

Notes on Commelinaceae of Taiwan: *Cyanotis* and *Belosynapsis*, and the rediscovery of *Murdannia edulis*

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ABSTRACT

In this report we provide a taxonomic revision of *Cyanotis* (two species) and *Belosynapsis* (two species) in Taiwan. A new combination, *Belosynapsis kawakamii*, is made. We also document the rediscovery of *Murdannia edulis*, which has not been collected for more than half a century on this island. A taxonomic treatment as well as line drawings of all five species are provided to aid in identification. A meiotic chromosome count of $n = 21$ is reported for *M. edulis* from Taiwan for the first time.

Key words: *Belosynapsis ciliata*, *Belosynapsis kawakamii*, Chromosome number, Commelinaceae, *Cyanotis arachnoidea*, *Cyanotis axillaris*, *Murdannia edulis*, *Murdannia formosana*, Revision, Taiwan, Taxonomy, New combination, Rare species

Introduction

The taxonomy of the genus *Cyanotis* (Commelinaceae) has long received attention from botanists. Based on morphological and cytological characters, Sharma (1955) and Rao et al. (1968) suggested that *Cyanotis sensu lato* should be split into three genera, namely *Amischophacelus*, *Belosynapsis*, and *Cyanotis sensu stricto*. However, Brenan (1966), Jones and Jopling (1972), and Faden and Suda (1980) recognized *Belosynapsis*, but considered that morphological and karyotypic variation in *Amischophacelus* did not justify its separation from *Cyanotis*. In the first edition of Flora of

Taiwan (Hsu, 1978) three indigenous species were recognized in *Cyanotis sensu lato*. During the course of preparing the treatment of Commelinaceae for the second edition of the Flora of Taiwan, we adopt the generic concepts of *Belosynapsis* and *Cyanotis*. As a result, name changes are required for all three species of *Cyanotis* recorded earlier. In addition, *Cyanotis axillaris*, a previously neglected species, was recently reported from Taiwan (Yang and Peng, 2000). Thus, a taxonomic revision now seems appropriate. In this paper we also document the rediscovery of *Murdannia edulis*, a rare species that has not been collected for more than half a century on this island.

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The Genera *Belosynapsis* and *Cyanotis*

Belosynapsis Hassk. 假紫萬年青屬

Perennial herbs, green or purple. Roots fibrous. Stems procumbent, branched, rooting at nodes. Leaves sessile, arranged nearly on the same plane, elliptic-ovate, succulent; sheath cylindrical. Inflorescence terminal, a cincinnus enclosed in biseriate bracteoles, or flowers solitary; bract and bracteoles isophenous, margins ciliate, elliptic-ovate. Flowers bisexual, actinomorphic; sepals 3, free, greenish, persistent, boat-shaped, lanceolate; petals 3, free, pink purple, with a white streak in middle, obovate, apex acute, base cuneate; stamens 6, equal; anthers trapezoid; filaments barbate, trichomes moniliform, white or blue; ovary ellipsoid, 3-angled, apex hispid; style barbate. Capsules ellipsoid, 3-loculed, apex hispid. Seeds uniseriate, trapezoid or ellipsoid, embryostega apical, hilum punctiform.

About five species, southern Asia to Papua New Guinea; two species in northern and southern Taiwan, respectively.

Key to species of Belosynapsis in Taiwan

1. Leaves 4-5 cm long, 1.3-2 cm wide, glabrous, margins ciliate; inflorescence a cincinnus enclosed in biseriate bracteoles -----
----- 1. *B. ciliata*
1. Leaves 1.7-3 cm long, 0.7-1.1 cm wide, densely velutinous; flowers solitary -----

-----2. *B. kawakamii*

1. ***Belosynapsis ciliata*** (Blume) R. S. Rao, Notes Roy. Bot. Gard. Edinburgh 25: 187. 1964; Hong, Acta Phytotax. Sin. 12(4): 477, 1974 (excl. syn. *Cyanotis kawakamii*); Hong, Fl. Reipubl. Popularis Sin. 13(3): 118. pl. 30: 3-5. 1997 (excl. syn. *Cyanotis kawakamii*).

毛葉鴨舌疳 (假紫萬年青) Figure 1

Tradescantia ciliata Blume, Cat. Buitenzorg 61. 1823.

Cyanotis ciliata (Blume) Bakh. f., Blumea 6: 399. 1950; Hsu, Fl. Taiwan 5: 166. 1978.

Stems villous along a line decurrent from sheath, otherwise glabrous. Leaves 4-5 cm long, 1.3-2 cm wide, apex acute, base rounded, both surfaces glabrous, margins ciliate; sheath ca. 6 mm long, pilose. Flowering shoots short, 1-3 from leaf axils; inflorescence terminal, cincinni enclosed in biseriate bracteoles; bract 1-1.3 cm long, 0.5-0.6 cm wide, bracteoles ca. 0.6-0.8 cm long, 0.3-0.4 cm wide. Sepals ca. 5 mm long, 1.5 mm wide, margins and ridge ciliate; petals 5-6 mm long, ca. 3 mm wide, anthers yellow, base brown, ca. 1 mm long; filaments ca. 7 mm long; ovaries usually abortive, ca. 1-2 mm long, 1 mm across, apex emarginate; style ca. 7 mm long. Capsules ca. 3 mm long, locules 2-seeded. Seeds ca. 1.5 mm long, 1 mm in diam.

Distribution: India, southern China, Japan,

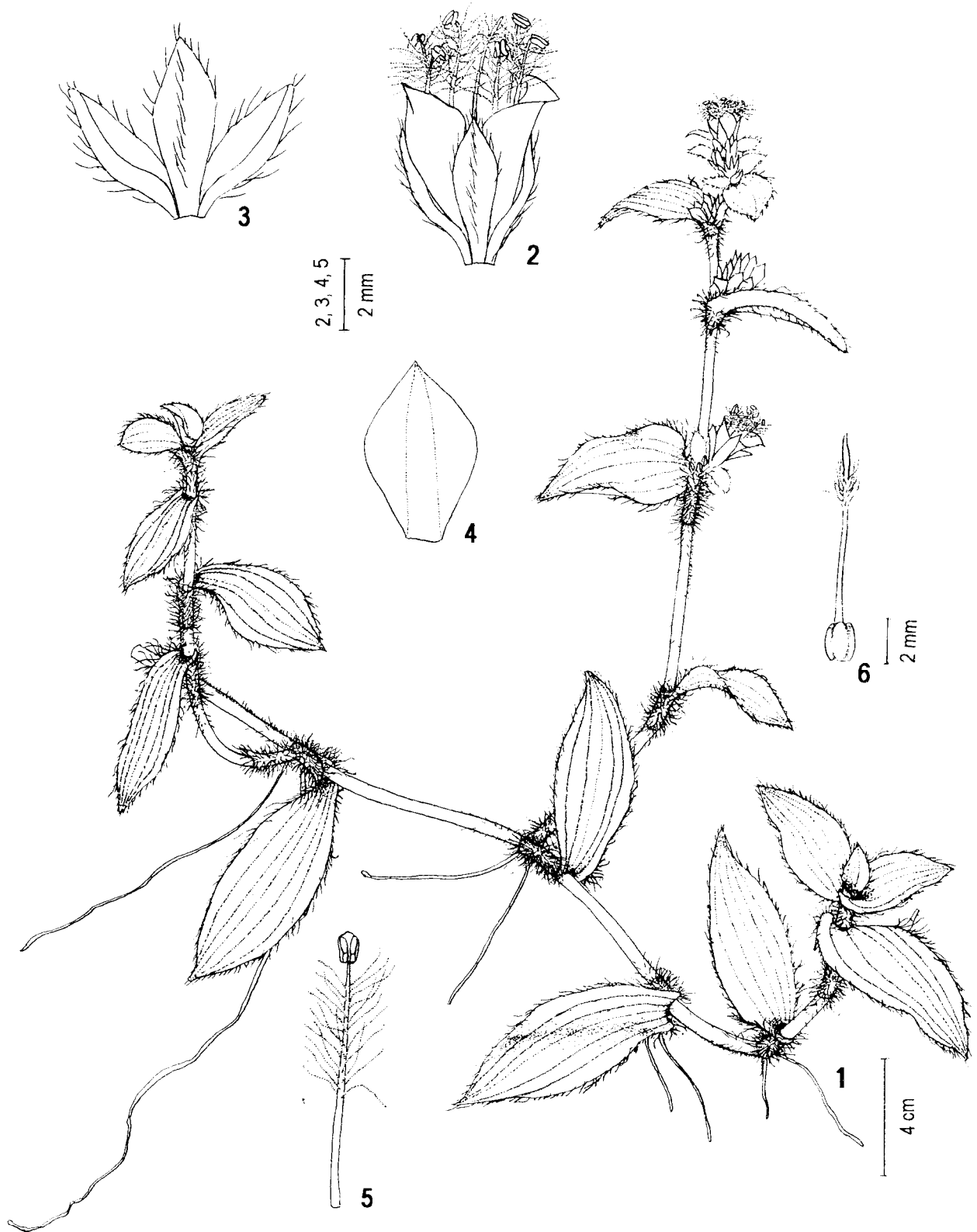


Figure 1. *Belosynapsis ciliata* (Blume) R. S. Rao
1. habit; 2. flower; 3. calyx; 4. petal; 5. stamen; 6. pistil.

the Philippines, Indonesia, and Papua New Guinea, Taiwan, at low elevations in the north (Figure 2A), often forming a large mat in moist semi-shaded places. Flowering in Oct. to Jan.

Specimens examined: KEELUNG CITY: watershed of Nuannuan Reservoir, *Chen et al.* 525 (TNU); Shihfenliao, 7 Nov 1943, *Masamune s. n.* (TAI). TAIPEI HSIEN: Pinghsi Hsiang, *Shen* 244 (TNU); Shihing Hsiang: Huangtitienshan, on floor of bamboo plantation, ca. 440 m, *Peng* 8576 (HAST); same loc., *Chen et al.* 251, 252 (TNU); Leikungpo, Hsiaoketou, 350-450 m, *Peng & Hu* 12298 (HAST); Chinkuashih, 20 Oct 1970, *Hsu s. n.* (TAI); Wantan, 20 Jan 1936, *Simizu s. n.* (TAI); same loc., 17 Apr 1936, *Simizu s. n.* (TAI); Wutzushan, *Nakamura* 4051 (TAI). CHIAYI HSIEN: Tsengwenhsi, 1 Dec 1907, *Mori s. n.* (TAI). ILAN HSIEN: Kungliao to Tali, Tsaoling Trail, *Chen* 446 (TNU), *Chen et al.* 899 (TNU), *Chen & Wang* 908 (TNU).

2. *Belosynapsis kawakamii* (Hayata) C.-I Peng & Y.-J. Chen, *comb. nov.*

川上氏鴨舌痛 Figure 3

Cyanotis kawakamii Hayata, J. Coll. Sci. Univ. Tokyo 22: 449, 1906; Hsu, Fl. Taiwan 5: 166, 1978.

Belosynapsis ciliata auct. non R. S. Rao (1964): Hong, Acta Phytotax. Sin. 12(4): 477, 1974 (pro parte); Hong, Fl. Reipubl. Popularis Sin. 13(3): 118, 1997 (pro parte).

Stems villous. Leaves elliptic-ovate, 1.7-3 cm long, 0.7-1.1 cm wide, densely velutinous, apex acute, base rounded; sheath ca. 3 mm long, pilose. Flower solitary, bract elliptic-ovate, ca. 8 mm long, 2-3 mm wide; pedicel 1.2 mm long. Sepals ca. 5 mm long, 2 mm wide, margins and ridge ciliate; petals 7-8 mm long, ca. 4.5 mm wide; anthers yellow, ca. 1.3 mm long; filaments ca. 8 mm long; ovary ca. 2 mm long, 1.4 mm in diam.; style 7-8 mm long. Capsules ca. 2.6 mm long, 1.5 mm in diam. Seeds ca. 2 mm long, 1.1 mm in diam.

Distribution: Endemic to Taiwan, mostly in the south (Figure 2A), usually forming large or small mats on rocky or soil slope along semi-shaded forest margin at low elevations. Flowering in Jun. to Jan.

Specimens examined: MIAOLI HSIEN: Tahu ("Taiko"), *Hayata* 280 (TAIF). KAO-HSIUNG HSIEN: Wuweishan ("Buizan"), *Matuda* 294 (TAI). PINGTUNG HSIEN: Lilungshan, 500-600 m, *Chen* 518 (TNU); Tahanshan logging trail, *Chen et al.* 830 (TNU). TAITUNG HSIEN: Tawu, 500-600 m, *Peng & Lin* 10567 (HAST).

Notes: *Belosynapsis kawakamii* is sharply distinct from *B. ciliata*, as shown in the key to the species (see above). With few exceptions, *B. ciliata* is confined to northern Taiwan, while *B. kawakamii* is restricted to the southern part of the island. Both species are limited in distributional range and not common

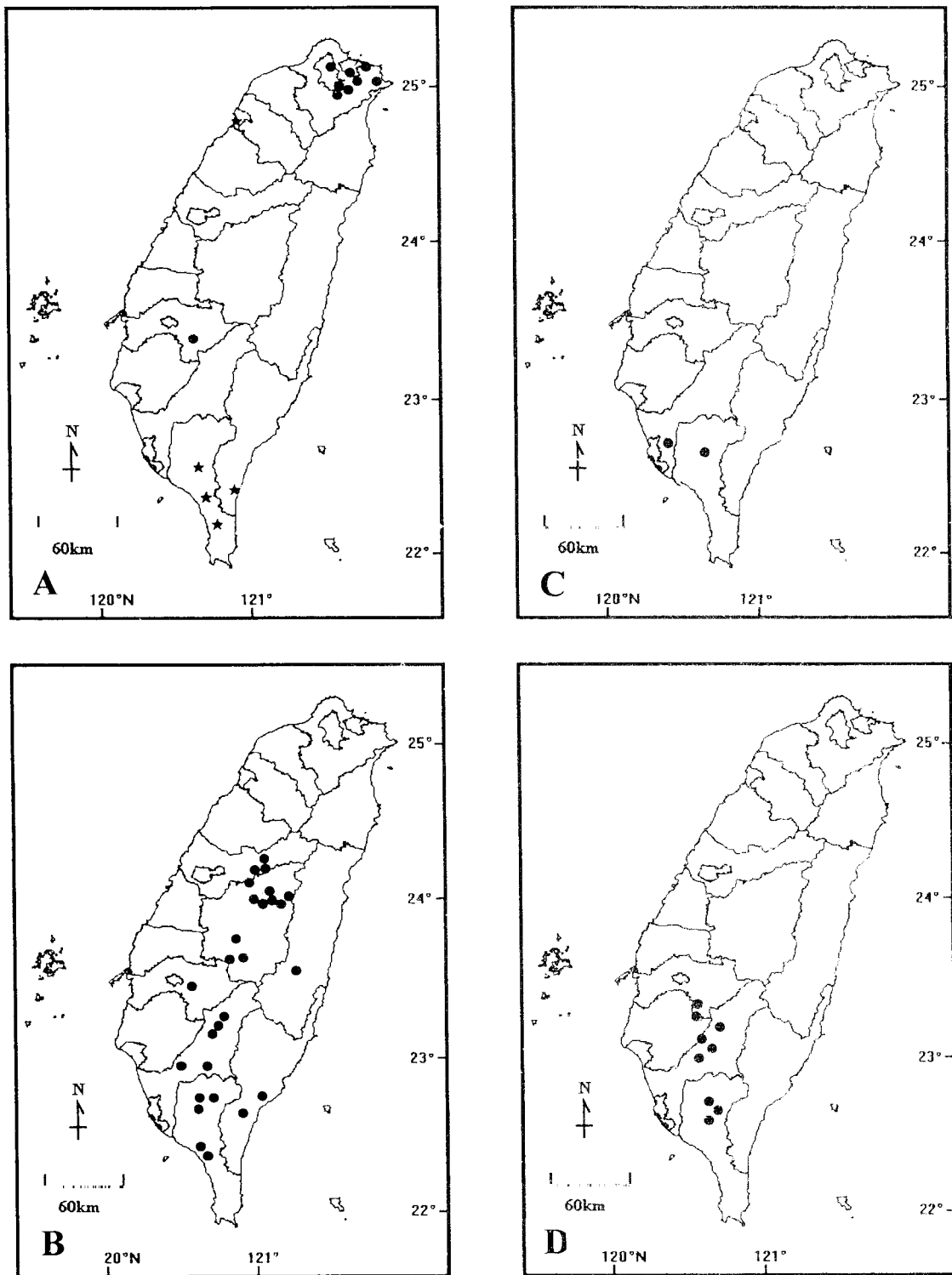


Figure 2. Distribution of *Belosynapsis*, *Cyanotis*, and *Murdannia edulis* in Taiwan.
 A. *Belosynapsis ciliata* (solid circles), *Belosynapsis kawakamii* (stars); B. *Cyanotis arachnoidea*;
 C. *Cyanotis axillaris*; D. *Murdannia edulis*.

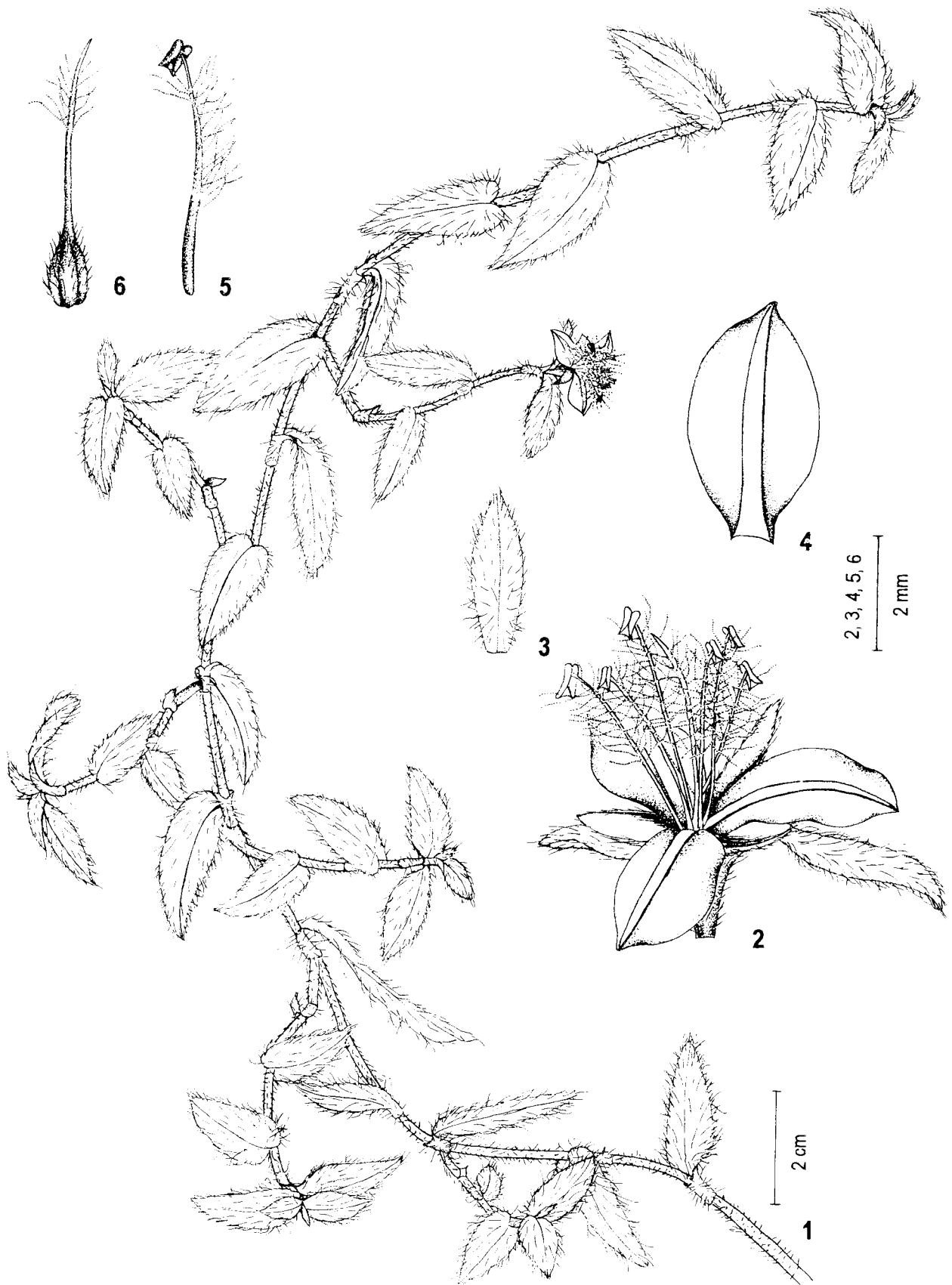


Figure 3. *Belosynapsis kawakamii* (Hayata) C.-I Peng & Y.-J. Chen
1. habit; 2. flower; 3. sepal; 4. petal; 5. stamen; 6. pistil.

in Taiwan (Figure 2A).

Cyanotis D. Don 鴨舌疳屬

Annual or perennial herbs, green or purple. Stems erect, ascending, creeping or decumbent. Leaves succulent, linear or lorate, apex acuminate. Cincinni terminal and in axils of leaves or foliaceous bracts. Flower bisexual, actinomorphic; sepals 3, basally fused, greenish, persistent, lanceolate; petals 3, connate below into a tube, pink purple; stamens 6, equal, anthers trapezoidal; filaments inflated apically, barbate, trichomes moniliform, purple; ovary ellipsoid, 3-angled; style inflated apically, ventricose. Capsules trilocular, 3-valved, ellipsoid, locules 2-seeded. Seeds uniseriate, deltoid-trapezoid, embryostega apical, hilum punctiform.

About 50 species, in the Old World subtropics and tropics; two species in Taiwan.

Key to species of Cyanotis in Taiwan

1. Plants with radical leaves; leaves 0.7-2 cm wide; inflorescences terminal, scorpioid cymes enclosed in biseriate bracteoles, subtended by spathe bracts; apices of capsules mucronulate -----
-----1. *C. arachnoidea*
1. Plants without radical leaves; leaves 0.2-0.4 cm wide; inflorescences axillary, bracts wanting, bracteoles inconspicuous; apices of capsules notched -----
-----2. *C. axillaries*

1. *Cyanotis arachnoidea* C. B. Clarke in DC., Monogr. Phanerog. 3: 250. 1881; Hong, Acta Phytotax. Sin. 12(4): 479. 1974; Hong, Fl. Reipubl. Popularis Sin. 13(3): 122. *pl.* 30. 1997. 蛛絲毛藍耳草 Figure 4

Cyanotis vaga auct. non Schultes f. (1830): Hsu, Fl. Taiwan 5: 168. *pl.* 1308. 1978.

Perennial, more or less arachnose pubescent. Roots fibrous, thickened, 2-3 mm in diam. Main stem short, with a rosette of leaves; flowering shoots erect or ascending, somewhat decumbent basally, unbranched or occasionally branched. Rosette leaves strap shaped, 8-15 cm long, 1-2 cm wide, apex acute, subglabrous to arachnoid pubescent on both surfaces; leaves on flowering shoots shorter, 3-7 cm long, 0.7-1 cm wide, sheath 0.5-1.5 cm long, densely arachnose. Flowering shoots 1-7 from leaf axils on main stem; inflorescence terminal, a cincinnus enclosed in biseriate bracteoles, subtended by spathe-like bracts; bract lorate-lanceolate, 1.2-3.7 cm long, 0.4-0.7 cm wide, upper surface nearly glabrous, arachnoid pubescent on the lower surface, margins ciliate; bracteoles drepanoid, ca. 0.6-1 cm long, 0.15-0.3 cm wide. Sepals 4-6 mm long, 1.3-2.2 mm wide, apex acuminate, hispid, base villous; petals 6.7-8.4 mm long, 3-4.3 mm wide, apex acute; anthers yellow, ca. 1 mm long; filaments ca. 1 cm long; ovary ca. 2 mm long, 1-1.5 mm in diam., apex hispid; style ca. 8 mm long, barbate, trichomes moniliform, purple. Capsules ca. 3 mm long, 2 mm in diam.,

mucronulate, hispid. Seeds ca. 2 mm long, 1 mm in diam., rugose, pitted.

Distribution: Africa, India, Sri Lanka, Vietnam, Laos, Cambodia, and southern China. Taiwan, in the center and south (Figure 2B), often on rocky outcrops at forest margins, from 200-2,300 m. Flowering in May to Dec.

Specimens examined: TAICHUNG HSIEN: Chingshan, 900-1300 m, *Chen* 858 (TNU); Chinlehsi, 1480 m, *Wang* 857 (HAST, TAIF); Pahsienshan, *Huang et al.* 2768 (TAI); same loc., 10 May 1933, *Sasaki s. n.* (TAI); Paikoutashan, 1 Sep 1909, *Mori s. n.* (TAI, TAIF). NANTOU HSIEN: Baibara (Hsinsheng), 20 Jul 1926, *Suzuki s. n.* (TAI); Jenai Hsiang: Chingjing Farm, 1750-1900 m, *Peng* 6095, 6119 (HAST); same loc., *Hsu* 131 (TAI); Chuayfong, 2000-2300 m, *Hsu* 11601 (TAI); Hosheh, 1150 m, *Peng* 6204 (HAST); Kuantaochi, *Chang* 2160 (TAI); Lushan, 1700-2100 m, *Peng* 11295 (HAST); same loc., *Peng* 6171 (HAST); Lushan to Tunyen, 10 Aug 1964, *Kao s. n.* (TAI); same loc., *Huang et al.* 5674 (TAI); NCHU Hui-Sun Experimental Forest, Tangkungpei, *Kuoh* 4195 (TAI); same loc., *Chen & Hsu* 744 (TNU); Nengkao Forest Experiment Station, *Huang & Kao* 6027 (TAI); Oiwake, 6 Jul 1938, *Ku et al. s. n.* (TAI); Tsiufeng to Sungkang, *Jeng* 1876 (TAI); Tungpushan, 6500 ft (=ca. 2150 m), *Kawakami & Sasaki* 99 (TAI, TAIF); Tungpu to Loloku, 1300-1500 m, *Huang et al.* 5243 (TAI); same loc., *Suzuki* 13232 (TAI); Tungpu to Rainbow Waterfall, 1120-1400 m, *Huang* 1587

(TNU); Tungpu Hot Spring to Kuankao, 1450 m, *Peng* 8064 (HAST); same loc., *Chen* 832 (TNU); Wushe, *Kawakami & Mori* 1177 (TAIF). CHIAYI HSIEN: Chiayi City to Alishan, 1600 m, *Peng* 14324 (HAST); Kotaipo, Oct 1917, *Sasaki s. n.* (TAIF); Niitakashan, *Kawakami & Mori* 2325 (TAIF). KAOHSIUNG HSIEN: Banshoryo, 30 Nov 1907, *Mori s. n.* (TAIF); Chishan, *Yamamoto & Mori* 688 (TAI); Chiah sien Hsiang: Paolai, ca. 600 m, *Lu & Sang* 704 (TNU); Meishan Youth Activity Center, *Chen et al.* 800 (TNU); Shanping to Tengchuan, 750-1100 m, *Wang et al.* 9675 (TNU); Taoyuan Hsiang, Pao-shan Village, Shihshan Forest Road, 1500 m, *Wang et al.* 10392 (TNU); Tengchih, 1550-1700 m, *Huang et al.* 13935 (TAI); same loc., 1500-1800 m, *Ohashi* 12843 (TAI), *Chen* 555 (HAST, TAIF), *Yang* 5128 (TAIF, HAST), *Chen & Hsu* 896 (TNU). PINGTUNG HSIEN: Ako-huzi, 11 Jul 1918, *Matuda s. n.* (TAIF); Chunjih Hsiang: Chichia Forest Road, 760 m, *Liu et al.* 726 (HAST); same loc., 300-600 m, *Wang & Yang* 8916 (TNU, HAST); Tahan Forest Trail, 800 m, *Leu et al.* 552 (HAST, TNU); Tahanshan logging trail, *Chen et al.* 831 (TNU); Machia Hsiang, Liangshan, *Liao* 142 (PPI); Pingtung, 24 Aug 1932, *Hosokawa s. n.* (TAI); Wutai Hsiang, Wutai, 1000-1100 m, *Peng* 10212 (HAST); Paiwan, *Matuda* 462 (TAI). HUALIEN HSIEN: Wanjung Hsiang: Hungyeh Hot Spring, 200 m, 3 Jul 1988, *s. c., s. n.* (TNU). TAITUNG HSIEN: Chipon-goe, 13 Oct 1934, *Sasaki s. n.* (TAI).

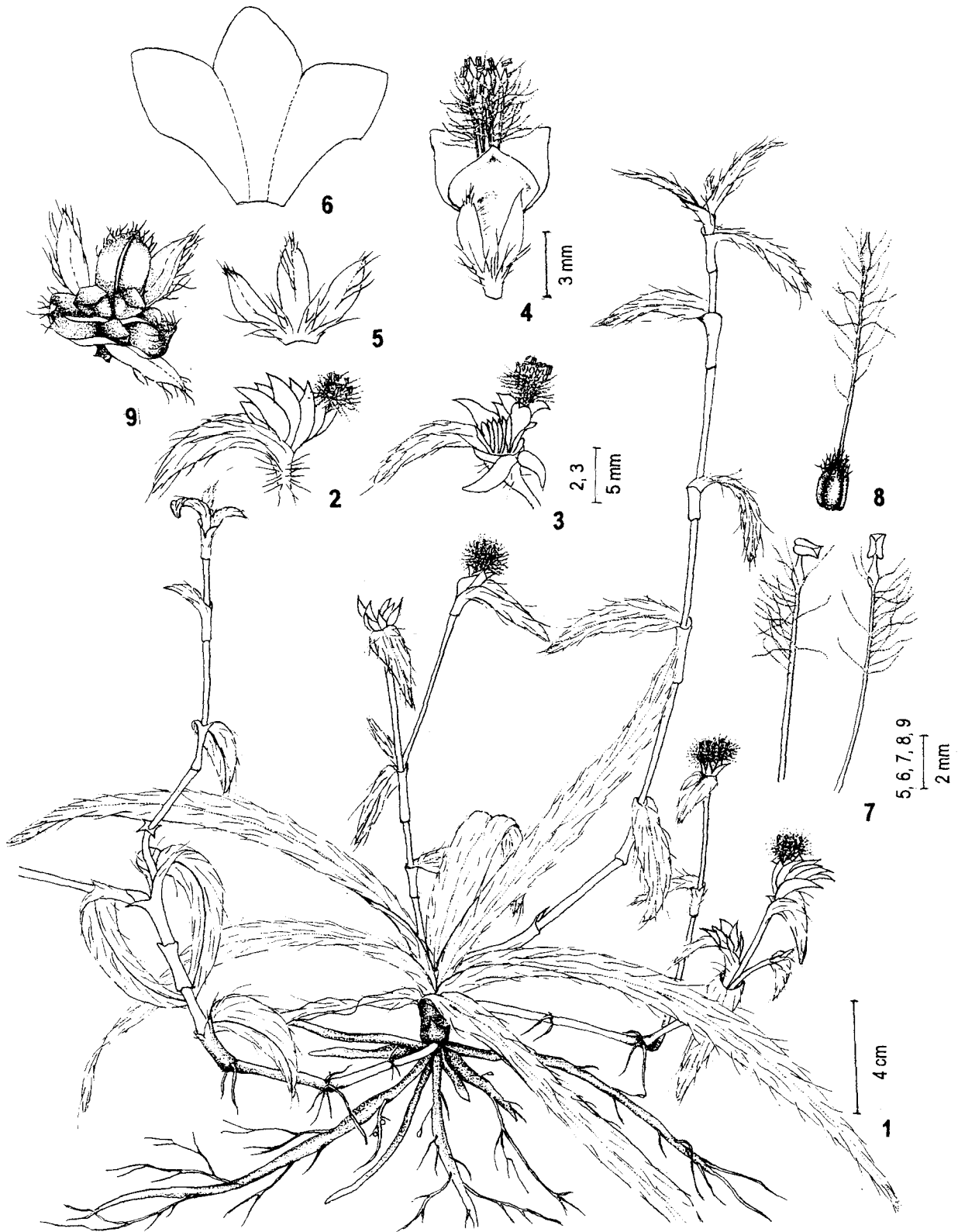


Figure 4. *Cyanotis arachnoidea* C. B. Clarke

1. habit; 2. inflorescence; 3. inflorescence, some bracteoles removed; 4. flower; 5. calyx; 6. corolla; 7. stamen; 8. pistil; 9. capsule.

1. **Cyanotis axillaris** (L.) Sweet, Sweet's Hort. Brit. 430. 1827; Yang & Peng, Bull. Natl. Pingtung Univ. Sci. Tech. 9: 200. 2000 ("*Cyanotis axillaris* (L.) D. Don ex Sweet"). 鞘苞花 Figure 5

Commelina axillaris L., Sp. Pl. 42. 1753.

Tradescantia axillaris (L.) L., Syst. Veg. ed. 13, 260. 1774.

Zygomenes axillaris (L.) Salisb., Trans. Hort. Soc. London 1: 271. 1812.

Amischophacelus axillaris (L.) R. S. Rao et Kammathy, J. Linn. Soc. Bot. 59: 306. 1966; Hong, Acta Phytotax. Sin. 12: 478. 1974; Hong, Fl. Reipubl. Popularis Sin. 13 (3): 120. pl. 30. 1997.

Roots fibrous. Stems creeping, branched, rooting at nodes, glabrous. Leaves sessile; blades linear to lanceolate, 2-8 cm long, 0.2-0.4 cm wide, glabrous; sheath ca. 0.8 cm long, ciliate at mouth. Inflorescence axillary, consisting of 1-3 cincinni, enclosed in leaf sheath, bracteoles almost hidden. Sepals equal, ca. 8.5 mm long, ca. 4 mm wide, 1 glabrous, others puberulent on ridge, united in the lower half, apex free; petals blue or pink, apex free, ca. 12 mm long; anthers ca. 1 mm long; filaments ca. 12 mm long; ovary ca. 2.2 mm long, ca. 1 mm in diam., apex hispid; style ca. 10 mm long, glabrous. Capsules ca. 3.5 mm long, 3-valved, each valve notched at tip, apex hispid. Seeds lustrous, ca. 1.6 mm long, 1 mm in diam., deeply pitted.

Distribution: Eastern Africa, India, Sri Lanka, Indochina, southern China, Malaysia, the Philippines, Indonesia, and Australia. Taiwan, at low elevations in the south (Figure 2C); very rare. Flowering and fruiting in Nov. and Dec.

Specimens examined: KAOHSIUNG HSIEN: Tashu Hsiang, Taiju, *Sukemoto* 63 (TAI). PINGTUNG HSIEN: Taiwu Hsiang, Wanan village, Chinshui Park, *Ku* 312 (HAST, PPI), *Yang* 28899 (PPI).

Notes: This species was neglected in the Flora of Taiwan (Hsu, 1978), although an unidentified specimen (*Sukemoto* 63) collected in 1934 was available at TAI. Sixty-five years later, *C. axillaris* was rediscovered from southern Taiwan (Yang and Peng, 2000). A small population was found on mossy banks of irrigation ditches in a local park.

Rediscovery of *Murdannia edulis* from Taiwan

Murdannia edulis (Stokes) Faden, Taxon 29: 77. 1980; Hong, Fl. Reipubl. Popularis Sin. 13 (3): 100. 1997. 葶花水竹葉 Figure 6

Commelina edulis Stokes, Bot. Materia Med. 1: 184. 1812.

Aneilema formosanum N. E. Br., J. Linn. Soc. Bot. 36: 152. 1903.

Murdannia formosanum (N. E. Br.) K. S. Hsu,

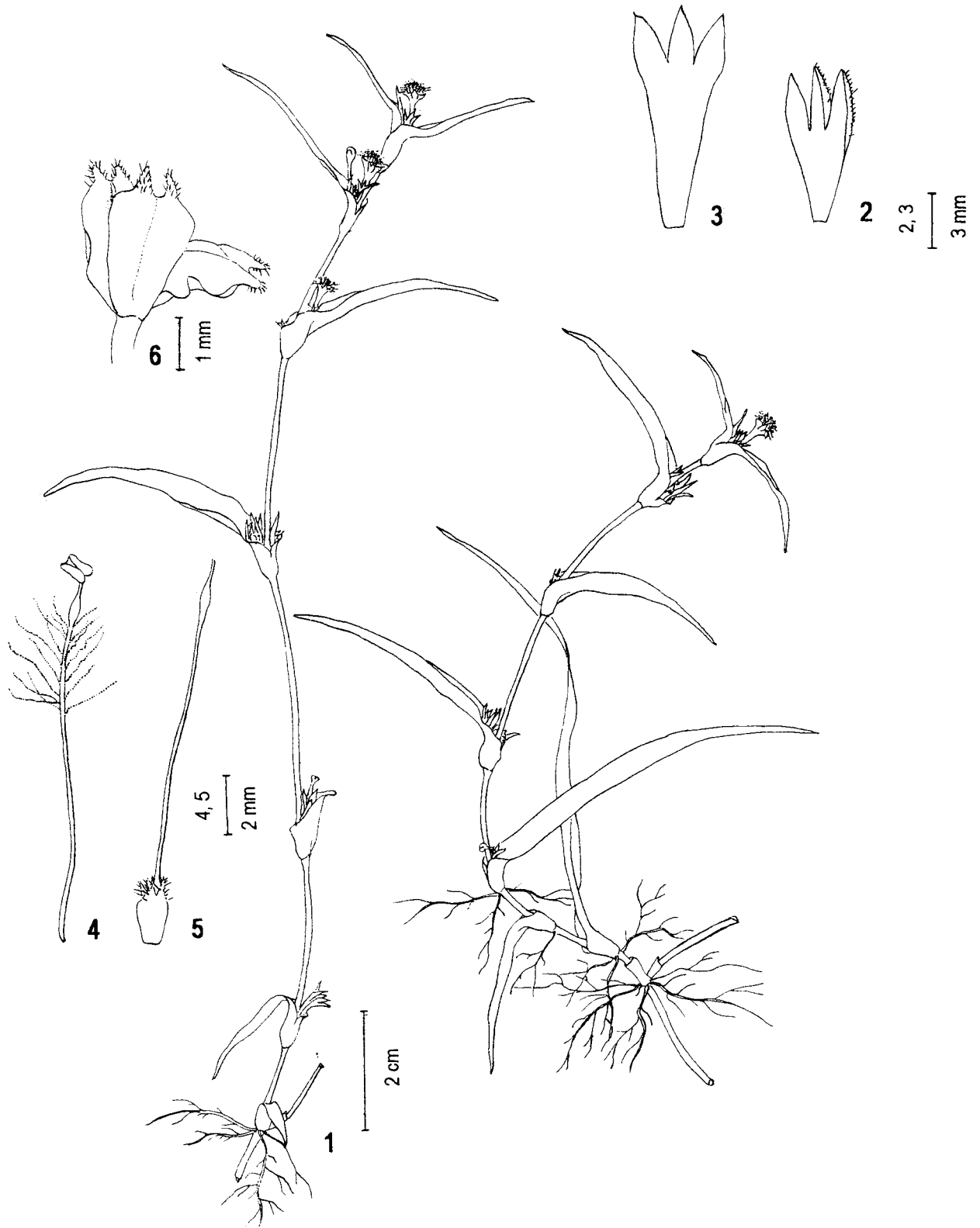


Figure 5. *Cyanotis axillaris* (L.) Sweet

1. habit; 2. calyx; 3. corolla; 4. stamen; 5. pistil; 6. capsule.

Fl. Taiwan 5: 170. 1978.

Perennials, deciduous, andromonoecious. Roots thickened, 1.6-4.5 mm in diam., many with distal fusiform tubers ca. 1.7-3 cm long, 0.5-0.9 cm in diam. Acaulescent; flowering shoots 1-several, ascending, sharply bent. Rosette leaves repand, oblanceolate, 12-25 cm long, 2-3.5 cm wide, apex acuminate, upper surface glabrous or sparsely puberulous, lower surface puberulous, margins ciliate; leaves on flowering shoots lanceolate, 0.5-1.8 cm long, 0.3-0.7 cm wide; sheath puberulous, margins ciliate. Inflorescence a terminal thyrse of 1 to 4 cymes and 1 or 2 short flowering branches from upper axils; bracteoles persistent, deltoid, infundibuliform, perfoliate, ca. 2 mm long, 2 mm wide; pedicel ca. 6 mm long. Flowers dimorphic: in functionally male flowers the style central and straight, the pistil vestigial, ca. 2.4 mm long, stamens symmetrically arranged; in bisexual flowers the style curved to one side and stamens to the opposite side; sepals lanceolate to elliptic, boat shaped, apex reddish purple, otherwise greenish, equal, 5-6 mm long, ca. 3 mm wide, apex obtuse; petals suborbicular, concave, ca. 6 mm long, 4.3 mm wide, purple; fertile stamens 3, antesealous, subequal, antecous one longer, anthers yellow, margins brown, narrowly elliptic-oblong, ca. 1.5 mm long; pollen whitish; filaments 3-5 mm long, bearded, the trichomes moniliform, purple; staminodes 3, equal, antepetalous, antherodes trilobed, yellow, ca. 0.6 mm long, filaments ca. 2.2 mm long, bearded; ovary ellipsoid, acutely

3-angled, ca. 2 mm long; style ca. 3.2 mm long, thickened toward base, tuberculate. Capsules oblong ovoid, 3-angled, trilocular, 5-6 mm long, ca. 3 mm in diam., locules (2)4-5(-6)-seeded, valves mucronulate at apex. Seeds brown, deltoid when located at ends of the capsule, trapeziform when in between, 1.3-2 mm long, 1.3-1.5 mm in diam., dorsiventral, dorsal surface slightly convex, ventral carinate, pitted, hilum punctiform.

Distribution: India, Nepal, Bangladesh, Myanmar, Thailand, Laos, Cambodia, Vietnam, southern China, the Philippines, Java, Kangeen Is., Timor, and Papua New Guinea. Taiwan, in the south (Figure 2D), usually in semi-shaded places and on bluffs in valley. Flowering in Apr. to Sep.

Specimens examined: TAINAN HSIEN: Tungshan Hsiang: Watershed area of Tsengwen Dam, along a trail from bridge # 4, ca. 150 m, 15 Jun 1994, *Leu & Wang 2040* (HAST); same loc., 11 Jul 1997, *Chen et al. 812* (TNU); en route from Yuching to Neikeng, elev. ca. 100-150 m, 24 May 1988, *Chen 534* (HAST). Chiahsien Hsiang: Kuanshan Tsun, Mukua-keng Bridge to Taitzuliao Stream, 21 Apr 1985, *Wang 4561* (HAST). KAOHSIUNG HSIEN: Chiahsienpu, 20 Jun 1930, *Sasaki & Hirakawa s. n.* (TAI); Liukuei Hsiang: Fuhsing (Kouliiao), village at mountain foot, ca. 150-250 m, 15 Jul 1988, *Chen 612* (HAST); Liukuei to Meinung, dry rocky river bed, ca. 200 m, 2-3 Nov 1987, *Chen & Wang 330* (HAST); Liukuei to

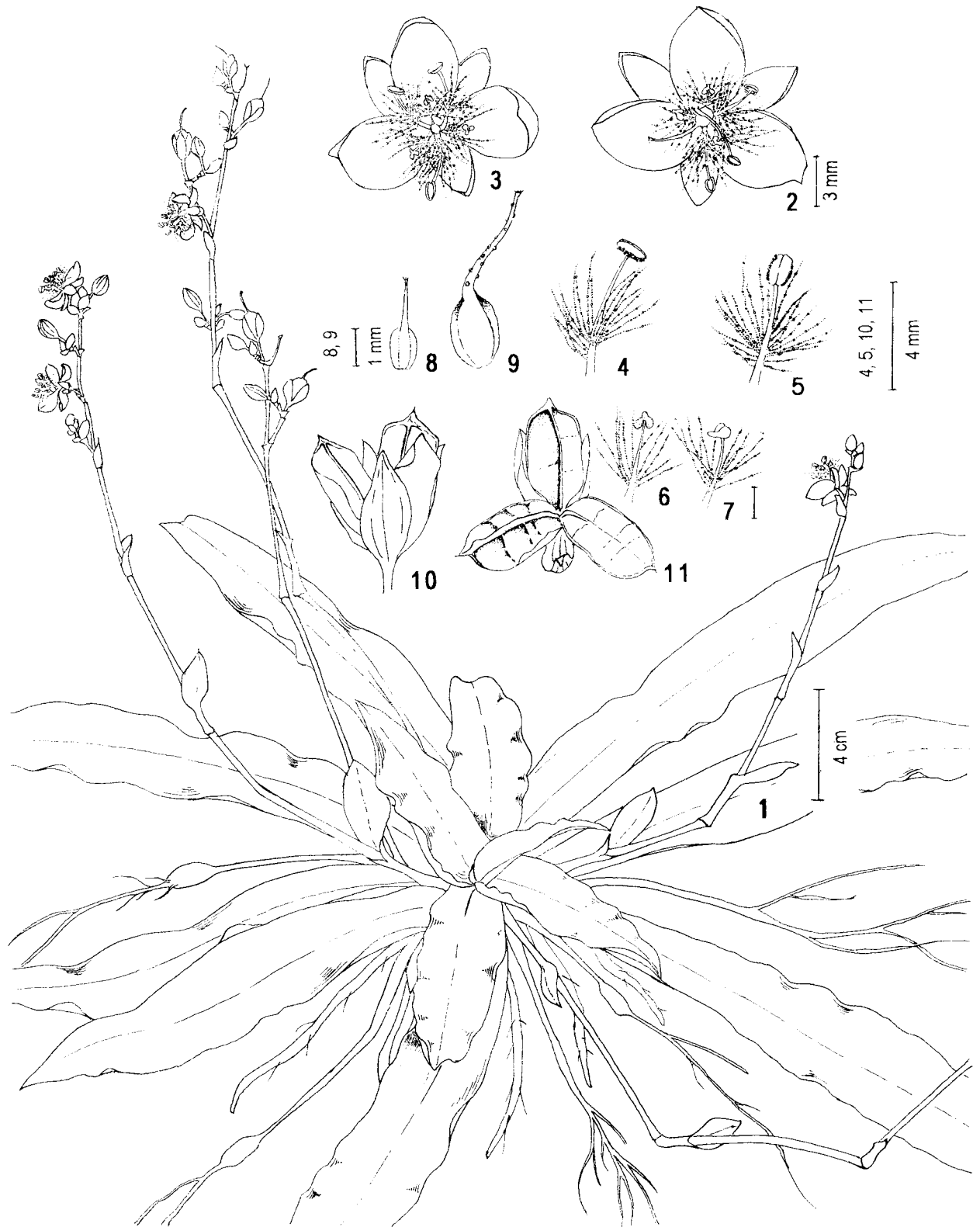


Figure 6. *Murdannia edulis* (Stokes) Faden

1. habit; 2. bisexual flower; 3. male flower; 4, 5. fertile stamen; 4. side view; 5. front view; 6, 7. staminode; 6. front view; 7. side view; 8. abortive pistil; 9. fertile pistil; 10, 11. dehiscent capsule.

Meinung, Hsien Rd. #184, between Liukuei tunnel # 2 and # 3, 10 Jul 1997, *Chen et al.* 795 (TNU); Paolai, ca. 400 m, 2 Nov 1987, *Peng* 11177 (HAST). PINGTUNG HSIEN: Ako, Aug 1912, *Soma s. n.* (TAI); same loc., Jul 1912, *Soma s. n.* (TAI); Bankinsing, *s. d.*, *Henry* 872 (NY, TAI, isotypes of *Aneilema formosanum* N. E. Br.); Litingshan, *Huang et al.* 16136 (TAI); same loc., 300 m, 9 Jul 1997, *Chen & Huang* 778 (TNU).

Notes: Based on a collection made by Augustine Henry (date unknown) from southern Taiwan, N. E. Brown (1903) published *Aneilema formosanum*, which was transferred to *Murdannia* by Hsu (1978), who considered it a species endemic to Taiwan. Shortly thereafter, Faden (1980) placed *Aneilema formosanum* in synonymy under *Murdannia edulis*, a widespread species in southern Asia. However, in the Flora of Taiwan (Hsu, 1978), *Murdannia edulis* was

documented by only two collections made by Japanese botanists, Soma, in 1912, and Sasaki & Hirakawa, in 1930. An examination of the material of *Murdannia* deposited at all of the herbaria in Taiwan reveals that plants of *M. edulis* were not re-collected by Taiwanese botanists until 1985. Although this it is a very distinct species with broad leaves and roots with distal, fusiform tubers, it was overlooked for 55 years presumably because of its restricted distribution in southern Taiwan and the fact that it is deciduous. *Murdannia edulis* sheds leaves in the winter when dry spell prevails in the south. As such, it is less visible than its evergreen congeners on this island.

Faden (1980) noted an apparent geographic variation in phenology in *M. edulis*. Plants from India produce some or all of their scapes prior to the rosettes, sometimes even fruiting before the leaves are developed. In contrast, plants from Indochina to New Guinea appear to produce their flowering shoots at the

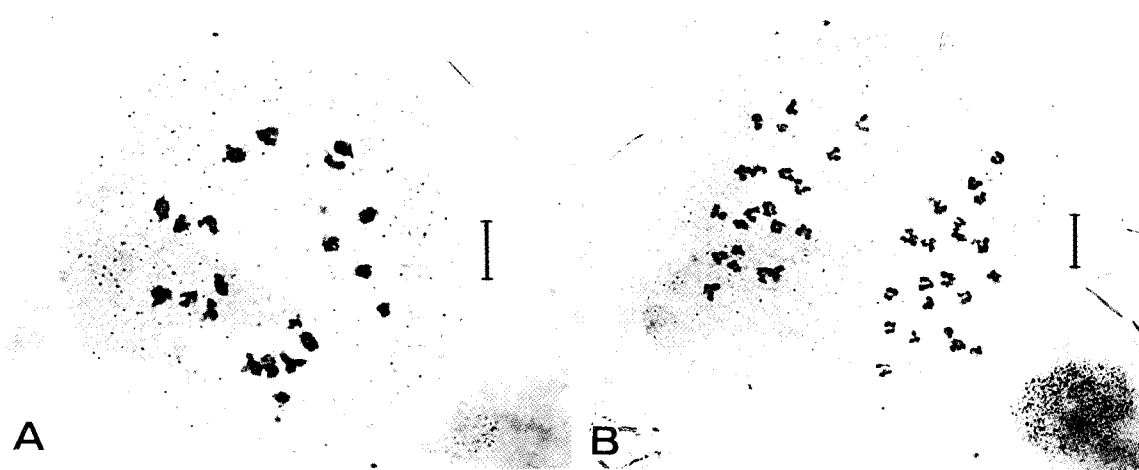


Figure 7. Meiotic chromosome spread of *Murdannia edulis*, showing $n = 21$. A. Diakinesis; B. Anaphase I. Bars = 10 μm .

same time the rosettes develop or later. In Taiwan, plants from all populations we collected produce flowering shoots only after the rosettes develop.

Cytological studies of *Murdannia edulis* consistently reveal a meiotic chromosome count of $n = 21$ (Figure 7) for several populations in Taiwan. Our result disagrees with those reported by Kammathy & Rao (1961: $n = 9$, "*Murdannia scapiflora* ") from India. Further observation from materials across the distribution range of *M. edulis* is required to confirm the cytological variation.

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台灣鴨跖草科分類札記：假紫萬年青屬、鴨舌堇屬 及葶花水竹葉

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摘 要

本文進行台灣產鴨跖草科假紫萬年青屬（二種）及鴨舌堇屬（二種）之分類訂正，成立一個新組合—*Belosynapsis kawakamii* C.-I Peng & Y.-J. Chen，並報導稀有植物葶花水竹葉自從日據時代（1930）以後在南台灣之再發現。除分類處理外，並提供以上五種植物之繪圖及在台灣之分布圖。本文另首次報導台灣產葶花水竹葉之染色體數為 $n = 21$ ，此與印度學者之報導（ $n = 9$ ）迥然不同。

關鍵詞：毛葉鴨舌堇、川上氏鴨舌堇、蛛絲毛藍耳草、鞘苞花、葶花水竹葉、染色體數、鴨跖草科、分類訂正、新組合、台灣、稀有植物

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