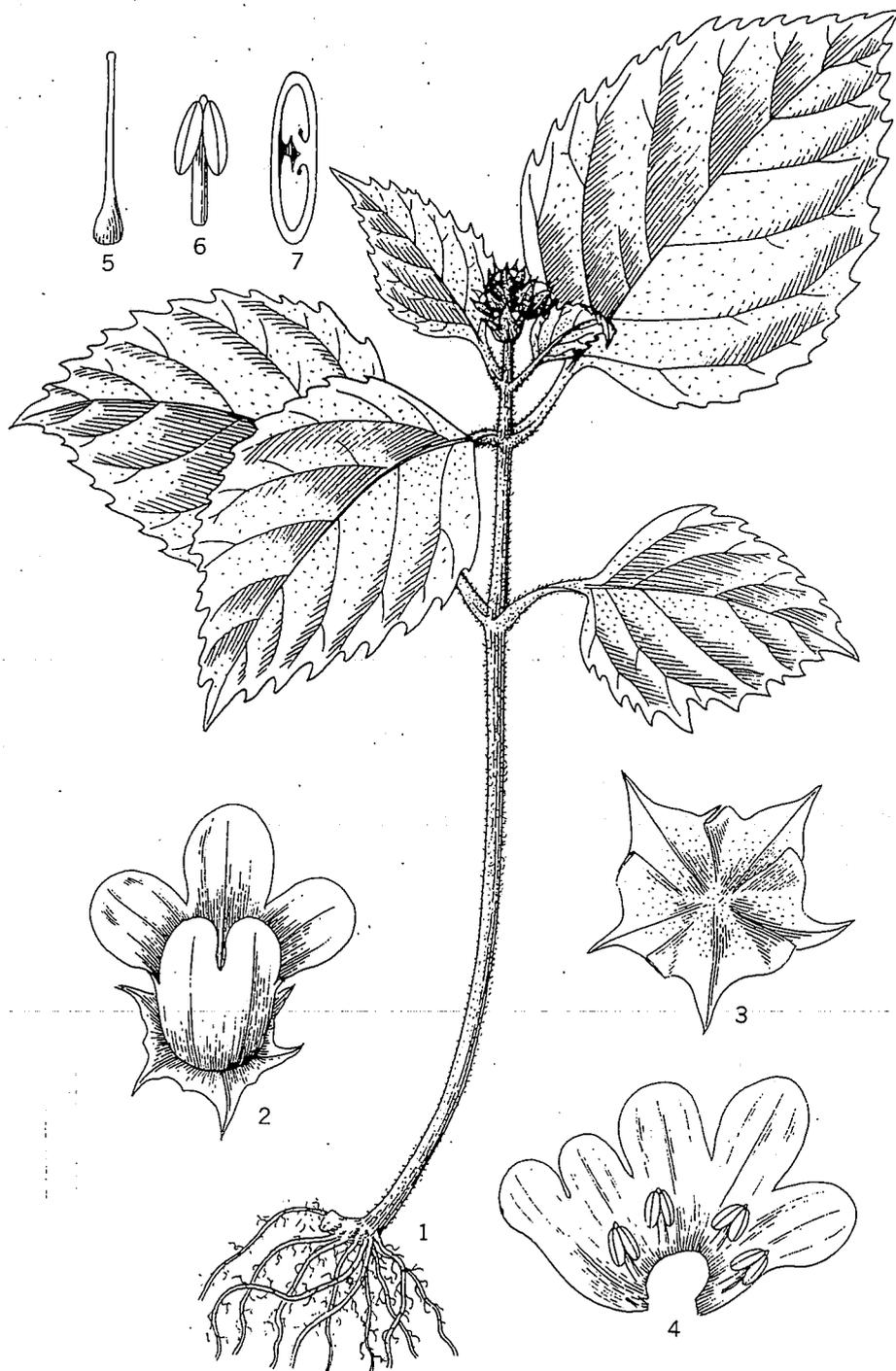


Figure 114.1. *Gyrogyne subaequifolia* W. T. Wang: 1, habit; 2, flower; 3, calyx; 4, corolla opened to show insertion of stamens; 5, pistil; 6, stamen; 7, cross section of ovary. (J. F. Wang)

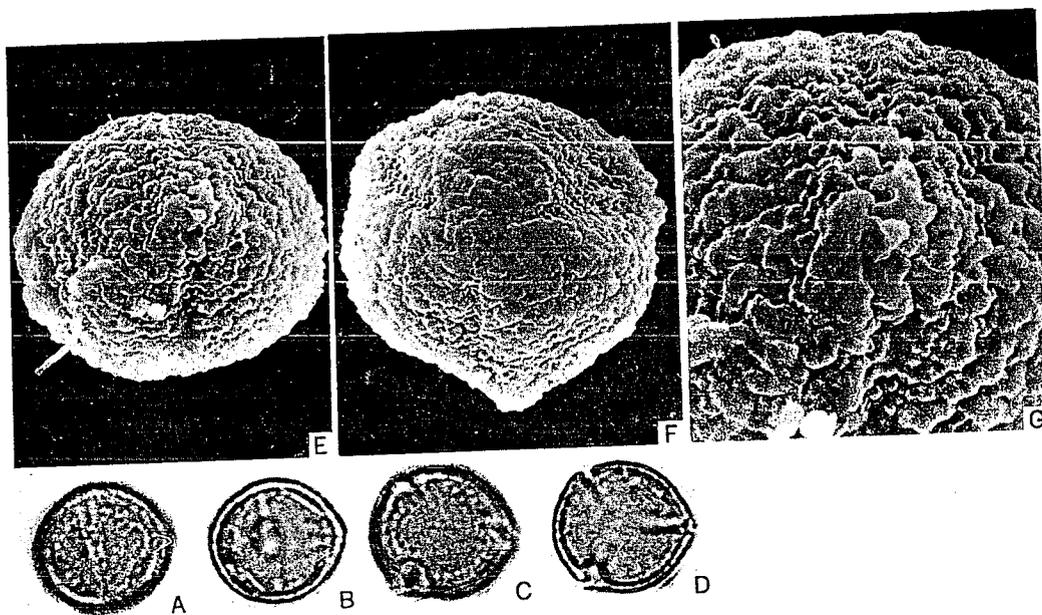


Figure 114.2. (A-G) *Gyrogyne subaequifolia* W. T. Wang. Pollen (R. Z. Huang 3-22094, PE); A, equatorial view showing aperture and ornamentation, LM X 1000; B, equatorial optical cross section, LM X 1000; C, polar view, LM X 1000; D, polar optical cross section, LM X 1000; E, equatorial view showing aperture and ornamentation, SEM X 3000; F, polar view, SEM X 3000; G, detail of aperture and ornamentation, SEM X 6000.

115. *Hemiboea* Clarke, Hooker's Icon. Pl. 18: pl. 1798. 1888. Figure 115.2. Type species: *Hemiboea follicularis* Clarke.

**Description:** Perennial herbs, stems erect. Leaves opposite, petiolate. Inflorescence a short, terminal or axillary cyme, sometimes solitary. Involucres boat-shaped, semi-globose or urceolate. Calyx 5-lobed, lobes 3-veined. Corolla funnel-shaped, white, pale yellow or roseate, limb bilabiate, upper lip 2-lobed, lower lip 3-lobed. Fertile stamens 2, inserted in corolla tube, filaments narrowly linear or filiform, anther sacs parallel, apex not confluent; staminodes 2 or 3, inserted in corolla tube. Disc annular. Ovary superior, linear, 2-locular, only 1 locule fertile, stigma truncate or capitate. Capsule oblong-lanceolate to slender cylindrical, loculicidally dehiscent. Seeds numerous, small, 6-ribbed, glabrous. Fl. Jun-Dec; fr. Sep-Dec (or the following spring). *Hemiboea* is a genus of 21 species.

**Uses:** Most species of the genus are used in traditional Chinese medicine and as fodder. The leaves of *Hemiboea henryi* are used as a vegetable.

#### Key to species

1. Sepals separate or some of them united.
  2. Sepals glabrous.
    3. Involucre glabrous.
      4. Corolla glabrous.
        5. Leaves entire, glabrous; sepals 7-8 mm long, 2 mm wide ..... 1. *H. integra* C. Y. Wu ex H. W. Li
        5. Leaf margins repand, puberulous; sepals 8-20 mm long, 2.5-4 mm wide.
          6. Sepals 19-20 mm long, 2.5 mm wide; stems nearly cylindrical ..... 2. *H. longisepala* Z. Y. Li
          6. Sepals 8-9 mm long, 3-4 mm wide; stems quadrangular ..... 3. *H. bicornuta* (Hayata) Ohwi
      4. Corolla sparsely glandular puberulous.
        7. Leaves and involucres herbaceous.
          8. Leaf surfaces verrucose only on veins.
            9. Sepals 4.5-8(-12) mm long; anthers 1.1-3.2 mm long.
              10. Stems with 4-15 nodes; lateral veins 6-14 pairs; cymes (1-)-3-12 flowered; anthers (2.5-)3-3.2 mm long; staminodes 2 or 3 ..... 4. *H. cavaleriei* H. Léveillé
              10. Stems with 3-5 nodes; lateral veins 4-6 pairs; cymes 1-3-flowered; anthers 1.1-2.5 mm long; staminodes 2 ..... 5. *H. gracilis* Franchet
            9. Sepals 15-18 mm long; anthers 3.5-4 mm long ..... 6. *H. omeiensis* W. T. Wang
          8. Leaf surfaces clavate-verrucose.
            11. Sepals separate; disc 1-1.2 mm tall.
              12. Petiole bases not united; sepals 5-9 mm long ..... 7. *H. subcapitata* Clarke
              12. Petiole bases united, boat-shaped; sepals 10-12 mm long ..... 8. *H. henryi* Clarke
            11. Some sepals united; disc 1.8 mm high ..... 9. *H. latisejala* H. W. Li
      7. Leaves and involucres fleshy ..... 10. *H. lungzhouensis* W. T. Wang ex Z. Y. Li

3. Involucre pubescent.
13. Stems glabrous, petiole slender.
14. Stems with up to 12 nodes, branched, nodes inflated; leaves densely pubescent, petiole glabrous, lateral veins 7-11 pairs; pedicel pubescent ..... 11. *H. pingbianensis* Z. Y. Li
14. Stems with 3-5 nodes, unbranched, nodes not inflated; leaves and petiole slightly puberulous, lateral veins 4-6 pairs; pedicel glabrous ..... 5. *H. gracilis* Franchet
13. Stems pubescent; petiole complanate.
15. Petiole bases not united ..... 12. *H. subacaulis* Handel-Mazzetti
15. Petiole bases united.
16. Flowers ca. 2.2 cm long ..... 13. *H. parviflora* Z. Y. Li
16. Flowers 3.5-4 cm long ..... 8. *H. henryi* Clarke
2. Sepals glandular pubescent.
17. Ovary and capsule glabrous.
18. Petiole wingless, not united; sepals 11-15 mm long, 2.5-5 mm wide.
19. Upper surface of leaves slightly puberulous, petiole glabrous.
20. Leaves entire; disc 0.8 mm tall ..... 14. *H. glandulosa* Z. Y. Li
20. Leaves dentate or crenate; disc 1.4 mm tall ..... 15. *H. fangii* Chun ex Z. Y. Li
19. Both surfaces of leaves densely pubescent, petiole spreading pubescent ..... 16. *H. mollifolia* W. T. Wang
18. Petiole winged, petiole bases united on upper stem, boat-shaped; sepals 7-9 mm long, 1.2-2.2 mm wide ..... 17. *H. strigosa* Chun ex W. T. Wang
17. Ovary and capsule glandular puberulous.
21. Stems with 3-6 nodes, densely pubescent and puberulous; lateral veins 5-8 pairs; corolla tube without a ring of hairs inside; anthers narrowly oblong ..... 18. *H. flaccida* Chun ex Z. Y. Li
21. Stems with 10-15 nodes, glandular puberulous upward; lateral veins 8-12 pairs; corolla tube with a ring of hairs inside; anthers nearly globose ..... 19. *H. longgangensis* Z. Y. Li
1. Sepals all united.
22. Sepals united below middle; corolla 3.8-4 cm long, rose pink, exserted; style longer than ovary; capsule linear-lanceolate, 1.8-2.4 cm long ..... 20. *H. gamosepala* Z. Y. Li
22. Sepals united above middle; corolla 1.5-1.8 cm long, pale green, included; style shorter than ovary; capsule oblong-lanceolate, 1-1.5 cm long ..... 21. *H. follicularis* Clarke

**Pollen:** Pollen grains of *Hemiboea henryi* are 3-colporoidate, subspheroidal, sometimes subprolate, subcircular in polar view. Size: P = (18.3-)-19.7(-21.8)  $\mu\text{m}$ , E = (18.3-)-20.2(-21.8)  $\mu\text{m}$ . Colpi long and broad; colpus membrane with granular processes. Endoaperture (oroid) indistinctly delimited. Exine ca. 1.7  $\mu\text{m}$  thick, sexine as thick as nexine, finely reticulate. Muri rather coarse; lumina subcircular-elliptic, rather irregular in shape. Figure 115.1.

**Ecology:** *Hemiboea* grows on rocks and in wet places within forests and at forest margins, in rock crevices by streams and in other wet, shady places in karst regions; 80-2100 m.

**Geography:** *Hemiboea* is distributed from the eastern edge of the Xizang and Yunnan plateaus eastward to Taiwan, and from the southern slopes of the Qinling mountain range southward to Yunnan and Guangdong. *Hemiboea bicornuta* also occurs in the Ryukyu Islands, Japan, and *H. cavaleriei* var. *paucinervis* is in northernmost Vietnam. Maps 115.1 and 115.2.

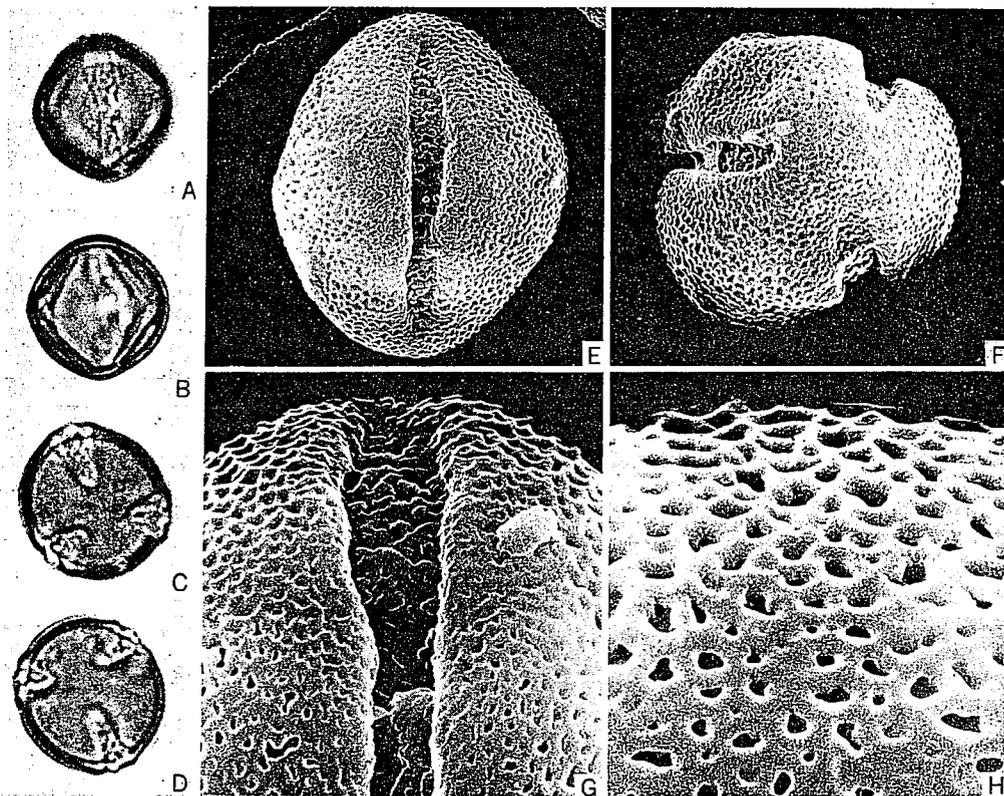
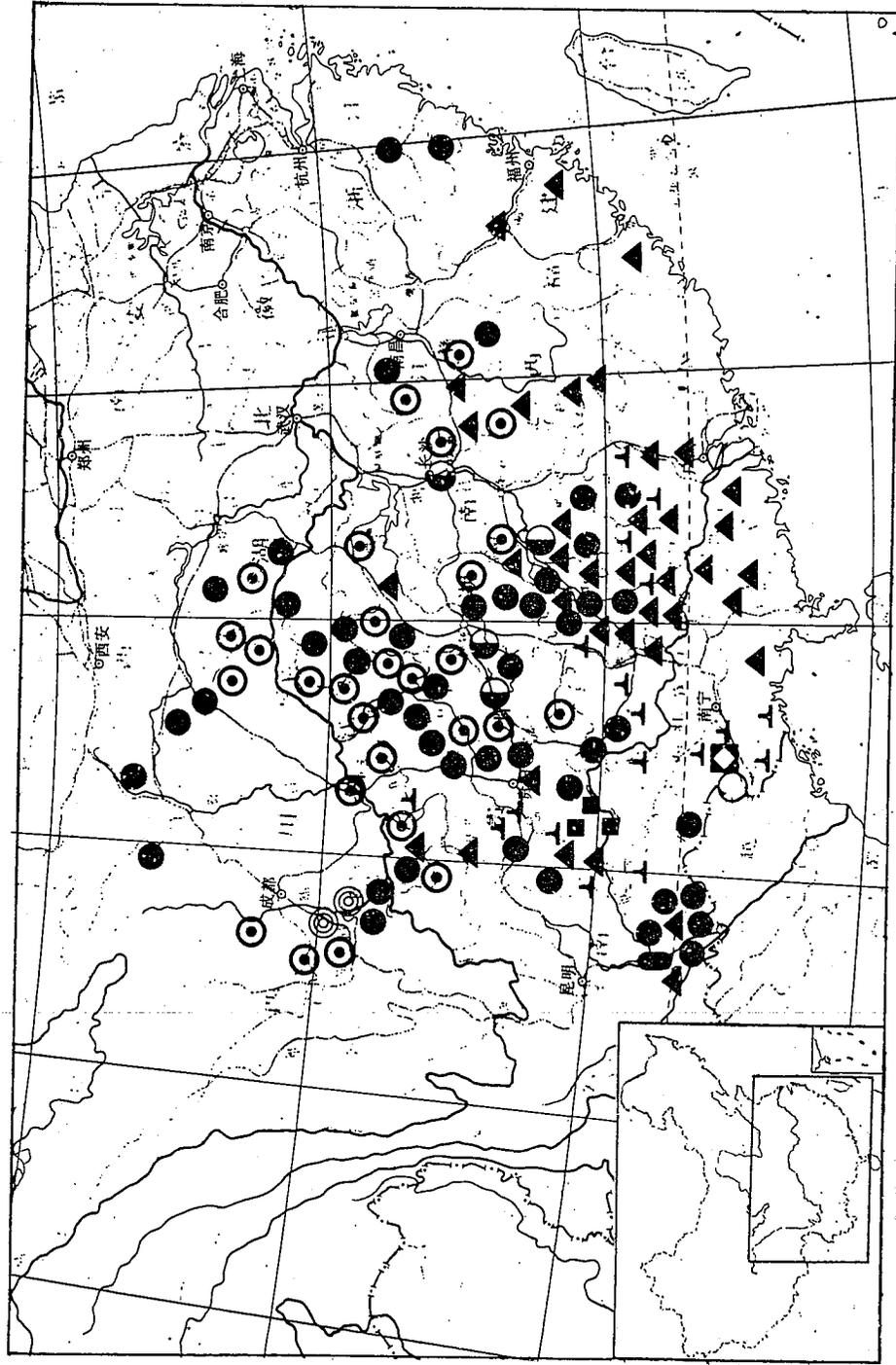


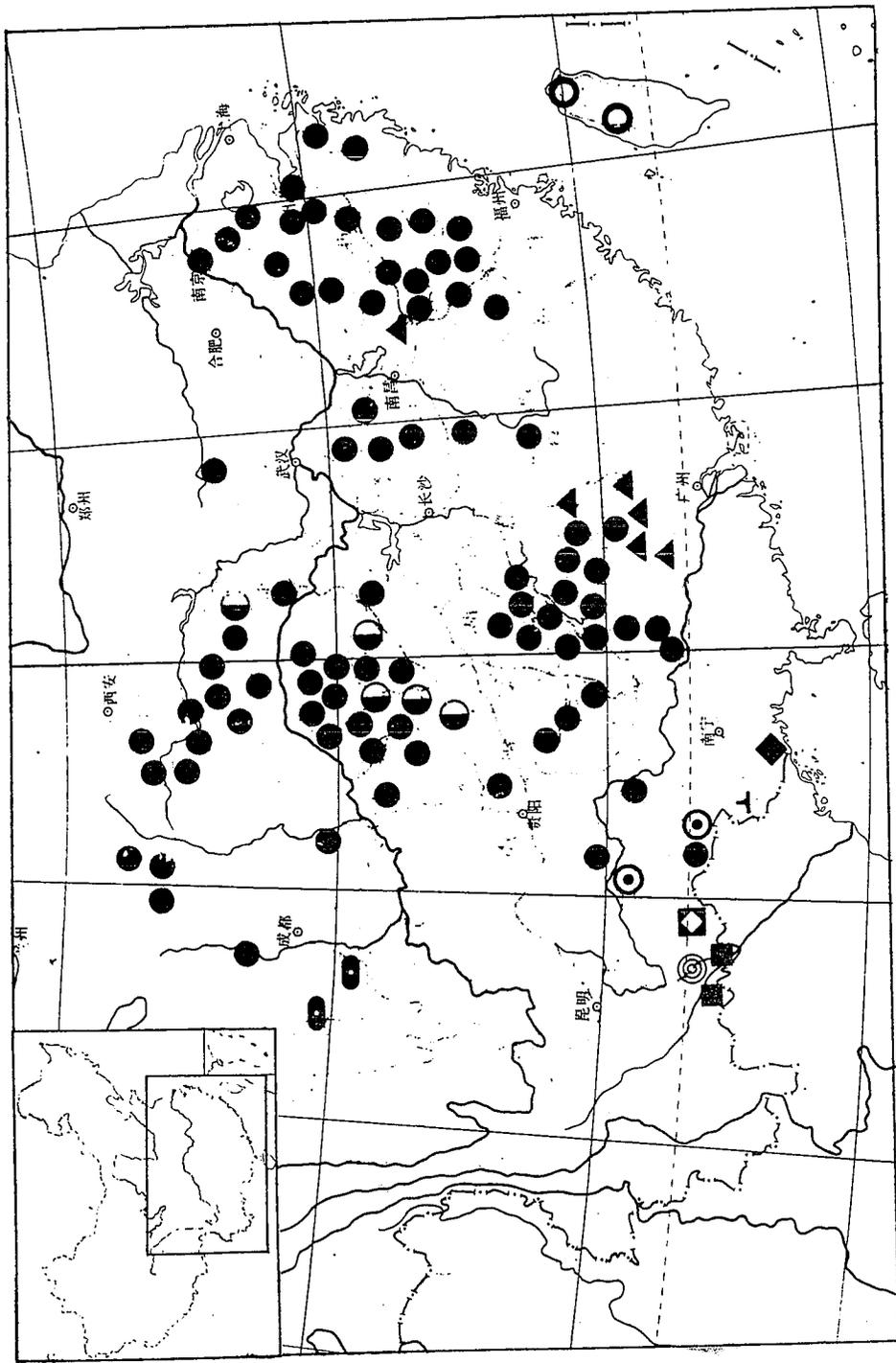
Figure 115.1. (A-H) *Hemiboea henryi* Clarke. Pollen (*Y. X. He* 24630, PE); A, equatorial view showing aperture, LM X 1000; B, equatorial optical cross section, LM X 1000; C, polar view, LM X 1000; D, polar optical cross section, LM X 1000; E, equatorial view showing aperture and ornamentation, SEM X 2400; F, oblique polar view, SEM X 2400; G, detail of aperture and ornamentation, SEM X 6000; H, detail of ornamentation, SEM X 12000.



Figure 115.2 *Hemiboea follicularis* Clarke: 1, habit; 2, corolla opened; 3, sepals and pistil.  
*H. henryi* Clarke: 4, upper portion of plant. (S. Q. Cai)



Map 115.1. ▲ *Hemiboea cavaleriei* H. Léveillé; ◎ *H. fangii* Chun ex Z. Y. Li; ▲ *H. follicularis* Clarke; ■ *H. gamosepala* Z. Y. Li; ● *H. glandulosa* Z. Y. Li; ○ *H. gracilis* Franchet; ◆ *H. longgangensis* Z. Y. Li; ○ *H. parviflora* Z. Y. Li; ⊙ *H. subcapitata* Clarke.



Map 115.2. ○ *H. bicornuta* (Hayata) Ohwi; ◉ *H. flaccida* Chun ex Z. Y. Li; ● *H. henryi* Clarke; ■ *H. integra* C. Y. Wu ex H. W. Li; ◆ *H. latiseipala* H. W. Li; ◈ *H. longiseipala* Z. Y. Li; ▲ *H. lungzhouensis* W. T. Wang ex Z. Y. Li; ◉ *H. mollifolia* W. T. Wang; ◉ *H. omeiensis* W. T. Wang; ⊙ *H. pingbianensis* Z. Y. Li; ▲ *H. strigosa* Chun ex W. T. Wang.

116. *Hemiboeopsis* W. T. Wang, Acta Bot. Yunnan. 6: 397. 1984. Figure 116.1. Type species: *Hemiboeopsis longisepala* (H. W. Li) W. T. Wang.

**Description:** Subshrubs, 25-80 cm tall. Leaves opposite, papery, oblong or oblong-lanceolate, entire or repand-crenate, lower surface remotely pubescent along nerves; petiole sparsely pubescent. Axillary cymes with 3-7 flowers; peduncles pubescent; bracts 2, suborbicular or ovate-orbicular, opposite, glabrous; pedicel glabrous; calyx divided to base, lobes 5, spatulate-linear, glabrous; corolla pale purple or white, funnel-shaped, bilabiate, upper lip bifid, lower lip trifid, lobes ovate-orbicular; stamens 2, included; filaments linear, inserted below middle of corolla tube, slightly curved; anthers ellipsoid, dorsifixed, ventrally coherent, locules confluent at apex, connective with a triangular appendage at apex; staminodes 2, narrowly linear, apex slightly enlarged. Disc annular. Ovary slender cylindrical, bilocular, placentation axile; style equalling ovary in length, with black glands near base; stigmas 2. Capsule slender cylindrical, ca. 8 cm long, glabrous, verrucose. Seeds ellipsoid, smooth. Fl. Apr-May; fr. May-Jun. Monotypic.

**Pollen:** Pollen grains of *Hemiboeopsis longisepala* are 3-colporoidate, subspheroidal, subcircular in polar view. Size: P = (17.4-)19.4(-21.8)  $\mu\text{m}$ , E = (15.7-)18.7(-20.9)  $\mu\text{m}$ . Colpi long and slightly broad; colpus membrane with irregularly granulate processes. Endoaperture (oroid) indistinctly delimited. Exine 1.7  $\mu\text{m}$  thick, sexine as thick as nexine, with indistinct columellae (LM), finely reticulate. Muri rather thin; lumina subcircular, elliptic or angular in shape, larger in polar areas, smaller on colpus margins. Figure 116.2

**Ecology:** *Hemiboeopsis* grows in thickets in valleys, in shady places along streams and in banana forests; 250-800 m.

**Geography:** *Hemiboeopsis* is restricted to southernmost Yunnan. Map 116.



Figure 116.1. *Hemiboeopsis longisepala* (H. W. Li) W. T. Wang: 1, upper portion of stem; 2, inflorescence; 3, seeds; 4, sepals; 5, corolla opened to show stamens; 6, pistil and disc; 7, stamens; 8, anthers; 9, cross section of immature fruit. (J. F. Wang)

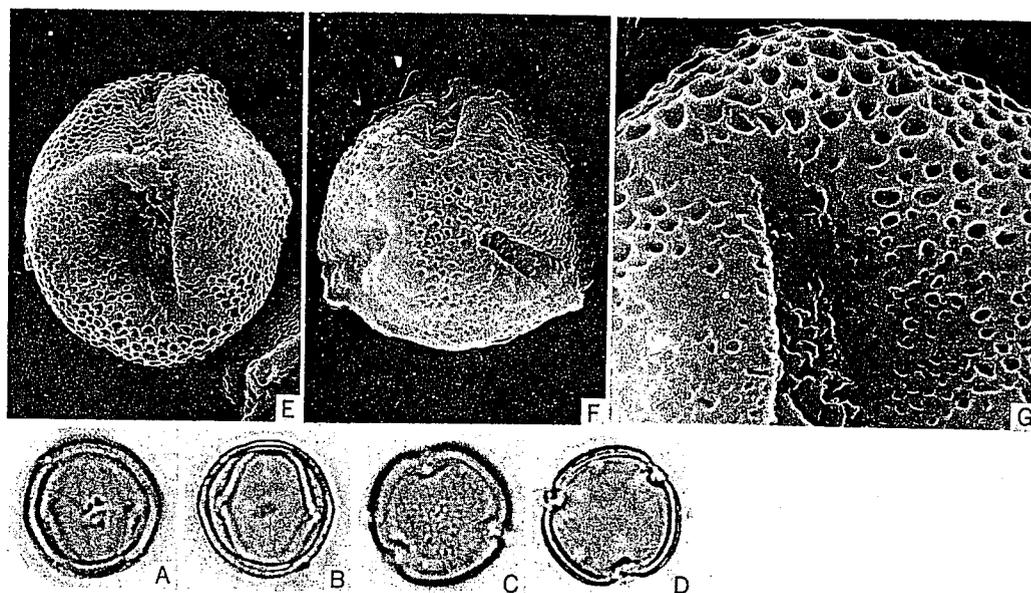
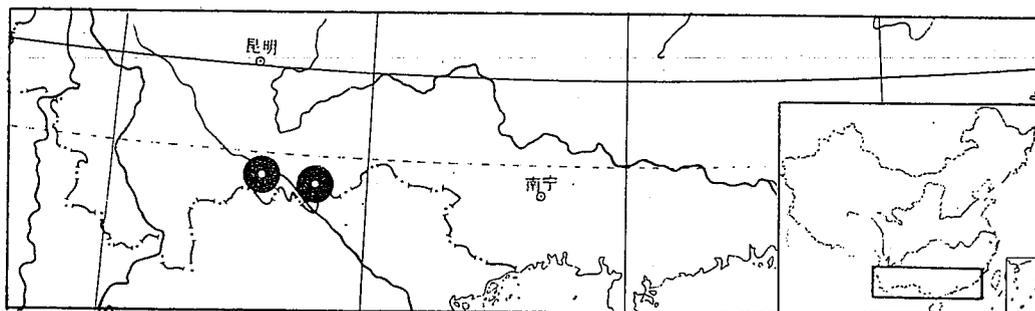


Figure 116.2. (A-G) *Hemiboeopsis longisepala* (H. W. Li) W. T. Wang. Pollen (without collector 292, PE); A, equatorial view showing aperture, LM X 1000; B, equatorial optical cross section, LM X 1000; C, polar view, LM X 1000; D, polar optical cross section, LM X 1000; E, equatorial view showing aperture and ornamentation, SEM X 2400; F, polar view, SEM X 2400; G, detail of aperture and ornamentation, SEM X 6000.



Map 116. ● *Hemiboeopsis longisepala* (H. W. Li) W. T. Wang.

117. *Isometrum* Craib, Notes Roy. Bot. Gard. Edinburgh 11: 250. 1919. Figure 117.1. Type species: *Isometrum farreri* Craib.

**Description:** Perennial rhizomatous herbs. Leaves basal, sessile or petiolate, pinnately lobed or undivided, dentate, usually pubescent on both sides. Scapes 2-5, pubescent or glandular pubescent; cymes branched or unbranched; peduncles and pedicels brown villose and glandular pubescent, rarely without glandular hairs; bracts 2; calyx campanulate, divided to base, lobes 5, equal in size, outer surface puberulous; corolla campanulate or tubular, pale purple, sanguineous or blue-purple, outer surface pubescent, bilabiate, upper lip bifid, lower lip trifid; stamens 4; filaments inserted near base of corolla tube, glabrous, rarely pubescent or scaly; anthers didymous, coherent, locules divergent; staminode 1; disc annular, 5-lobed or entire. Ovary glabrous, puberulous or glandular puberulous; style shorter than or nearly equal to ovary in length; stigmas 2, spheroid. Capsule slender cylindrical-oblong or oblanceolate, glabrous or pubescent. Seeds ovoid, brown, smooth. Fl. Jul-Aug; fr. Sep-Oct. A genus of 12 species.

#### Key to species

1. Corolla campanulate, corolla tube 6-15 mm long, 5-9 mm in diam., outer surface pubescent or subglabrous.
  2. Leaves lanceolate-ovate, crenate, upper surface subglabrous; corolla sanguineous, outer surface puberulous ..... 1. *I. glandulosum* (Batalin) Craib
  2. Leaves narrowly oblong, serrate, upper surface gray appressed pubescent; corolla purple, outer surface subglabrous ..... 2. *I. fargesii* (Franchet) Burt
1. Corolla slender tubular, tube 8-14(-23) mm long, 2.7-3.6(-8) mm in diam., outer surface glandular pubescent.
  3. Leaves undivided.
    4. Corolla white, 23 mm long, 8 mm in diam., outer surface sparsely pubescent ..... 3. *I. leucanthum* (Diels) Burt
  4. Corolla sanguineous, purple or white, 11-13(-20) mm long, 3-4 mm in diam., outer surface glandular pubescent, rarely sparsely pubescent or subglabrous.
    5. Leaves crenate; disc irregularly 5 lobed.
      6. Corolla lobes suborbicular; ovary glabrous ..... 4. *I. farreri* Craib
      6. Corolla lobes oblong to obovate; ovary pubescent or with scale-like hairs.
        7. Leaves oblong-ovate, 3-5.5 cm long, 2-3 cm wide; corolla glandular pubescent on outer surface, throat not contracted; pistil shorter than calyx, ovary with brown or gray scale-like hairs ..... 5. *I. giraldii* (Diels) Burt
        7. Leaves narrowly elliptic, 2-3 cm long, 1-1.6 cm wide; corolla pubescent on outer surface, throat contracted; pistil longer than calyx, ovary pubescent ..... 6. *I. crenatum* K. Y. Pan
  5. Leaves entire or irregularly serrulate; disc repand or 5-lobed.
    8. Leaves petiolate, 1.5-7 cm long, upper surface pubescent to subglabrous; pedicel villose and glandular puberulous; corolla glandular puberulous on outer surface.
      9. Flowers 8-12 mm long, upper lip conspicuously longer than lower lip.
        10. Inflorescence 9-20 cm long; leaves oblong, oblong-lanceolate or ovate-elliptic, 3.5-14 cm long, 2-3.7 cm wide ..... 7a. *I. lancifolium* (Franchet) var. *lancifolium*

10. Inflorescence ca. 9 cm long; leaves oblong, 2-4 cm long, 0.9-1.1 cm wide ..... 7b. *I. lancifolium* var. *mucronatum* K. Y. Pan
9. Flowers 16-20 mm long, upper lip equal in length to lower lip length ..... 7c. *I. lancifolium* var. *tsingchengshanicum* W. T. Wang & K. Y. Pan
8. Leaves sessile, blade obovate-oblong, upper surface brown villose to subglabrous; pedicel villose, eglandular; corolla glabrous ..... 8. *I. villosum* K. Y. Pan
3. Leaves pinnately lobed.
11. Leaves rhomboid-elliptic, upper surface papillate; upper and lower lips equal in length; pistil equalling or slightly shorter than calyx; style ca. 0.7 mm long ..... 9. *I. primuliflorum* (Batalin) Burt
11. Leaves oblong or lanceolate, upper surface plain; pistil longer than calyx; style 1-2.5 mm long.
12. Leaves 5.5-12 cm long, 3-5.2 cm wide; anthers separate ..... 10. *I. eximium* Chun
12. Leaves 1.5-10 cm long, 0.8-4.5 cm wide; anthers connate.
13. Blade oblong, 2.7-10 cm long, 2.3-4.5 cm wide; corolla and pistil glandular puberulous ..... 11. *I. sichuanicum* K. Y. Pan
13. Blade lanceolate, 1.5-5 cm long, 0.8-1.5 cm wide; corolla sparsely pubescent; pistil glabrous ..... 12. *I. pinnatilobatum* K. Y. Pan

**Pollen:** Pollen grains of *Isometrum farreri* are 3-colporoidate, subspheroidal to subprolate, subcircular in polar view. Size: P = (17.4-)18.9(-20)  $\mu\text{m}$ , E = (14.8-)16.9(-18.3)  $\mu\text{m}$ . Colpi long and rather narrow; colpus membrane with granulate processes. Endoaperture (oroid) indistinctly delimited, protruding. Exine ca. 1  $\mu\text{m}$  thick, sexine as thick as nexine, finely reticulate. Muri rather coarse; lumina rather small, decreasing gradually in size towards colpus margins (perforation-like). Figure 117.2.

**Ecology:** *Isometrum* grows in forests, on rock cliffs along trails and roadsides, and in rock crevices in moist, shaded places; 500-2000(-3900).

**Geography:** *Isometrum* occurs in southern Gansu, western Hubei, southern Shaanxi and northwestern and eastern Sichuan provinces. Map 117.

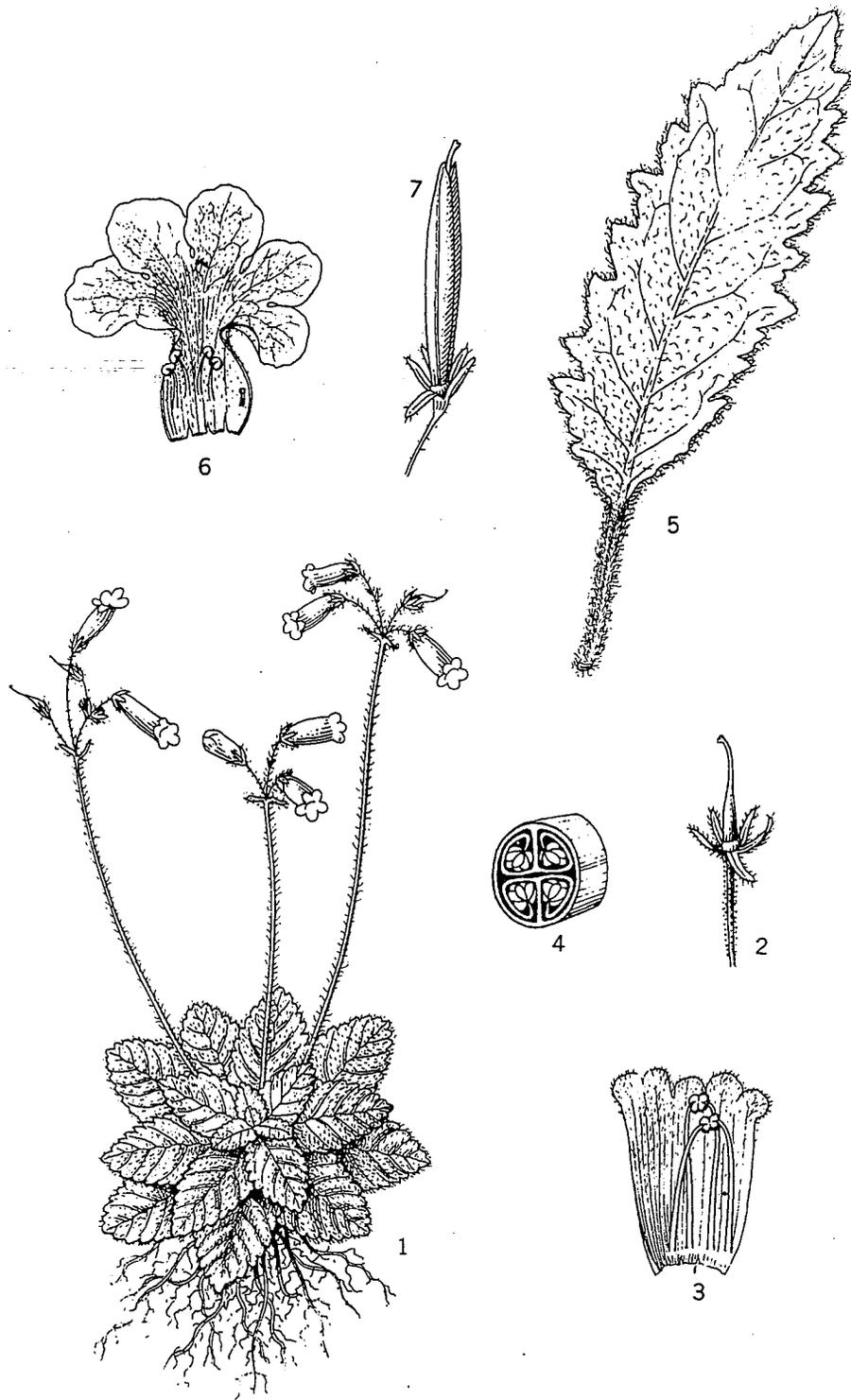


Figure 117.1. *Isometrum farreri* Craib: 1, habit; 2, calyx and pistil; 3, corolla opened to show insertion of stamens; 4, cross section of ovary. *I. eximium* Chun ex W. T. Wang & K. Y. Pan: 5, leaf; 6, corolla opened to show insertion of stamens; 7, fruit. (C. Z. Ji)

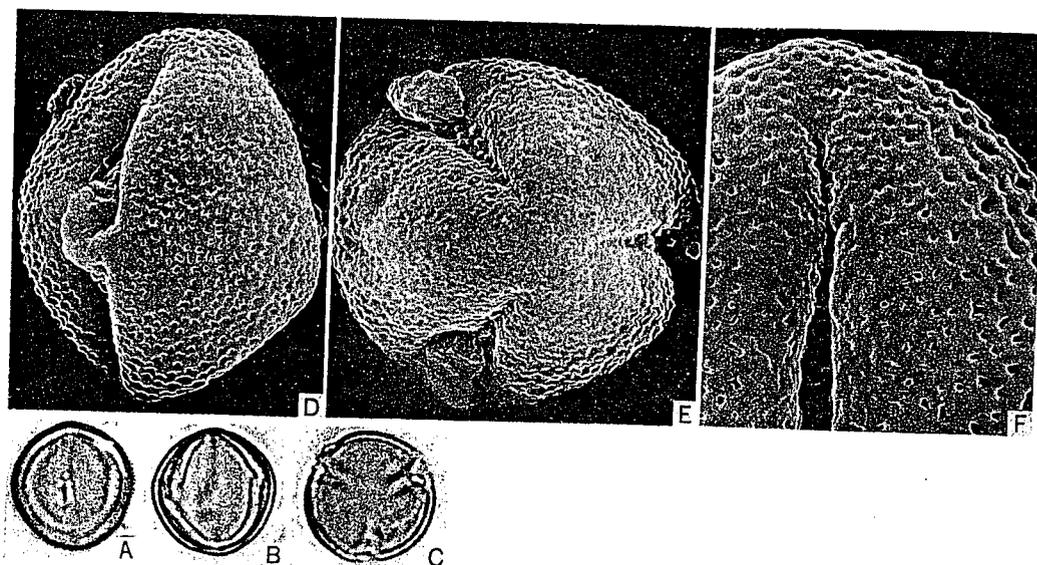
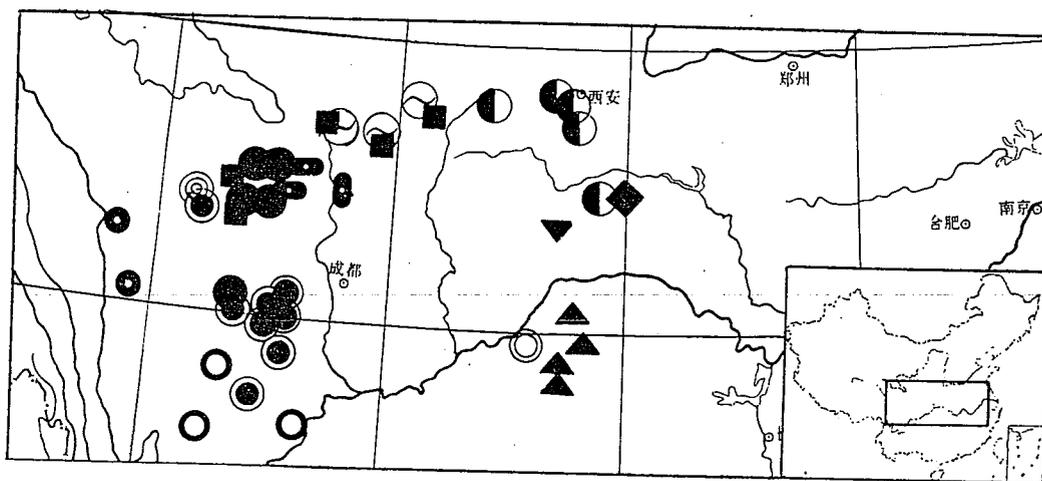


Figure 117.2. (A-F) *Isometrum farreri* Craib. Pollen (K. T. Fu 6501, PE); A, equatorial view showing aperture, LM X 1000; B, equatorial optical cross section, LM X 1000; C, polar view, LM X 1000; D, oblique equatorial view showing aperture and ornamentation, SEM X 3000; E, polar view, SEM X 3000; F, detail of ornamentation, SEM X 6000.



Map 117. ◆ *Isometrum crenatum* K. Y. Pan; ○ *I. eximium* Chun; ⊕ *I. farreri* Craib; ▼ *I. fargesii* (Franchet) Burt; ⊙ *I. giraldii* (Diels) Burt; ■ *I. glandulosum* (Batalin) Craib; ⊗ *I. lancifolium* (Franchet) var. *lancifolium*; ⊕ *I. lancifolium* var. *mucronatum* K. Y. Pan; ⊙ *I. lancifolium* var. *tsingchengshanicum* W. T. Wang & K. Y. Pan; ⊙ *I. leucanthum* (Diels) Burt; ▲ *I. pinnatifolium* K. Y. Pan; ● *I. primuliflorum* (Batalin) Burt; ⊕ *I. sichuanicum* K. Y. Pan; ⊙ *I. villosum* K. Y. Pan.

118. *Lagarosolen* W. T. Wang, Acta Bot. Yunnan. 6: 11-14. 1984. Figure 118.1. Type species:  
*Lagarosolen hispidus* W. T. Wang.

**Description:** Perennial rhizomatous herbs. Leaves basal, widely ovate, ovate-orbicular or widely elliptic, crenate, both surfaces white strigose; petiole hirsute. Scape shorter than leaves. Cymes branched; bracts 2, hirsute; bractlets opposite; pedicel hirsute or glandular hairy. Calyx campanulate, divided, lobes 5, linear-lanceolate; corolla purple, bilabiate, upper lip bifid, lower lip trifid, lobes narrowly triangular, puberulous, corolla tube slender. Stamens 2, filaments inserted at middle or above middle of corolla tube, linear, straight; anthers oblong, coherent, apex confluent; staminodes 3, very small. Disc cyathiform; ovary slender cylindrical, puberulous or glandular pubescent; parietal placentas 2; style slender, stigma bifid. Fruit unknown. Fl. Aug. Monotypic.

**Pollen:** Pollen grains of *Lagarosolen hispidus* are 3-colporoidate, subspheroidal or subprolate, rarely prolate, subcircular in polar view. Size: P = (20-)21.9(-24.4)  $\mu\text{m}$ , E = (21.8-)23.4(-25.2)  $\mu\text{m}$ . Colpi long and slightly broad, constricted in middle; colpus membrane with irregularly granulate processes. Endoaperture (oroid) indistinctly delimited. Exine 1.7  $\mu\text{m}$  thick, sexine as thick as nexine, finely reticulate. Muri rather coarse; lumina subcircular or elliptic, unequal in size. Figure 118.2

**Ecology:** *Lagarosolen* grows in broadleaved evergreen forests at ca. 1500 m.

**Geography:** *Lagarosolen* is restricted to southern Yunnan. Map 118.

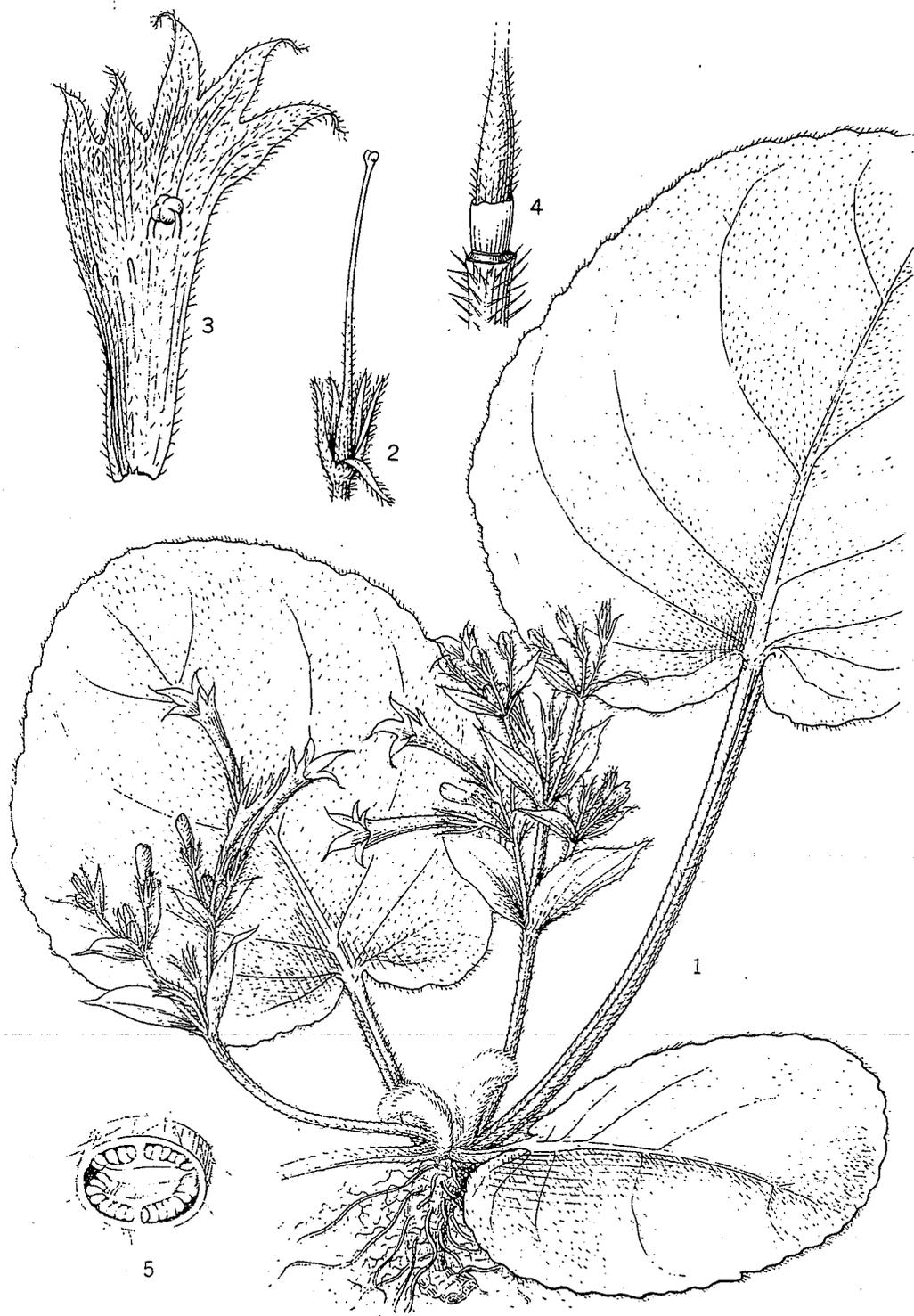


Figure 118.1. *Lagarosolen hispidus* W. T. Wang: 1, habit; 2, calyx and pistil; 3, corolla opened to show insertion of stamens and staminodes; 4, disc and ovary; 5, cross section of ovary. (C. Z. Ji)

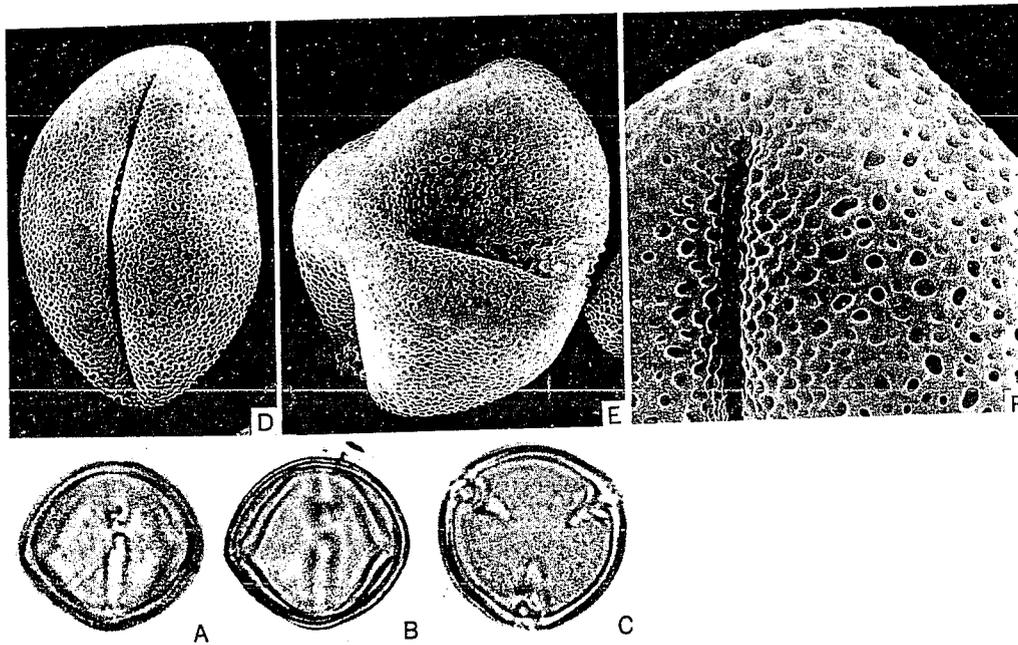
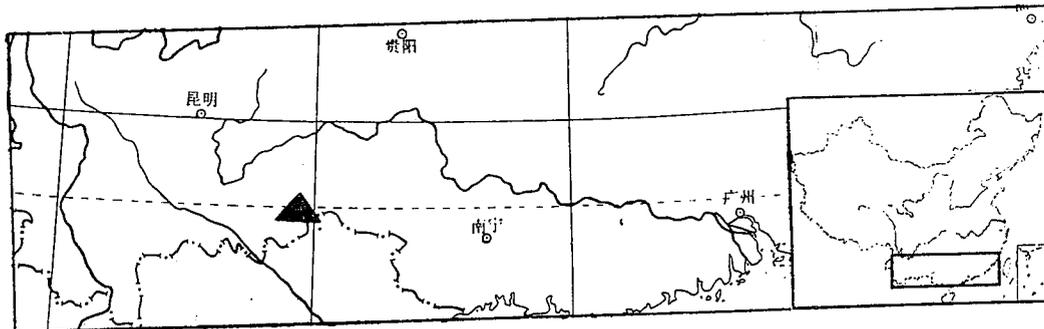


Figure 118.2. (A-F) *Lagarosolen hispidus* W. T. Wang. Pollen (*W. M. Chu 13184*, PE); A, equatorial view showing aperture, LM X 1000; B, equatorial optical cross section, LM X 1000; C, polar view, LM X 1000; D, equatorial view showing aperture and ornamentation, SEM X 1800; E, oblique polar view, SEM X 1800; F, detail of ornamentation, SEM X 6000.



Map 118. ▲ *Lagarosolen hispidus* W. T. Wang.

119. *Metabriggsia* W. T. Wang, *Guihaia* 3: 1. 1983. Figure 119.1. Type species: *Metabriggsia ovalifolia* W. T. Wang.

**Description:** Perennial herbs. Stems brown villose. Leaves opposite, ovate or elliptic, crenate, both surfaces puberulous; petiole brown villose. Cymes axillary; peduncles brown glandular hairy or villose; involucre subglobose. Calyx campanulate, divided, lobes 5, linear-lanceolate; corolla white, tube funnel-shaped, bilabiate, upper lip 2-parted or 2 divided, lower lip 3-lobed; stamens 2, filaments inserted at middle of corolla tube, narrowly linear, straight; anthers basifixed, apex coherent, locules not confluent at apex; staminodes 2 or 3; disc annular. Ovary slender cylindrical, puberulous; parietal placenta 1; style slender, longer than ovary; stigma small. Capsule slender cylindrical; seeds numerous, widely ellipsoid, smooth. Fl. Sep-Oct; fr. Oct-Nov. A genus of two species.

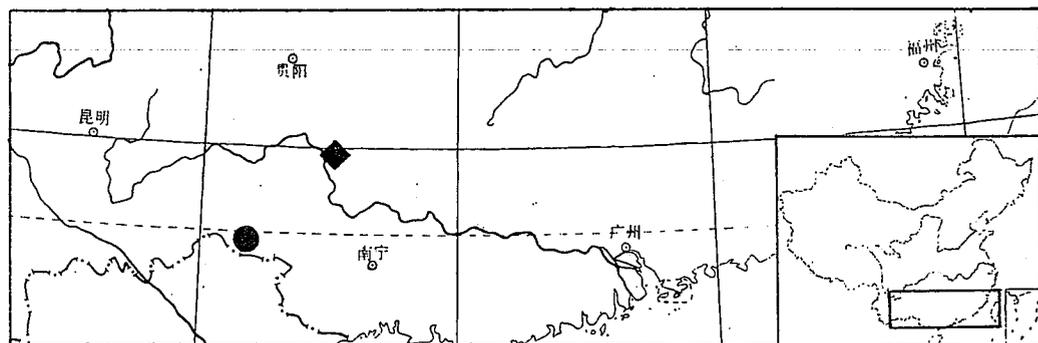
Key to species

1. Leaves elliptic or oblong, lower surface purple; staminodes 2 ..... 1. *M. purpureotincta* W. T. Wang  
 1. Leaves ovate, lower surface greenish; staminodes 3 ..... 2. *M. ovalifolia* W. T. Wang

**Pollen:** Pollen grains of *Metabriggsia ovalifolia* are 3-colporoidate, subprolate, sometimes suboblate, circular-lobate in polar view. Size: P = (20.9-)23(-24.4)  $\mu\text{m}$ , E = (15.7-)19.4(-21.8)  $\mu\text{m}$ . Colpi long and rather broad, constricted in middle, with slightly thickened margins; colpus membrane with irregularly tuberculate processes. Endoaperture (oroid) indistinctly delimited. Exine 1.7  $\mu\text{m}$  thick, sexine as thick as nexine, with rather distinct columellae (LM), finely reticulate. Muri coarse; lumina small, circular, subcircular or elliptic, unequal and decreasing gradually in size towards colpus margins and polar areas. Figure 119.2.

**Ecology:** *Metabriggsia* grows in dense forests in limestone mountains; 1100 m.

**Geography:** *Metabriggsia* is restricted to northwestern Guangxi. Map 119.



Map 119. ● *Metabriggsia ovalifolia* W. T. Wang; ◆ *M. purpureotincta* W. T. Wang.



Figure 119.1. *Metabriggsia ovalifolia* W. T. Wang: 1, habit; 2, corolla opened to show stamens and staminodes; 3, calyx and pistil; 4, disc and ovary; 5, stamens, lateral view; 6, stamen, adaxial view; 7, cross section of ovary. *M. purpureotincta* W. T. Wang: 8, corolla opened to show stamens and staminode; 9, calyx and pistil. (J. F. Wang)

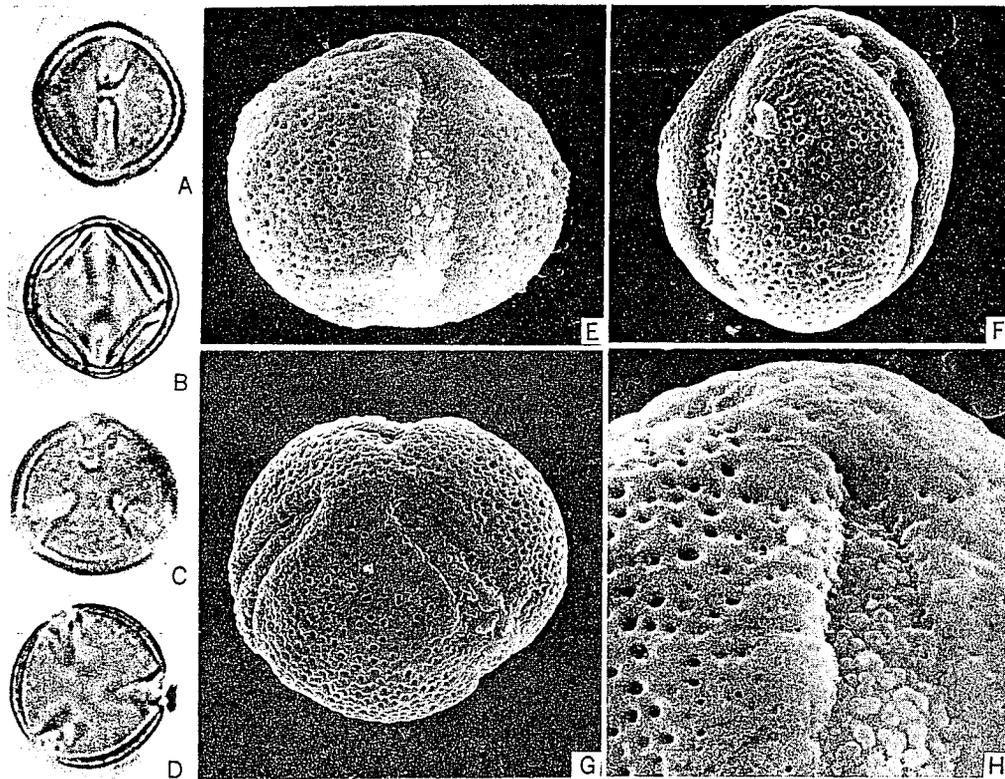


Figure 119.2. (A-H) *Metabriggsia ovalifolia* W. T. Wang. Pollen (D. Fang & X. P. Liao 22342, PE); A, equatorial view showing aperture, LM X 1000; B, equatorial optical cross section, LM X 1000; C, polar view, LM X 1000; D, polar optical cross section, LM X 1000; E, oblique equatorial view showing aperture and ornamentation, SEM X 2400; F, equatorial view showing mesocolpium, SEM X 2400; G, oblique polar view, SEM X 2400; H, detail of aperture and ornamentation, SEM X 6000.

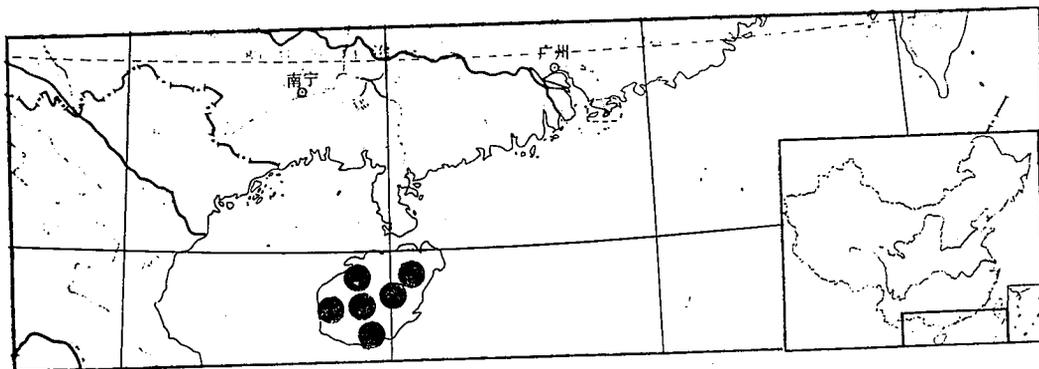
120. *Metapetrocosmea* W. T. Wang, Bull. Bot. Res., Harbin 1(4): 38. 1981. Figure 120.1. Type species: *Metapetrocosmea peltata* W. T. Wang.

**Description:** Perennial rhizomatous herbs. Leaves basal, entire or repand, long petiolate. Cymes 1-3 flowered; bracts 2; calyx campanulate, divided to base, lobes 5, narrowly triangular; corolla white, bilabiate, upper lip 2-parted, lower lip slightly longer than upper lip, 3-parted; stamens 2, included; filaments inserted near base of corolla tube, filiform, thickened apically; anthers dorsifixed, white villose, locules divaricate, longitudinally dehiscent, apex not confluent; staminodes 2, very small. Disc absent. Pistil included; ovary broadly ovoid; parietal placentas 2; style slender; stigma capitate, small. Capsule globose, smooth. Fl. Dec-Feb; fr. unknown. Monotypic.

**Pollen:** Pollen grains of *Metapetrocosmea peltata* are 3-colporoidate, subspheroidal or prolate, subcircular in polar view. Size: P = (14.8-)17.3(-19.1)  $\mu\text{m}$ , E = (14.8-)16(-17.4)  $\mu\text{m}$ . Colpi long and narrow, with serrulate margins. Endoaperture (oroid) indistinctly delimited. Exine ca. 1  $\mu\text{m}$  thick, sexine and nexine indistinguishable (LM), finely reticulate. Muri rather coarse, with sparsely spinulate processes; lumina subcircular, elliptic or rather irregular in shape, unequal in size. Figure 120.2.

**Ecology:** *Metapetrocosmea* grows in forests and by the sides of streams; 700 m.

**Geography:** *Metapetrocosmea* is restricted to Hainan. Map 120.



Map 120. ● *Metapetrocosmea peltata* W. T. Wang.

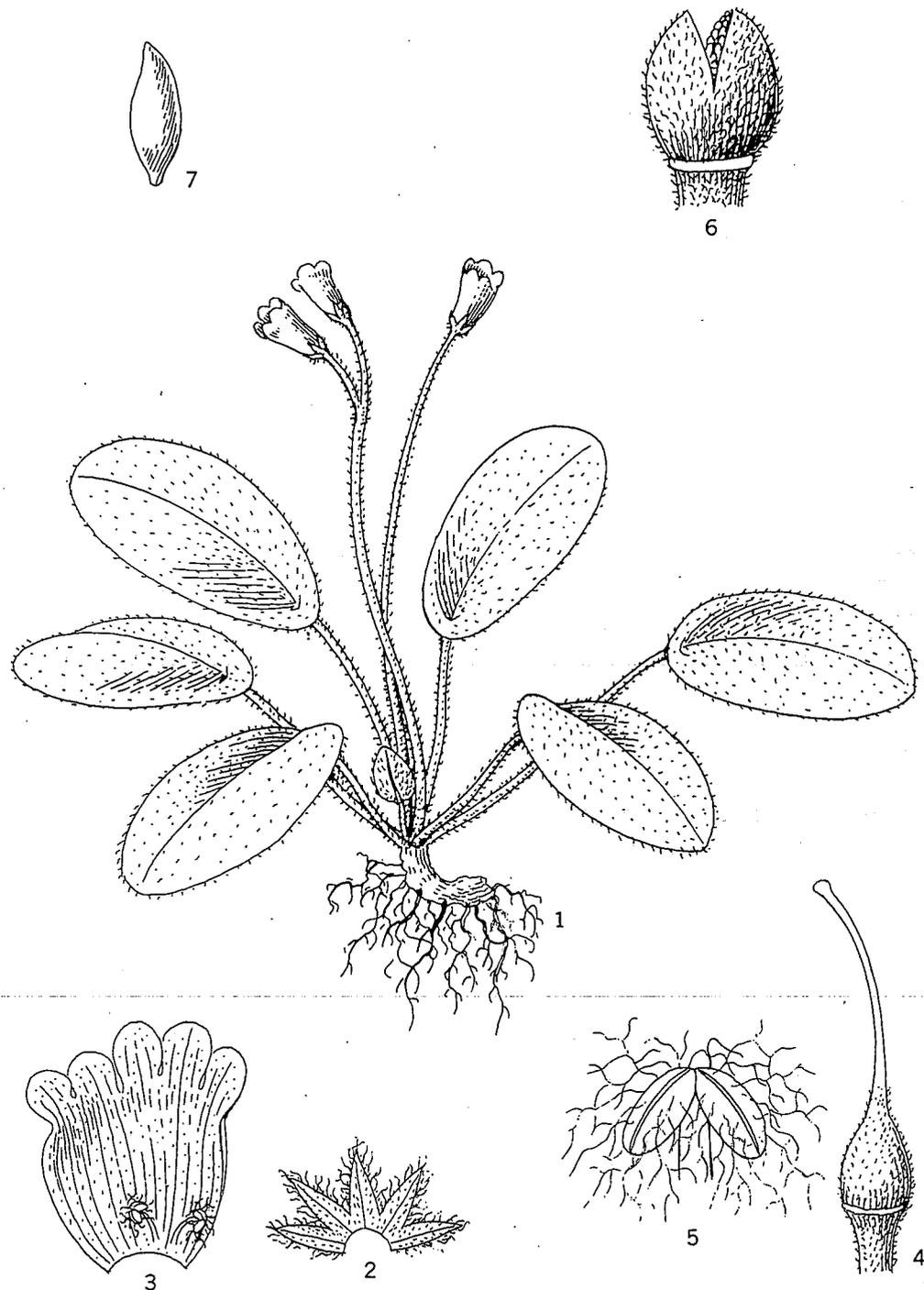


Figure 120.1. *Metapetrocosmea peltata* W. T. Wang: 1, habit; 2, calyx; 3, corolla opened to show insertion of stamens; 4, pistil; 5, stamen; 6, fruit; 7, seed. (J. F. Wang)

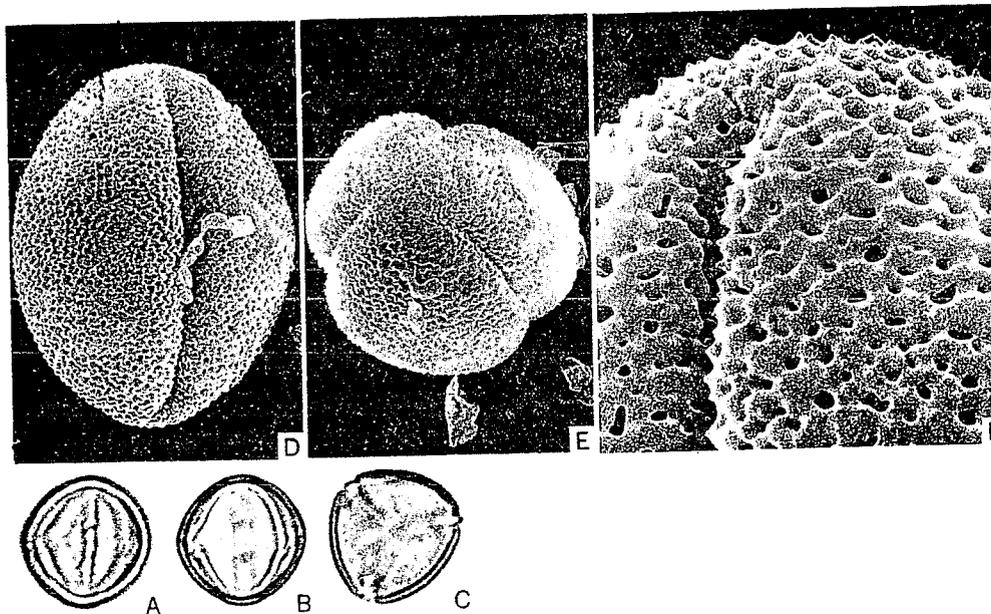


Figure 120.2. (A-F) *Metapetrocosmea peltata* W. T. Wang. Pollen (H. Y. Liang 64724, PE); A, equatorial view showing aperture, LM X 1000; B, equatorial optical cross section, LM X 1000; C, polar optical cross section, LM X 1000; D, equatorial view showing aperture and ornamentation, SEM X 3000; E, oblique polar view, SEM X 3000; F, detail of ornamentation, SEM X 12000.

121. *Petrocodon* Hance, J. Bot. 21: 167. 1883. Figure 121.1. Type species: *Petrocodon dealbatus* Hance.

**Description:** Perennial herbs; stems cylindrical. Leaves basal, oblong or oblong-lanceolate, entire or dentate, both surfaces strigose; petiole densely strigose. Scapes 1-3, strigose. Cymes subumbellate; bracts linear; pedicel densely puberulous; calyx campanulate, ca. 3 mm long, pubescent outside, 5-parted to near base, lobes linear-lanceolate; corolla white, urceolate-campanulate, 5-8 mm long, sparsely puberulous outside, 5-lobed, lobes triangular; stamens 2; filaments inserted near base of corolla tube, glabrous; anthers coherent; staminodes 3; disc annular; ovary glabrous, 2-locular; parietal placentas 2; style longer or shorter than ovary. Capsule slender cylindrical, ca. 1.4 cm long, 2-valved. Seeds tubercled. Fl. May-Aug; fr. Aug-Oct. A single species with two varieties.

#### Key to species

1. Leaves entire or inconspicuously crenate ..... 1. *P. dealbatus* Hance var. *dealbatus*  
1. Leaves dentate or denticulate ..... 2. *P. dealbatus* var. *denticulatus* (W. T. Wang) W. T. Wang

**Pollen:** Pollen grains of *Petrocodon dealbatus* variety *dealbatus* are 3-colporoidate, subspheroidal or prolate, subcircular in polar view. Size: P = (14.8-)15.9(-18.3)  $\mu\text{m}$ , E = (12.2-)14(-15.7)  $\mu\text{m}$ . Colpi long and rather narrow, with minutely spinulate membrane. Endoaperture (oroid) indistinctly delimited. Exine ca. 0.9  $\mu\text{m}$  thick, sexine and nexine indistinguishable (LM), spinulate. Spinules with acute apex. Figure 121.2.

The pollen of *Petrocodon dealbatus* var. *denticulatus* is similar to that of var. *dealbatus*.

**Ecology:** *Petrocodon* grows on rocks in valleys; 500-1050 m.

**Geography:** *Petrocodon* is in Guangxi, Guangdong, southern Guizhou, southwestern Hubei, and western Hunan. Map 121.



Figure 121.1. *Petrocodon dealbatus* Hance: 1, habit; 2, flower; 3, calyx and pistil; 4, corolla opened to show stamens and staminodes; 5, cross section of ovary. (J. F. Wang)

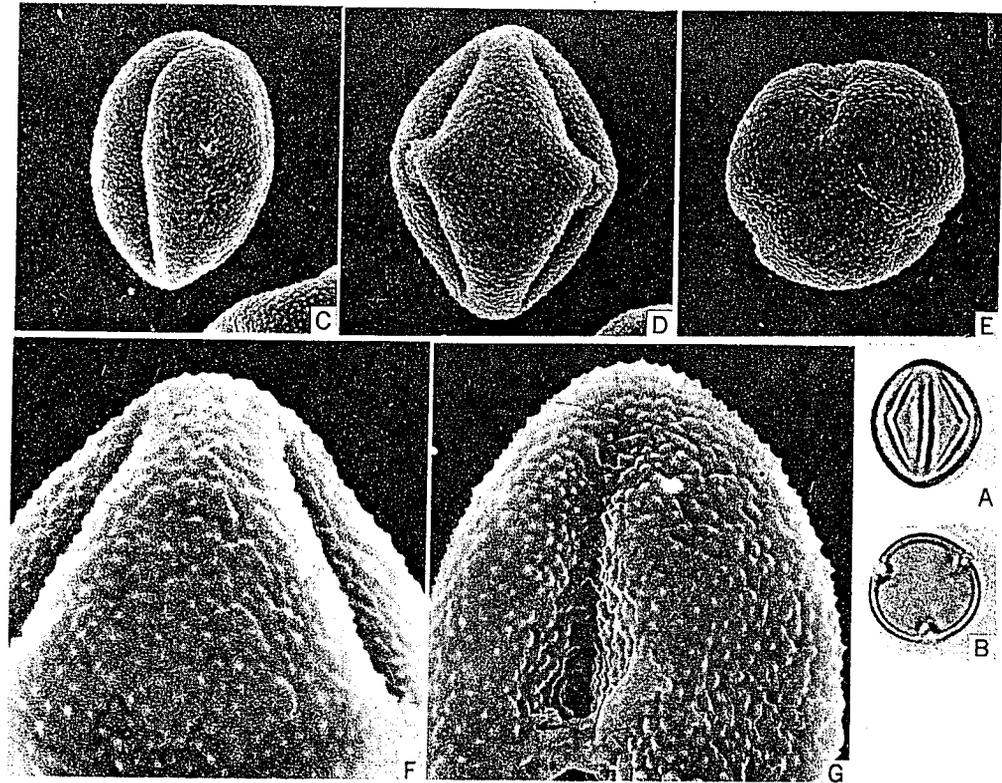
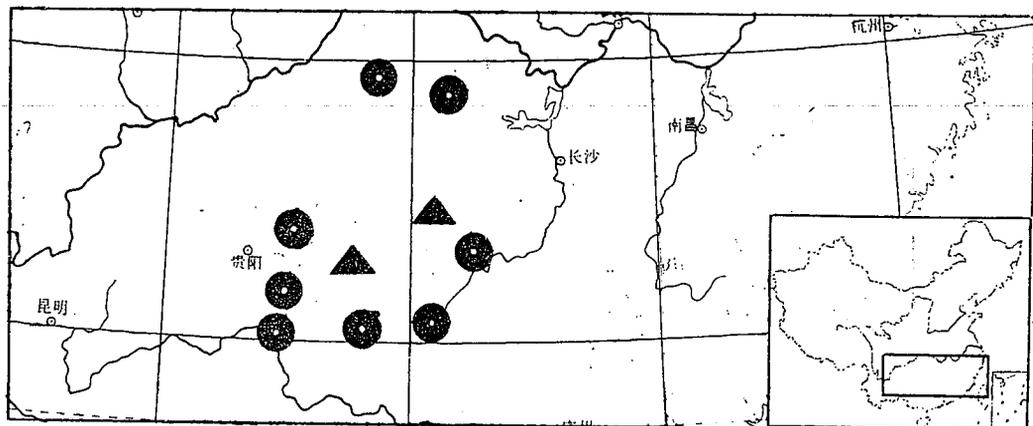


Figure 121.2. (A-G) *Petrocodon* pollen. (A-F) *P. dealbatus* Hance (Z. Y. Cao 2779, PE); A, equatorial view showing aperture, LM X 1000; B, polar optical cross section, LM X 1000; C, equatorial view showing aperture and ornamentation, SEM X 2400; D, equatorial view showing mesocolpium, SEM X 2400; E, polar view, SEM X 2400; F, detail of ornamentation, SEM X 6000; G, *P. dealbatus* Hance var. *denticulatus* (W. T. Wang) W. T. Wang (without collector 407, PE), detail of aperture and ornamentation, SEM X 6000.



Map 121. ● *Petrocodon dealbatus* Hance var. *dealbatus*; ▲ *P. dealbatus* Hance var. *denticulatus* (W. T. Wang) W. T. Wang.

122. *Primulina* Hance, J. Bot. 21: 169. 1883. Figure 122.1. Type species: *Primulina tabacum* Hance.

**Description:** Perennial herbs. Leaves basal, ovate-orbicular, base cordate, margins triangular lobed, upper surface puberulous, lower surface puberulous and glandular hairy; petiole undulate winged. Scapes equalling or slightly shorter than leaves, glandular and eglandular pubescent. Cymes umbellate, with 3-7 flowers; bracts 2, narrowly ovate, glandular pubescent; calyx 5-parted, lobes lanceolate, brown glandular pubescent; corolla purple, salverform, ca. 1.2 cm long, puberulous and glandular hairy, lobes 5, ovate-orbicular, slightly unequal in size; stamens 2, filaments inserted near base of corolla tube, anthers separate, staminodes absent; disc with two subquadrangular lobes; ovary pubescent, parietal placentas 2, ovules numerous; style short; stigma bifid. Capsule ellipsoid; seeds dark purple, densely papillate. Fl. Aug-Oct; fr. Sep-Nov. Monotypic.

**Pollen:** Pollen grains of *Primulina tabacum* are 3-colporate, subspheroidal, triangular in polar view. Size: P = (12.2-)13.6(-15.7)  $\mu\text{m}$ , E = (11.3-)13.5(-15.7)  $\mu\text{m}$ . Colpi rather long and narrow; colpus membrane with irregular granular processes; margins thickened in the middle. Endoaperture (ora) small, usually indistinctly delimited. Exine ca. 1  $\mu\text{m}$  thick, sexine and nexine indistinguishable (LM), finely reticulate. Muri rather coarse; lumina small. Figure 122.2.

**Ecology:** *Primulina* grows in forests at ca. 300 m.

**Geography:** *Primulina* is restricted to Guangdong Province. Map 122.



Figure 122.1. *Primulina tabacum* Hance: 1, habit; 2, calyx and pistil; 3, corolla opened to show stamens; 4, cross section of ovary. (J. F. Wang)

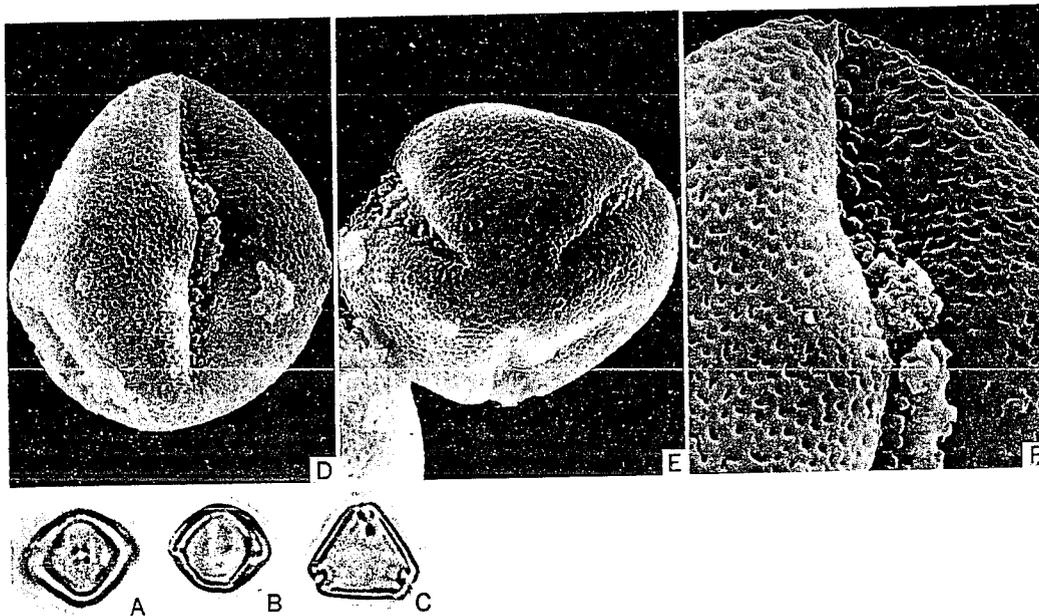
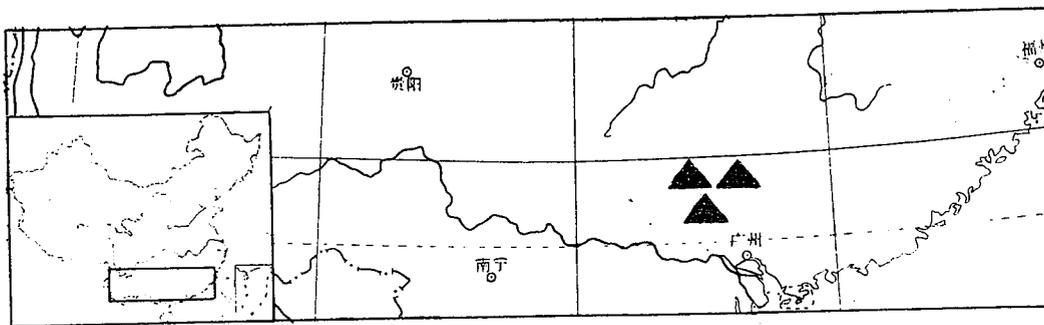


Figure 122.2. (A-F) *Primulina tabacum* Hance. Pollen (L. Deng 82794, PE); A, equatorial view showing aperture, LM X 1000; B, equatorial optical cross section, LM X 1000; C, polar optical cross section, LM X 1000; D, equatorial view showing aperture and ornamentation, SEM X 2400; E, oblique polar view, SEM X 2400; F, detail of aperture and ornamentation, SEM X 6000.



Map 122. ▲ *Primulina tabacum* Hance.

123. *Pseudochirita* W. T. Wang, Bot. Res. Academia Sinica 1: 22. 1983. Figure 123.1. Type species: *Pseudochirita guangxiensis* (S. Z. Huang) W. T. Wang.

**Description:** Perennial sericeous herbs to 1 m tall. Leaves opposite, unequal in size, elliptic, serrate, both surfaces sericeous; petiole 1-5.5 cm long, densely sericeous. Cymes axillary; bracts opposite, semicircular, caducous; pedicel slender, glandular pubescent or sericeous; calyx campanulate, pale yellow, 5-lobed, densely glandular pubescent and sericeous outside, glabrous inside; corolla white, bilabiate, upper lip bifid, lower lip trifid, corolla funnel-shaped; stamens 2; filaments inserted near middle of tube, narrowly linear, slightly curved, densely glandular pubescent; anthers basifixed, apex coherent, longitudinally dehiscent, apex not confluent; staminodes 2, filiform; disc annular. Ovary slender cylindrical, glandular pubescent; parietal placentas 2, style glandular pubescent; stigma unequally bifid. Capsule slender cylindrical, loculicidally dehiscent. Seeds fusiform, brown. Fl. Jul-Aug; fr. Sep-Oct. Monotypic.

**Uses:** *Pseudochirita* is cultivated in Nanning, Guangxi Province, and used medicinally to treat traumatic injuries and as an analgesic.

**Pollen:** Pollen grains of *Pseudochirita guangxiensis* are 3-colporoidate, subspheroidal or subprolate, subcircular in polar view. Size: P = (21.8-)23.7(-25.2)  $\mu\text{m}$ , E = (18.3-)19.5(-20.9)  $\mu\text{m}$ . Colpi long and rather broad, with narrower ends; colpus membrane with irregularly verrucate processes, thickened in the middle, protruding. Endoaperture (oroid) indistinctly delimited. Exine ca. 1.7  $\mu\text{m}$ , sexine as thick as nexine, with indistinct columellae (LM), finely reticulate. Muri rather thin; lumina rather irregular in shape, decreasing gradually in size toward colpus margins. Figure 123.2.

**Ecology:** *Pseudochirita* grows naturally in forests, but is now cultivated in Nanning, Guangxi Province.

**Geography:** *Pseudochirita* is restricted to Guangxi Province. Map 123.



Figure 123.1. *Pseudochirita guangxiensis* (S. Z. Huang) W. T. Wang: 1, upper portion of plant; 2, calyx opened; 3, corolla opened to show stamens and staminodes; 4, disc, pistil and stigma enlarged; 5, stamens; 6, cross section of ovary; 7, seed. (J. F. Wang)

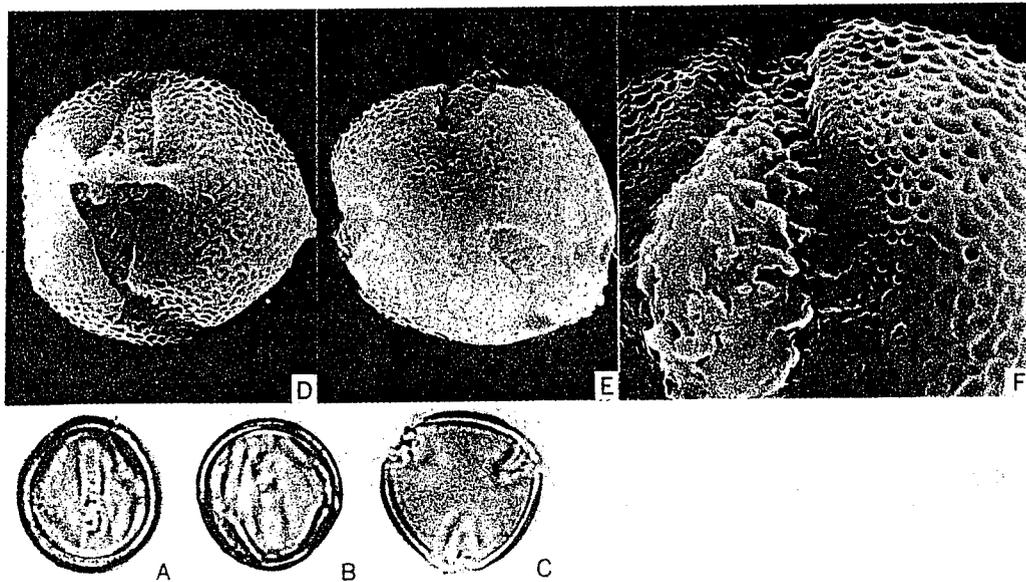
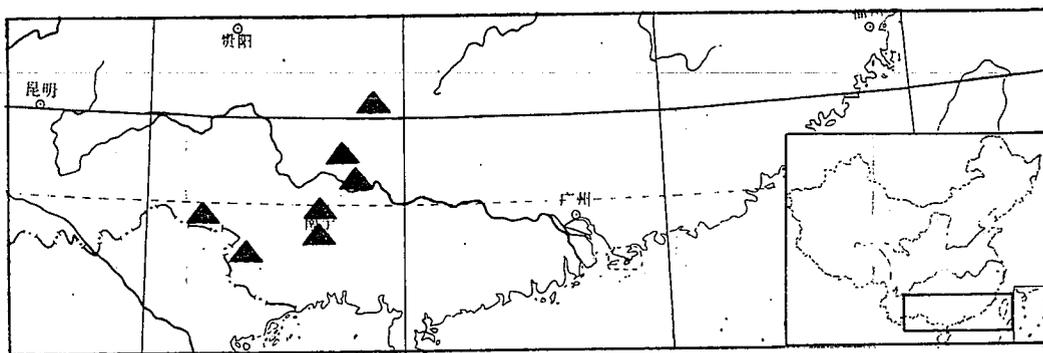


Figure 123.2. (A-F) *Pseudochirita quangxiensis* (S. Z. Huang) W. T. Wang. Pollen (S. Z. Huang 7709, PE); A, equatorial view showing aperture, LM X 1000; B, equatorial optical cross section, LM X 1000; C, polar optical cross section, LM X 1000; D, equatorial view showing aperture and ornamentation, SEM X 2400; E, oblique polar view, SEM X 2400; F, detail of aperture and ornamentation, SEM X 6000.



Map 123. ▲ *Pseudochirita quangxiensis* (S. Z. Huang) W. T. Wang.

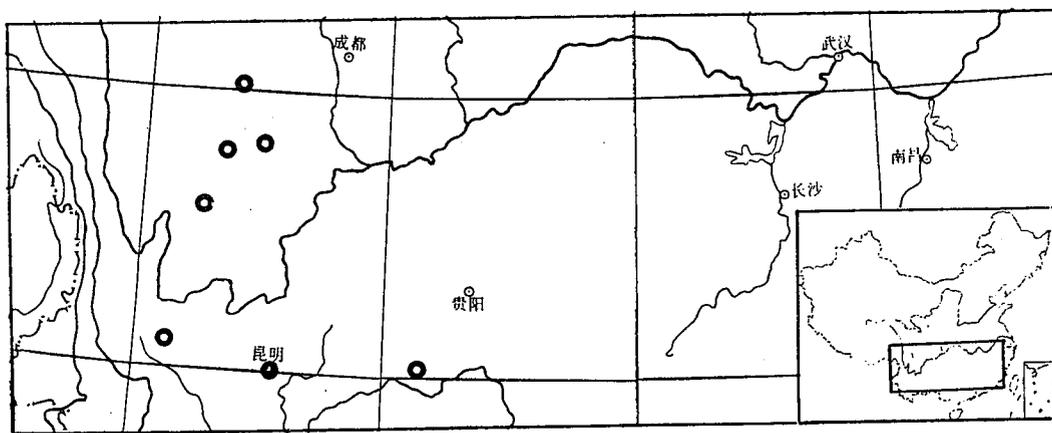
124. *Rhabdothamnopsis* Hemsley, Hooker's Icon. Pl. 28: pl. 2788. 1905. Figure 124.1. Type species: *Rhabdothamnopsis sinensis* Hemsley.

**Description:** Small branched shrubs to 50 cm tall. Branchlets sparsely pubescent. Leaves opposite, obliquely elliptic, elliptic-ovate or obovate, denticulate or crenate, upper surface sparsely puberulous, lower surface glabrous. Flowers axillary; pedicel slender, 2-4 mm long, glandular pubescent; calyx divided to near base, lobes 5, linear-lanceolate, ca. 7.5 mm long, glandular pubescent; corolla purple, campanulate-tubular, ca. 3.4 cm long, puberulous outside, bilabiate, upper lip bifid, lower lip trifid, lobes ovate-orbulate; stamens 2; filaments inserted below middle of corolla tube, included; anthers coherent, pubescent, locules confluent at apex; staminodes 2; disc annular. Ovary slender cylindrical, glandular pubescent; style linear, glandular puberulous; stigma capitate, bifid. Capsule ca. 2.2 cm long, spirally curved. Seeds numerous. Fl. May-Jun; fr. Jul-Aug. Monotypic.

**Pollen:** Pollen grains of *Rhabdothamnopsis sinensis* are 3-colporoidate, subspheroidal or suboblate, subcircular in polar view. Size: P = (19.1-)19.6(-20.9)  $\mu\text{m}$ , E = (19.4-)20.9(-22.6)  $\mu\text{m}$ . Colpi long and rather broad, with gemmate membrane. Endoaperture (oroid) indistinctly delimited. Exine 1.5  $\mu\text{m}$  thick, sexine and nexine indistinguishable (LM), finely reticulate. Muri rather coarse, with sparse spinulate processes; lumina rather small, circular or subcircular, rather uniform in size. Figure 124.2.

**Ecology:** *Rhabdothamnopsis* grows in dense forests, at streamsides in forested areas, and in thickets along roadsides; 1600-2200 m.

**Geography:** *Rhabdothamnopsis* is in southwestern Guizhou, western Sichuan and northern Yunnan provinces. Map 124.



Map 124. ● *Rhabdothamnopsis sinensis* Hemsley.

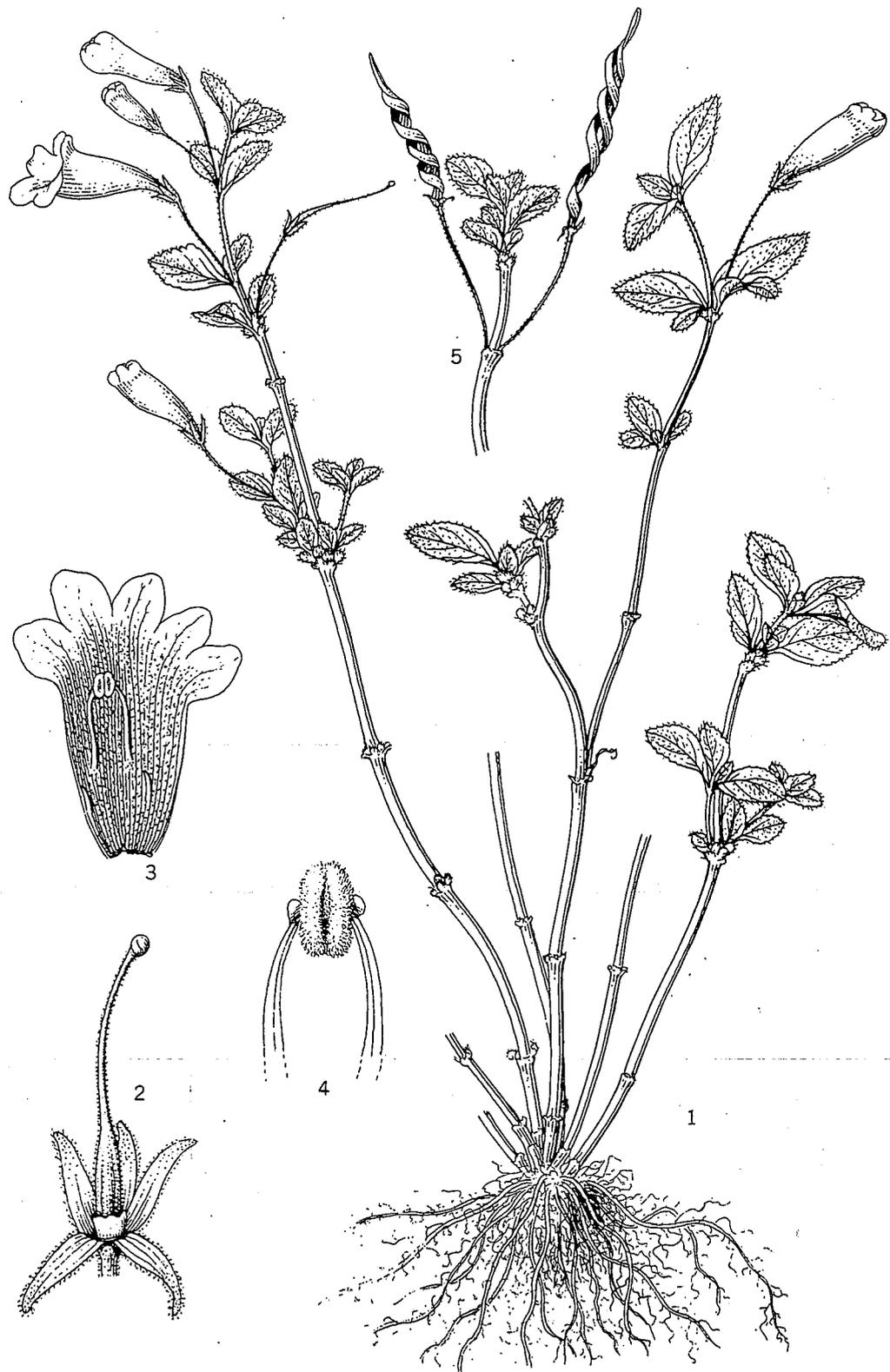


Figure 124.1. *Rhabdothamnopsis sinensis* Hemsley: 1, habit; 2, calyx and pistil; 3, corolla opened to show stamens and staminodes; 4, stamens; 5, fruit. (C. Z. Ji)

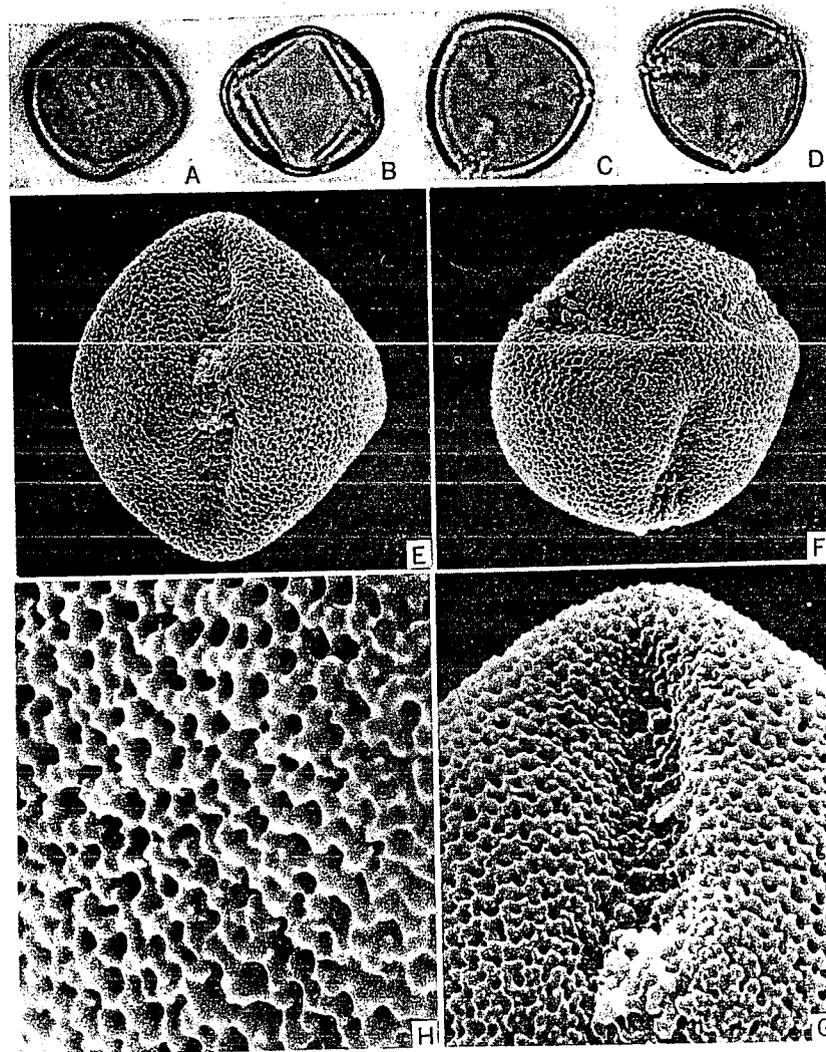


Figure 124.2. (A-H) *Rhabdothamnopsis sinensis* Hemsley. Pollen (P. Y. Qiu 77457, KUN); A, equatorial view showing aperture, LM X 1000; B, equatorial optical cross section, LM X 1000; C, polar view, LM X 1000; D, polar optical cross section, LM X 1000; E, equatorial view showing aperture and ornamentation, SEM X 2400; F, oblique polar view, SEM X 2400; G, detail of aperture and ornamentation, SEM X 6000; H, detail of ornamentation, SEM X 12000.

125. *Schistolobos* W. T. Wang, Bot. Res. Academia Sinica 1: 15. 1983. Figure 125.1. Type species: *Schistolobos pumilus* W. T. Wang.

**Description:** Perennial small herbs. Leaves basal, elliptic or elliptic-ovate, denticulate or crenate, both surfaces pubescent; petiole villose. Scapes 2, villose; cymes umbellate; bracts opposite, linear, margins ciliate, lower surface puberulous; pedicel villose; calyx campanulate, divided to base, lobes 5, linear, margins serrulate; corolla pale purple, bilabiate, upper lip 2-parted, lower lip 3-parted, lobes lacerate; stamens 2, glabrous; filaments inserted below middle of corolla tube, linear, anthers basifixed, nearly kidney-shaped, apex coherent, locules parallel; staminodes 2, narrowly linear. Ovary slender cylindrical, glabrous; parietal placentas 2; style shorter than ovary; stigma small. Fruit unknown. Fl. May. Monotypic.

**Pollen:** Pollen grains of *Schistolobos pumilus* are 3-colporoidate, subspheroidal, circular-lobate in polar view. Size: P = (14.8-)17.1(-18.3)  $\mu\text{m}$ , E = (15.7-)17.6(-20)  $\mu\text{m}$ . Colpi rather long and slightly broad; colpus membrane with irregularly granular processes. Endoaperture (oroid) indistinctly delimited. Exine 1.6  $\mu\text{m}$  thick, sexine and nexine indistinguishable (LM), finely verrucate, verrucae unequal in size, rather irregular in shape. Figure 125.2.

**Ecology:** *Schistolobos* grows on boulders in forests at ca. 200 m.

**Geography:** *Schistolobos* is restricted to Daxin Xian, Guangxi Province. Map 125.

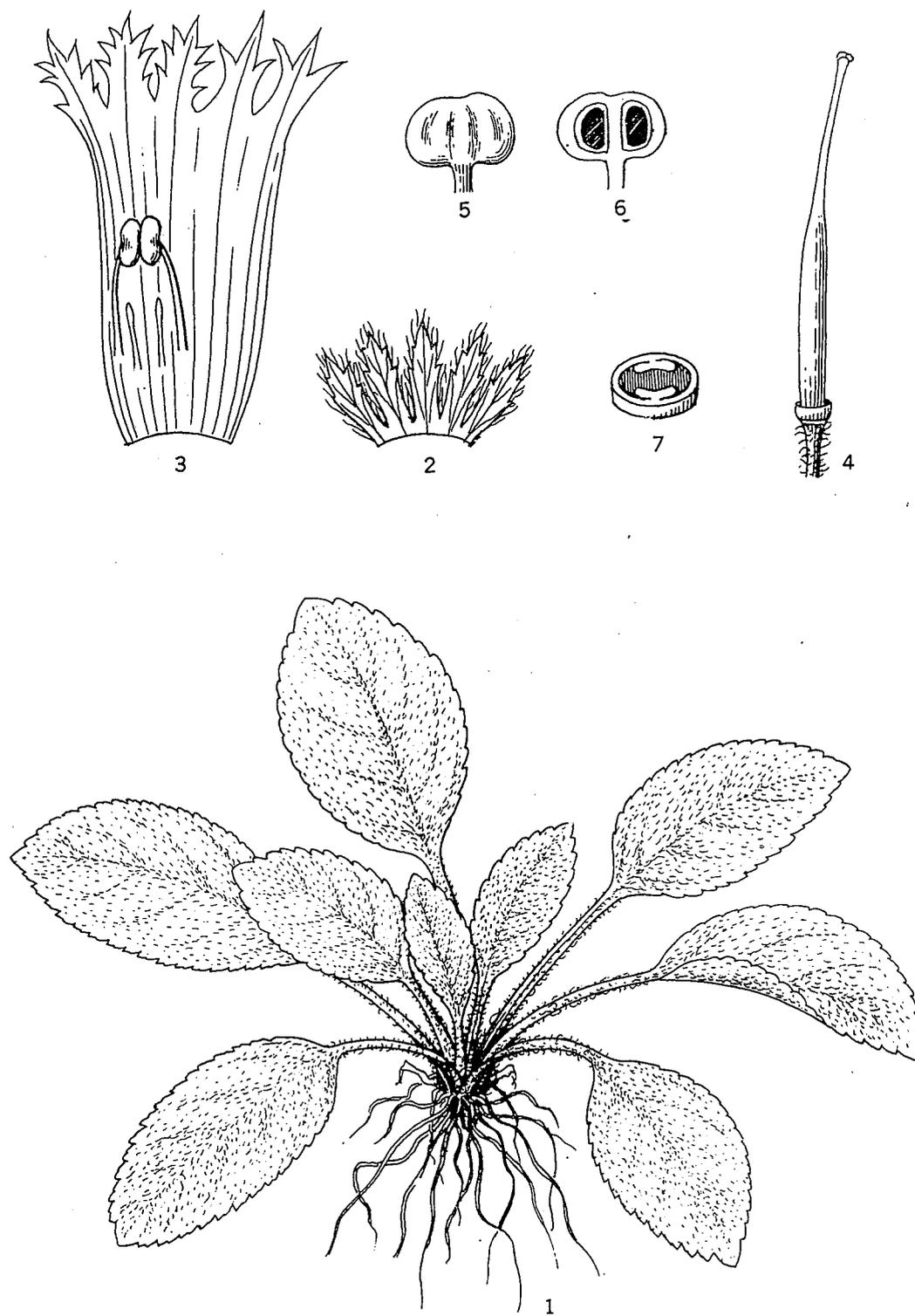


Figure 125.1. *Schistolobos pumilus* W. T. Wang: 1, habit; 2, calyx opened; 3, corolla opened to show stamens and staminodes; 4, disc and pistil; 5, anther, abaxial view; 6, anther, adaxial view; 7, cross section of ovary. (J. F. Wang)

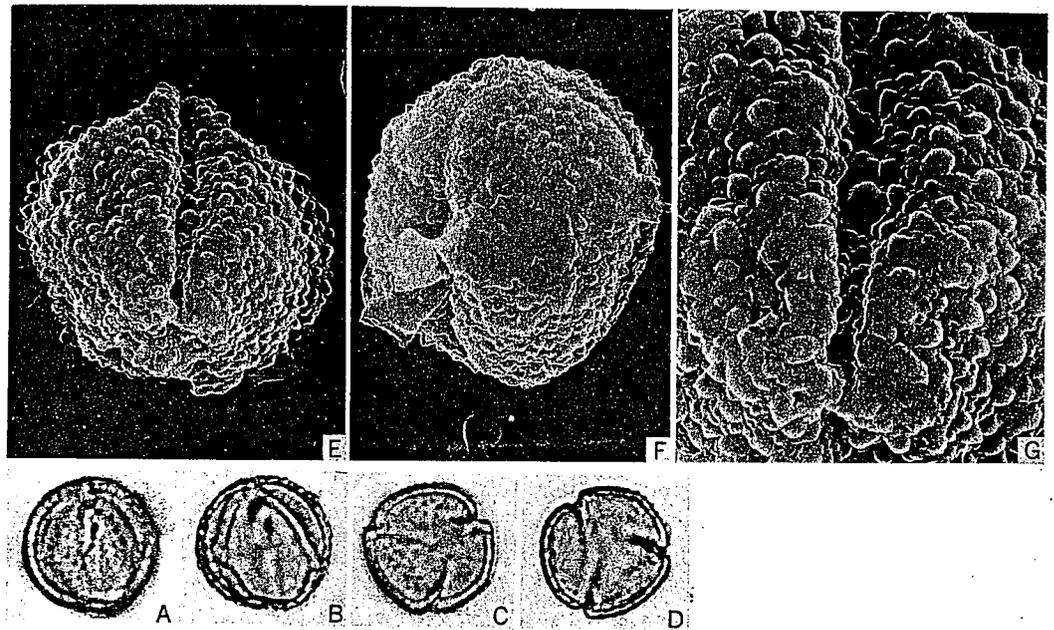
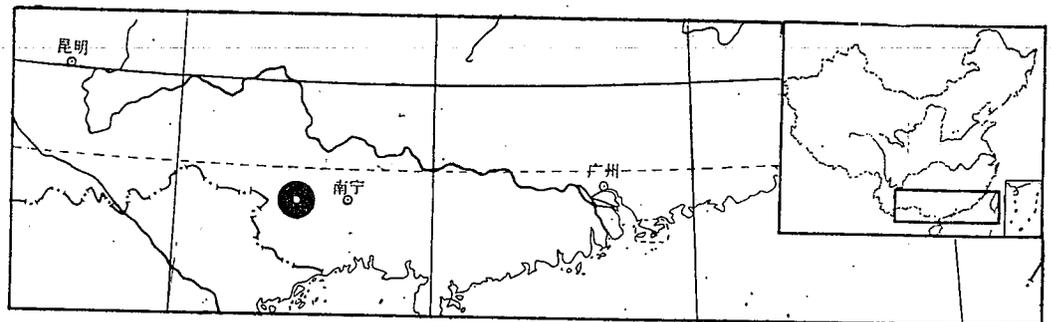


Figure 125.2. (A-G) *Schistolobos pumilus* W. T. Wang. Pollen (S. C. Chen 12219, PE.) A, equatorial view showing aperture and ornamentation, LM X 1000; B, equatorial optical cross section, LM X 1000; C, oblique polar view, LM X 1000; D, oblique polar optical cross section, LM X 1000; E, equatorial view showing aperture and ornamentation, SEM X 3000; F, equatorial view showing mesocolpium, SEM X 3000; G, detail of aperture and ornamentation, SEM X 6000.



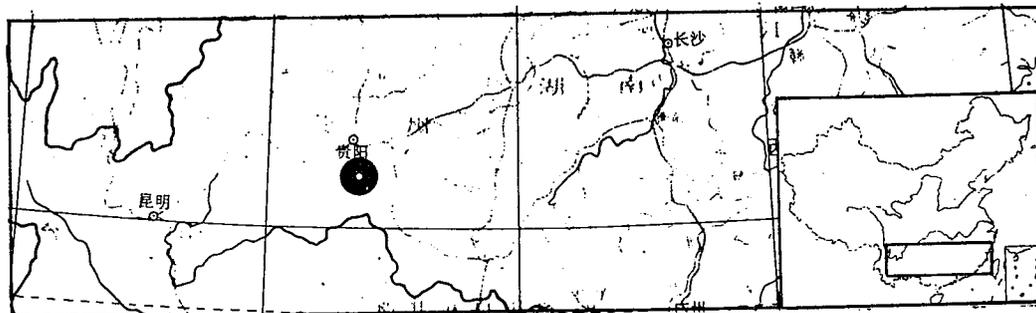
Map 125. ● *Schistolobos pumilus* W. T. Wang.

126. *Tengia* Chun, Sunyatsenia 6: 279, fig. 34, pl. 46. 1946. Figure 126. 1. Type species: *Tengia scopulorum* Chun.

**Description:** Rhizomatous perennial herbs. Leaves basal, elliptic, narrowly elliptic or narrowly obovate, denticulate, upper surface strigose, lower surface gray pubescent along veins; petiole pubescent. Scapes 1-3, densely strigose. Cymes with 8-10 flowers; pedicel slender, 4-5 mm long; flowers actinomorphic, calyx campanulate, divided to base, lobes 5, linear-lanceolate, ferruginous strigose; corolla white, tinged rose pink, corolla suburceolate, puberulous outside, 5-lobed, lobes lanceolate, equal in size; stamens 5, included, glabrous; filaments inserted at base of corolla tube; locules confluent at apex, disc annular; ovary slender cylindrical-lanceolate, densely strigose; style slightly exserted, puberulous; stigma capitate, bifid. Capsule to 1.5 cm long, slender cylindrical, brown, 4-valved. Fl. Jun-Jul; fr. Aug-Sep. Monotypic.

**Ecology:** *Tengia* grows in shady places on rock cliffs; elevation unknown.

**Geography:** *Tengia* is restricted to Guiding Xian, Guizhou Province. Map 126.



Map 126. ● *Tengia scopulorum* Chun.



Figure 126.1. *Tengia scopulorum* Chun: 1, habit; 2, flower; 3, corolla opened to show stamens; 4, stamen; 5, pistil; 6, cross section of ovary. (C. Z. Ji)

127. *Thamnocharis* W. T. Wang, Acta Phytotax. Sin. 19: 485. 1981. Figure 127.1. Type species: *Thamnocharis esquirolii* (H. Léveillé) W. T. Wang.

**Description:** Perennial rhizomatous herbs. Leaves basal, elliptic, rarely narrowly obovate, obtusely serrate, densely white puberulous on both surfaces. Scapes and pedicels densely puberulous; cymes 5-9 flowered; bracts opposite, subulate, puberulous. Flowers small, calyx campanulate, divided to base, lobes 4 or 5, triangular, puberulous outside; corolla purple or blue, divided, lobes 4 or 5, lanceolate-oblong, 2.5 times longer than calyx. Stamens 4 or 5, unequal, alternate with corolla lobes; filaments linear, sparsely puberulous; anthers basifixed, locules parallel, not confluent at apex; disc annular. Ovary ovoid, puberulous; parietal placentas 2; style slender, glabrous; stigma truncate. Capsule linear-lanceolate, sparsely strigose, loculicidally dehiscent. Fl. Aug; fr. Sep. Monotypic.

**Pollen:** Pollen grains of *Thamnocharis esquirolii* are 3-colporoidate, subspheroidal, rounded-triangular in polar view. Size: P = (15.7-)17.5(-20.9)  $\mu\text{m}$ , E = (16.5-)18.4(-20.9)  $\mu\text{m}$ . Colpi rather long and slightly broad, with spinulate membrane. Endoaperture (oroid) indistinctly delimited. Exine ca. 1.6  $\mu\text{m}$  thick, sexine and nexine indistinguishable (LM), spinulate, spinules swollen at base. Figure 127.2.

**Ecology:** *Thamnocharis* grows in forests and thickets; 1500-1600 m.

**Geography:** *Thamnocharis* is restricted to southwestern Guizhou Province. Map 127.

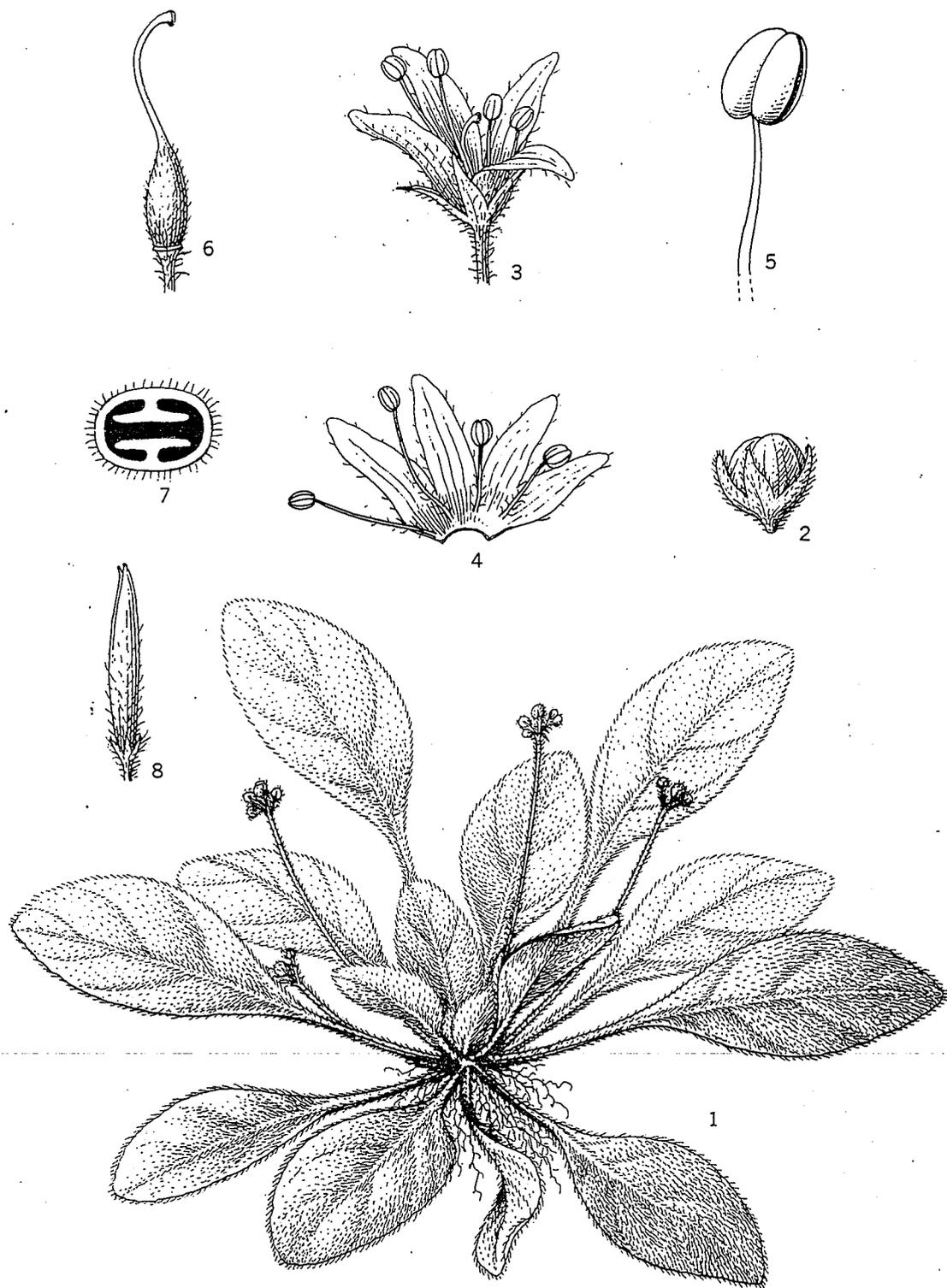


Figure 127.1. *Thamnocharis esquirolii* (H. Léveillé) W. T. Wang: 1, habit; 2, bud; 3, flower; 4, corolla opened to show insertion of stamens; 5, stamen; 6, pistil; 7, cross section of ovary; 8, fruit. (C. Z. Ji).

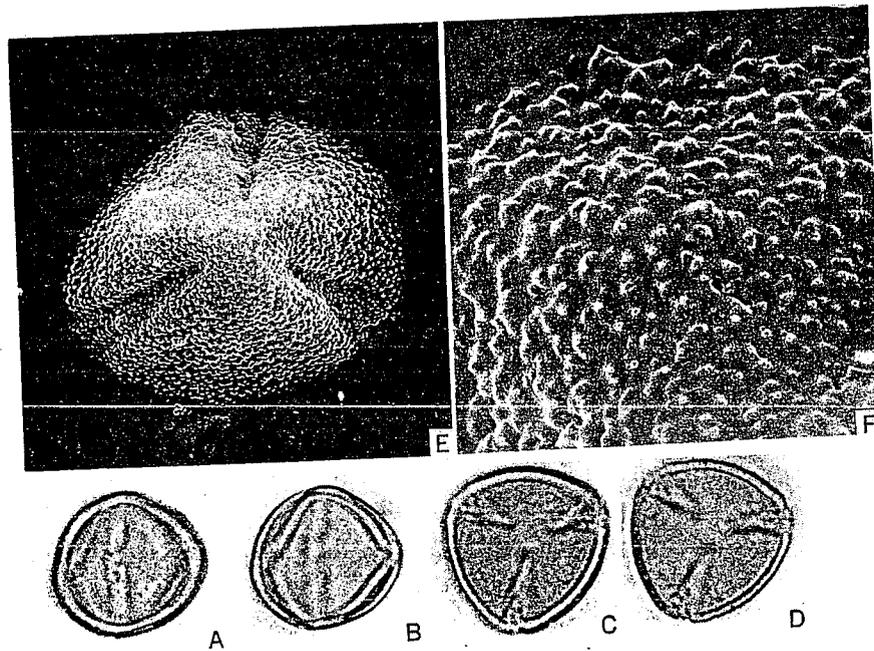
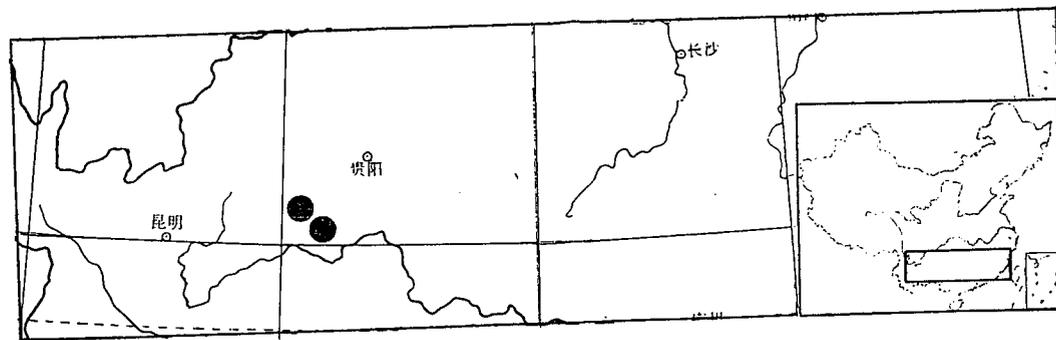


Figure 127.2. (A-F) *Thamnocharis esquirolii* (H. Léveillé) W. T. Wang. Pollen (Z. S. Zhang & Y. T. Zhang 8517, PE); A, equatorial view showing aperture, LM X 1000; B, equatorial optical cross section, LM X 1000; C, polar view, LM X 1000; D, polar optical cross section, LM X 1000; E, polar view, SEM X 2400; F, detail of ornamentation, SEM X 9000.



Map 127. ● *Thamnocharis esquirolii* (H. Léveillé) W. T. Wang.

128. *Tremacron* Craib, Notes Roy. Bot. Gard. Edinburgh 10: 21. 1918. Figure 128.1. Type species: *Tremacron forrestii* Craib.

**Description:** Perennial herbs. Leaves basal, elliptic, ovate, cordate-ovate or cordate-orbicular, crenate or dentate, both surfaces pubescent or glandular pubescent; petiole pubescent. Scapes 1-5; cymes branched, villose or glandular-pubescent; bracts linear, opposite; calyx divided to base, lobes 5, narrowly lanceolate, outer surface sparsely pubescent; corolla yellow white or red, subglabrous, bilabiate, upper lip emarginate, lower lip trifid, lobes 1-2 mm long; stamens 4, rarely didynamous, separate, exserted; filaments inserted near base of corolla tube, puberulous; anthers divaricate at base, locules confluent; disc annular or cyathiform; pistil glabrous; ovary slender cylindrical or oblong; style 1.5-5 mm long; stigma bifid; capsule slender cylindrical or oblong-lanceolate. Fl. Jul-Sep; fr. Sep-Nov. A genus of seven species.

#### Key to species

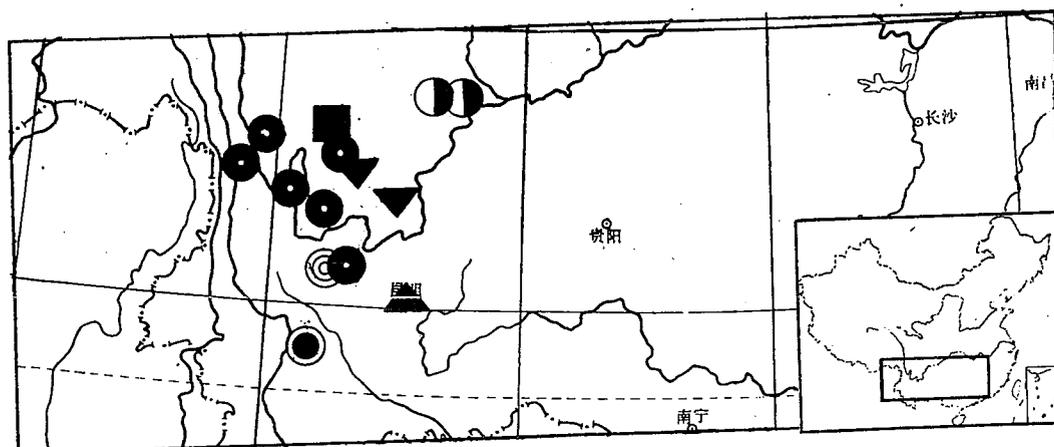
1. Flowers red, white or green-white.
2. Flowers red; corolla urceolate-tubular; leaves ovate-lanceolate or elliptic-lanceolate ..... 1. *T. rubrum* Handel-Mazzetti
2. Flowers white or green-white.
3. Flowers white; corolla urceolate-tubular; peduncle white pubescent; pistil glabrous; leaves cordate-ovate or cordate-orbicular ..... 2. *T. begoniifolium* H. W. Li
3. Flowers green-white; corolla tubular; peduncle glandular pubescent; pistil glandular pubescent; leaves lanceolate-ovate or ovate ..... 3. *T. mairei* Craib
1. Flowers yellow or orange-yellow.
4. Flowers orange-yellow; corolla funnel-shaped tubular; leaves ovate-orbicular ..... 4. *T. aurantiacum* K. Y. Pan
4. Flowers yellow; corolla tubular; leaves ovate, widely ovate or rhomboid-elliptic.
5. Stamens didynamous; leaves ovate, both sides white puberulous ..... 5. *T. obliquifolium* K. Y. Pan
5. Stamens equal in length, exserted; leaves widely ovate, narrowly elliptic or rhomboid-elliptic.
6. Outer surface of calyx glandular pubescent; pedicels glandular pubescent; leaves narrowly elliptic to rhomboid-elliptic ..... 6. *T. forrestii* Craib
6. Outer surface of calyx puberulous; pedicel brown pubescent; leaves widely ovate ..... 7. *T. urceolatum* K. Y. Pan

**Pollen:** Pollen grains of *Tremacron forrestii* are 3-colporoidate, subspheroidal, subcircular in polar view. Size: P = (16.5-)17.8(-19.1)  $\mu\text{m}$ , E = (16.5-)17.6(-19.1)  $\mu\text{m}$ . Colpi rather long and slightly broad, with narrow ends; colpus membrane granulate, protruding in the middle, usually broken. Endoaperture (oroid) indistinctly delimited. Exine 1.6  $\mu\text{m}$  thick, sexine as thick as nexine, with indistinct columellae (LM), finely reticulate. Figure 128.2.

The pollen of *Tremacron begoniifolium* is similar to that of *T. forrestii*, but the colpus membrane does not protrude in the middle and the muri are coarser.

**Ecology:** The species of *Tremacron* grow in evergreen broadleaved forests, on large boulders and on rocky cliffs; (1000-)2580-3200 m.

**Geography:** *Tremacron* is restricted to Sichuan and Yunnan provinces. Map 128.



Map 128. ● *T. aurantiacum* K. Y. Pan; ● *T. begoniifolium* H. W. Li; ● *T. forrestii* Craib; ▲ *T. mairei* Craib; ▼ *T. obliquifolium* K. Y. Pan; ◎ *T. rubrum* Handel-Mazzetti; ■ *T. urceolatum* K. Y. Pan.

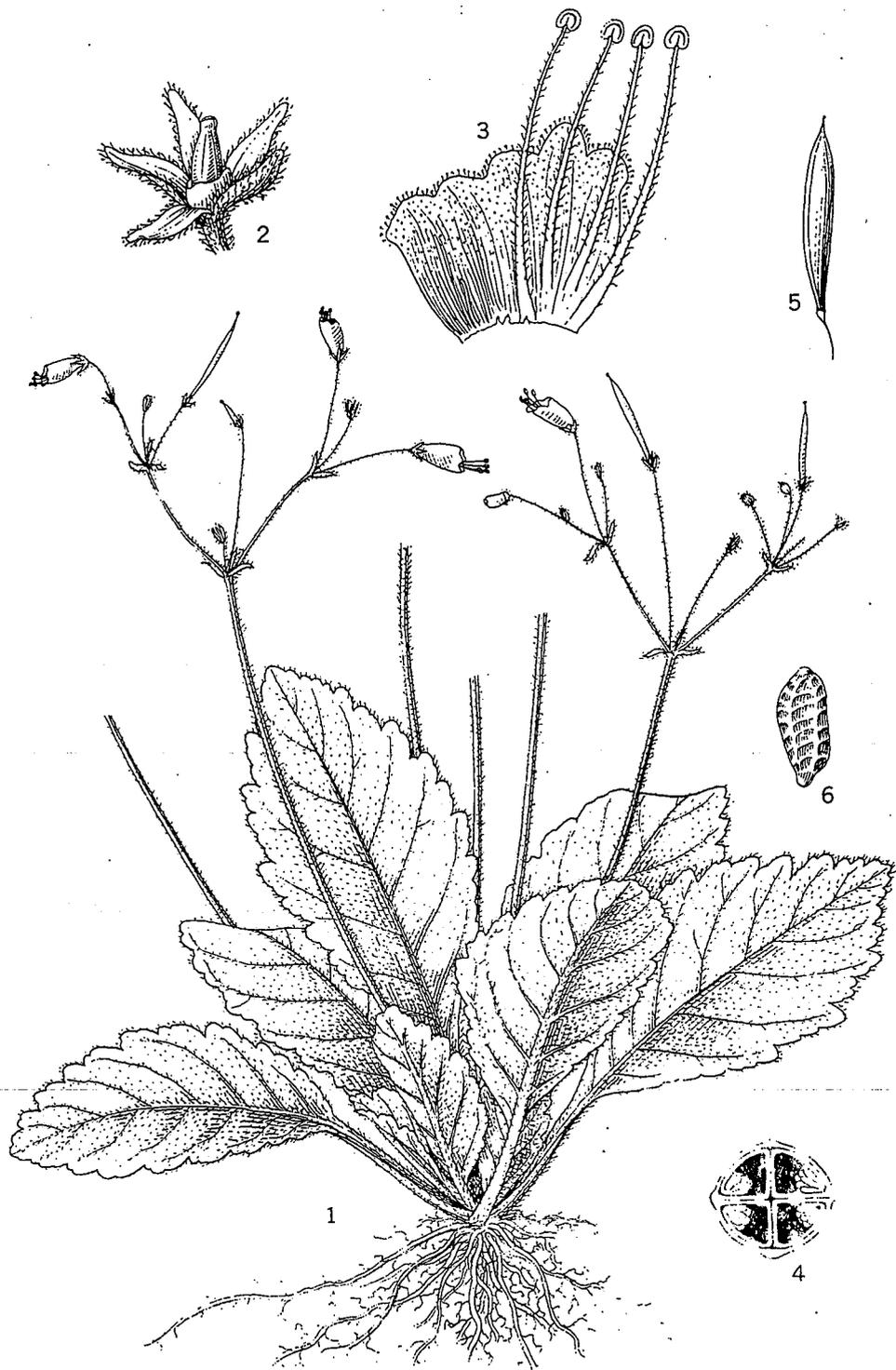


Figure 128.1. *Tremacron forrestii* Craib: 1, habit; 2, calyx and pistil; 3, corolla opened to show insertion of stamens and staminode; 4, cross section of ovary; 5, fruit; 6, seed. (C. Z. Ji)

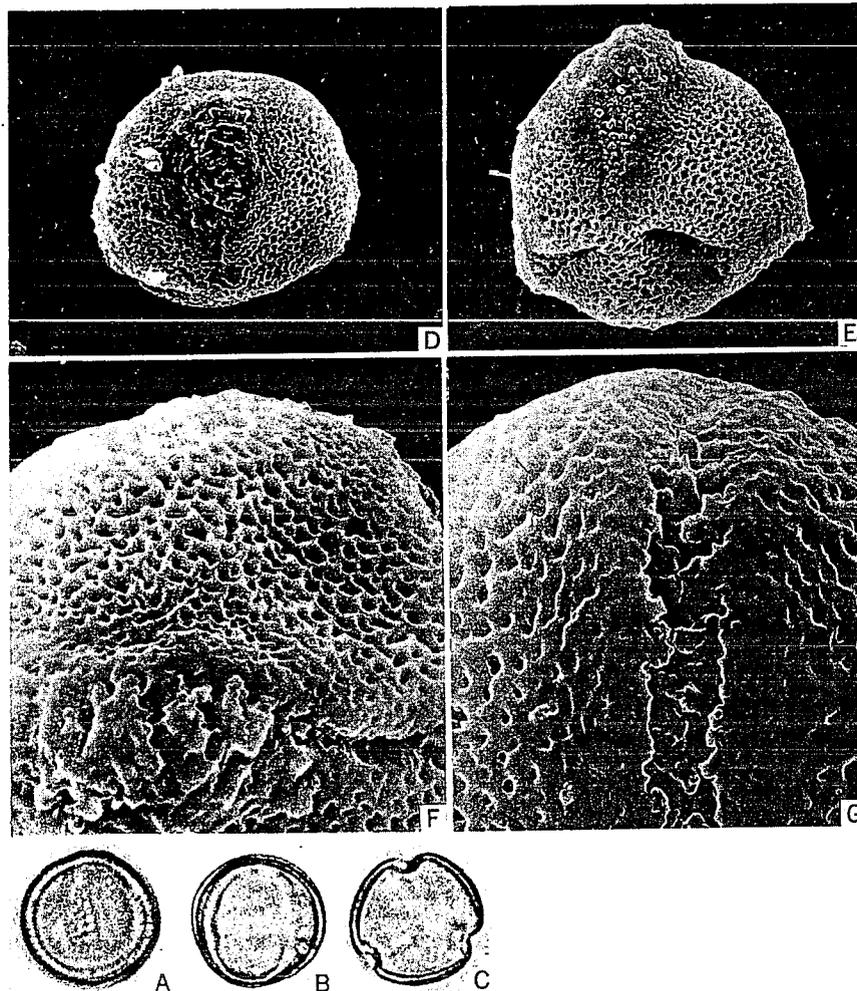


Figure 128.2. (A-G) *Tremacron* pollen. (A-F) *T. forrestii* Craib (without collector 13316, PE); A, equatorial view showing aperture, LM X 1000; B, equatorial optical cross section, LM X 1000; C, polar optical cross section, LM X 1000; D, equatorial view showing aperture and ornamentation, SEM X 2400; E, oblique polar view, SEM X 2400; F, detail of aperture and ornamentation, SEM X 6000; G, *T. begoniifolium* H. W. Li (S. G. Xu 4923, KUN); detail of aperture and ornamentation, SEM X 6000.

129. *Whytockia* W. W. Smith, Trans. Bot. Soc. Edinburgh 27: 338. 1919. Figure 129.1. Type species: *Whytockia chiritiflora* (Oliver) W. W. Smith.

**Description:** Perennial herbs. Leaves opposite, sessile, members of a pair very unequal in size, the smaller one stipule-like, obliquely ovate, larger one elliptic-ovate or ovate, base slightly oblique, serrate, upper surface sparsely short-pubescent, lower surface puberulous along veins. Cymes axillary, short-pubescent; bracts absent; pedicel puberulous; calyx campanulate, 5-lobed, lobes equal in size; corolla white or pale purple, bilabiate, upper lip bifid, lower lip trifid, longer than upper lip, lobes ovate, apex obtuse; stamens 4, included; filaments inserted near base of corolla tube; anthers didymous coherent, locules confluent at apex; disc shallow-cyathiform. Ovary ovoid, glabrous, 2-locular, placentation axile; style longer than ovary, persistent; stigma capitate. Capsule subglobose, dehiscent at apex, 2-valved. Seeds narrowly ovoid. Fl. Aug-Oct; fr. Sep-Nov. A genus of three species, one species with three varieties.

#### Key to species

1. Leaves sessile, ca. 15 cm long, 6 cm wide; flowers ca. 2.5 cm long, pink; stigma bilobed ..... 1. *W. chiritiflora* (Oliver) W. W. Smith
1. Leaves petiolate or sessile, to 11 cm long, less than 6 cm wide; flowers at most 1.8 cm long, white, light violet-purple or pink, stigma capitate or bilobed.
  2. Leaves petiolate, 7-11 cm long; flowers 1.4-1.8 cm long; corolla sometimes pouched; stem usually unbranched.
    3. Flowers white; leaf margins repand ..... 2a. *W. tsiangiana* (Handel-Mazzetti) A. Weber var. *tsiangiana*
    3. Flowers pink to light violet-purple.
      4. Leaves with short teeth ..... 2b. *W. tsiangiana* var. *minor* (W. W. Smith) A. Weber
      4. Leaves coarsely serrate; lower surface sometimes purple ..... 2c. *W. tsiangiana* var. *wilsonii* A. Weber
  2. Leaves sessile or subsessile, 5-8 cm long; flowers 1.2-1.5 cm long; corolla scarcely pouched; ovary unilocular; stigma capitate; plant usually branched from creeping base ..... 3. *W. sasakii* (Hayata) B. L. Burt

**Pollen:** Pollen grains of *Whytockia tsiangiana* var. *tsiangiana* are 3-colporoidate, subspheroidal, rarely subprolate, subcircular in polar view. Size: P = (14.8-16.1(-19.1)  $\mu\text{m}$ , E = (15.7-17.9(-20)  $\mu\text{m}$ . Colpi rather long and narrow, with indistinct membrane; margins slightly thickened. Endoaperture (oroid) indistinctly delimited. Exine ca. 1.6  $\mu\text{m}$  thick, sexine and nexine indistinguishable (LM), finely reticulate. Muri rather coarse; lumina subcircular, elliptic or rather irregular in shape, unequal in size. Figure 129.2.

**Ecology:** *Whytockia* grows on rocks in dense forests, at stream sides and in wet places in valleys; 1300-1700 m.

**Geography:** *Whytockia* is in northeastern Guangxi, Guizhou, western Hubei, western Hunan, central to northeastern Taiwan and southeastern Yunnan. Map 129.

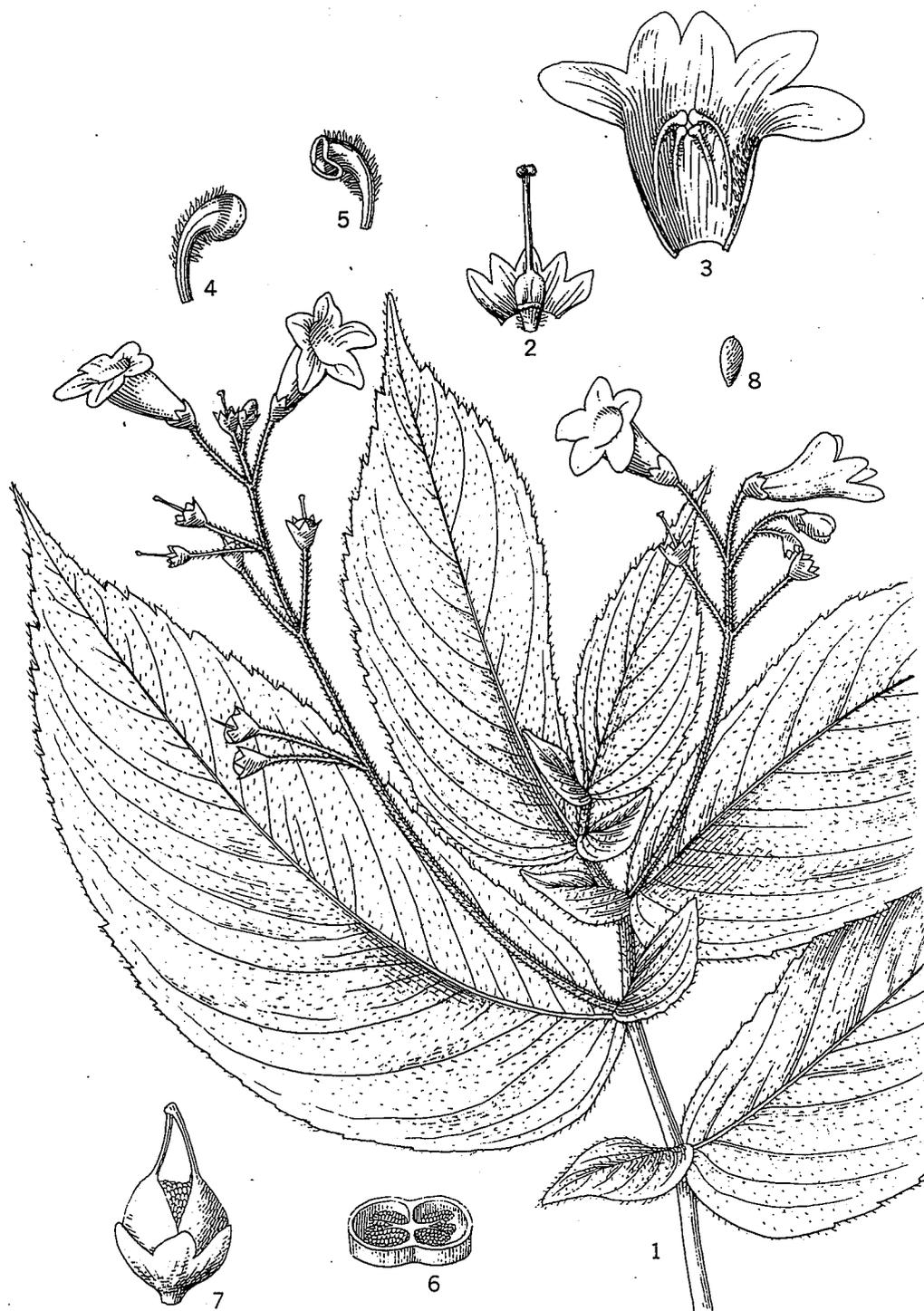


Figure 129.1. *Whytockia chiritiflora* (Oliver) W. W. Smith: 1, upper portion of plant; 2, calyx and pistil; 3, corolla opened to show insertion of stamens; 4, stamen, abaxial view; 5, stamen, adaxial view; 6, cross section of ovary; 7, fruit; 8, seed. (C. Z. Ji)

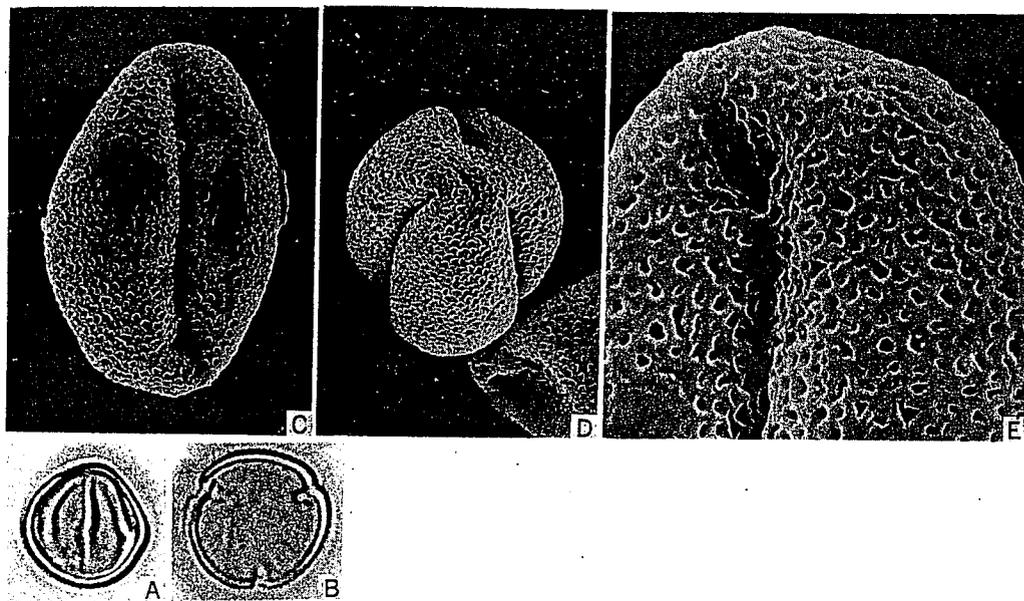
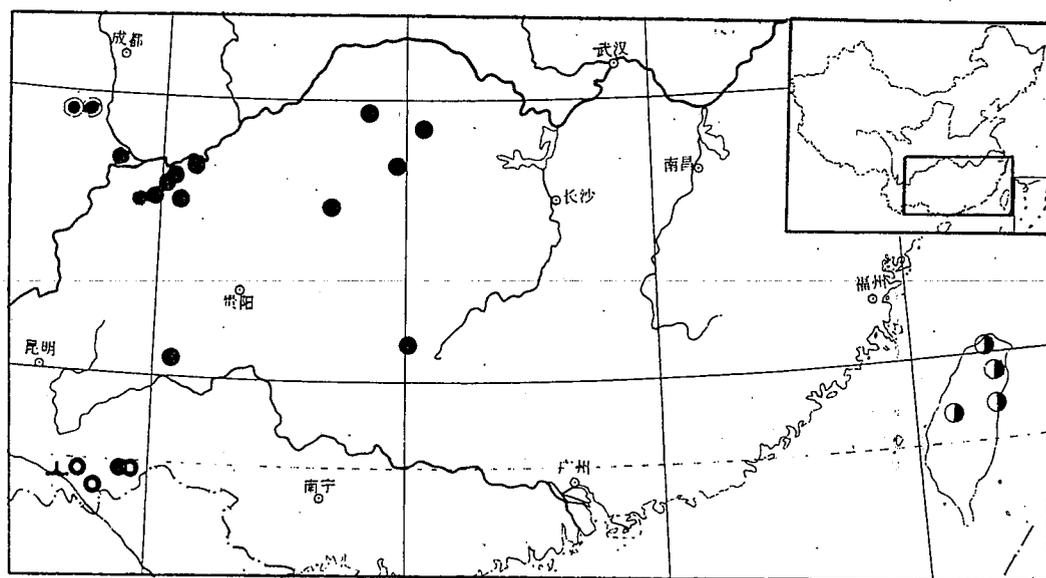


Figure 129.2. (A-E) *Whytockia tsiangiana* (Handel-Mazzetti) A. Weber var. *tsiangiana*. Pollen (Z. P. Jien & T. S. Ying 30671, PE); A, equatorial view showing aperture, LM X 1000; B, polar view, LM X 1000; C, equatorial view showing aperture and ornamentation, SEM X 2400; D, oblique polar view, SEM X 2400; E, detail of aperture and ornamentation, SEM X 6000.



Map 129. ○ *Whytockia chiritiflora* (Oliver) W. W. Smith; ◐ *W. sasakii* (Hayata) B. L. Burt; ● *W. tsiangiana* (Handel-Mazzetti) A. Weber var. *tsiangiana*; ⊙ *W. tsiangiana* var. *minor* (W. W. Smith) A. Weber; ▲ *W. tsiangiana* var. *wilsonii* A. Weber.