

6. ARGOSTEMMA Wallich in Roxburgh, Fl. Ind. 2: 324. 1824.

雪花属 xue hua shu

Chen Tao (陈涛); Charlotte M. Taylor

Herbs, unarmed, often reduced and/or monocaulous, often rhizomatous or tuberous, usually notably fleshy; stems flattened to subterete. Raphides present. Leaves opposite, apparently verticillate due to closely set stem nodes and/or leaflike stipules, or slightly to markedly anisophyllous and apparently alternate, decussate or distichous, without domatia; stipules persistent or deciduous, interpetiolar, entire or bilobed, sometimes leaflike and thus apparently absent. Inflorescences terminal or sometimes pseudoaxillary, fasciculate, cymose-corymbiform, or umbelliform, several flowered, few flowered, or reduced to 1 flower, sessile to pedunculate, bracteate with bracts sometimes fused into an involucre or sometimes with bracts very reduced. Flowers pedicellate or sessile, bisexual or monomorphic, sometimes somewhat zygomorphic, usually nodding. Calyx limb deeply 4- or 5-lobed. Corolla white, broadly rotate (i.e., “*Solanum*-like”) to campanulate (i.e., bell-shaped), glabrous inside; lobes 4 or 5, valvate in bud. Stamens 4 or 5, inserted near base of corolla tube, partially to fully exerted; filaments reduced or developed and free, coherent, or fused in middle portions into a tube; anthers free or usually coherent into a tube, with longitudinal slits or terminal pores, sometimes with connective prolonged at apex. Ovary 2-celled, ovules numerous in each cell on axile placentas attached near top of septum; stigma capitate or 2-lobed, included or exerted. Fruiting pedicels usually becoming thickened and erect. Fruit capsular, subglobose to obovoid, dehiscent through apical operculum formed from disk portion, leathery or membranous, often becoming black, with calyx limb persistent, with endocarp and septum becoming notably fibrous; seeds numerous, small, flattened to angled, with testa reticulate; endosperm fleshy.

At least 106 species: Bhutan, Cambodia, China, India, Indonesia, Japan, Laos, Malaysia, Myanmar, Nepal, New Guinea, Philippines, Thailand, Vietnam; two species endemic to W Africa; six species (four endemic) in China.

The morphology and anatomy of the androecium of *Argostemma* were detailed by Puff et al. (Ann. Missouri Bot. Gard. 82: 358–366. 1995), who noted an absence of nectaries and probable buzz-pollination of flowers with both linear and poricidal anther dehiscence. Bremer (Ann. Missouri Bot. Gard. 76: 7–49. 1989) reported that the inner layers of the fruit become fibrous and trap seeds inside, with some of them sprouting while still in the capsule in an unusual form of vivipary. *Argostemma* was studied in Thailand by Sridith (Thai Forest Bull., Bot. 27: 86–137. 1999) and Sridith and Puff (Thai Forest Bull., Bot. 28: 123–137. 2000). *Argostemma* species apparently vary widely in size of individual plants and vegetative organs probably in relation to environmental factors.

- 1a. Leaves subsessile, most of them apparently in whorls of 4 at tops of stems, slightly to markedly unequal; anthers free, opening by apical pores 5. *A. verticillatum*
- 1b. Leaves equal or unequal in pairs or sometimes apparently alternate due to marked reduction of 1 leaf of a pair, at least larger leaf of a pair clearly petiolate; anthers coherent in a cone, opening by longitudinal slits.
 - 2a. Calyx and fruit pilosulous, strigillose, villosulous, villous, or hirsute.
 - 3a. Calyx and fruit pilosulous or strigillose with generally straight hairs; larger leaf of a pair 1–4 cm 1. *A. discolor*
 - 3b. Calyx and fruit densely villous, villosulous, or hirsute with usually crisped hairs; larger leaf of a pair 2.5–10 cm 4. *A. solaniflorum*
 - 2b. Calyx and fruit glabrous or puberulent.
 - 4a. Corolla lobes ovate, ca. 5 mm 3. *A. saxatile*
 - 4b. Corolla lobes lanceolate, 8.5–11 mm.
 - 5a. Leaf blade brownish yellow abaxially when dry, with secondary veins not visible; larger leaf of a pair 1–4 × 0.6–1.5 cm 2. *A. hainanicum*
 - 5b. Leaf blade pale abaxially when dry, with secondary veins visible; larger leaf of a pair 2–6 × 1.5–2.5 cm 6. *A. yunnanense*

1. *Argostemma discolor* Merrill, Philipp. J. Sci. 23: 265. 1923.

异色雪花 yi se xue hua

Herbs, 7–15 cm tall, little branched; stems prostrate and rooting or with apices ascending, densely strigose to villosulous. Leaves opposite, markedly anisophyllous, in larger leaf of a pair petiole 3–8 mm, villosulous; blade drying papery and pale abaxially, elliptic, elliptic-oblong, or broadly ovate, 10–40 × 7–20 mm, adaxially sparsely strigose to hispid along midrib and near margins, abaxially glabrous on lamina and densely strigose to hispid along veins, base cuneate to obtuse, margin serrate-ciliate, apex acute to obtuse; secondary veins 4–6 pairs;

smaller leaf of a pair subsessile, suborbicular or broadly ovate, 5–10 mm; stipules persistent, ovate, suborbicular, or obovate, 2–6 mm, glabrescent, ciliate. Inflorescences 2- or 3-flowered, strigose to hispid; peduncles 5–20 mm; bracts triangular to linear, 1–3 mm; pedicels 10–25 mm. Calyx pilosulous or strigillose; hypanthium portion obconic, 1–1.5 mm; lobes 5, triangular to lanceolate, 1.5–2 mm. Corolla white, rotate, glabrous; tube ca. 2 mm; lobes 5, lanceolate, 6–7 mm, ciliate. Stamens 5; anthers coherent, dehiscent by longitudinal slits, with connective prolonged. Capsules subglobose or obovoid, ca. 3 mm in diam. Fl. Mar–May, fr. Sep–Oct.

- Dense forests; 500–1500 m. Hainan.

2. *Argostemma hainanicum* H. S. Lo, Bull. Bot. Res., Harbin 6(4): 46. 1986.

海南雪花 hai nan xue hua

Herbs, 10–20 cm tall; stems grayish black when dry, sub-erect or creeping, densely strigose-villous becoming glabrescent. Leaves opposite, anisophyllous; blade drying black adaxially, dark brown abaxially, oblong-lanceolate or oblong-ovate, 10–40 × 6–12(–15) mm, both surfaces strigose on midrib and sometimes near margins, base obtuse, margin entire or erose to ciliate, apex acute or shortly acuminate; secondary veins not visible; smaller leaf of a pair subovate, 2–8(–10) mm. Inflorescence 1- or 2-flowered, villous to glabrescent; peduncles 1–2 cm; bracts lanceolate, 1.5–2 mm. Calyx puberulent or subglabrous; lobes 5. Corolla white, rotate, glabrous; lobes 5, lanceolate, ca. 1 cm. Stamens 5; anthers coherent, dehiscent by longitudinal slits, with connective prolonged. Capsules slightly cordate, ?maybe didymous, ca. 5 × 7–8 mm, glabrous. Fl. May.

- Valleys or watersides in dense forests. Hainan (Ledong).

3. *Argostemma saxatile* Chun & F. C. How ex W. C. Ko, Fl. Hainan. 3: 578. 1974.

岩雪花 yan xue hua

Herbs, 5–15 cm tall, unbranched or sometimes few branched; stems prostrate and rooting near base, ascending at apex, villous. Leaves opposite, markedly anisophyllous, in larger of a pair petiole 3–5 mm, pilose; blade drying thinly papery and pale abaxially, oblong-elliptic or ovate, 15–55 × 8–18 mm, adaxially sparsely strigose at least along midrib and margin, abaxially strigose at least along veins, base cuneate to obtuse, apex acute or rarely acuminate; secondary veins 5–7 pairs; smaller leaf of a pair sessile, ovate, ca. 5 mm; stipules persistent, subovate, ca. 1 mm, glabrescent. Inflorescences umbelliform or racemiform, 2–4-flowered, glabrous; peduncles 1 or 2, 1–3 cm; bracts ovate, 2–4 mm; pedicels 1–3 cm. Calyx glabrous; hypanthium portion obconic, 2–2.5 mm; lobes 5, broadly triangular, 1.5–2 mm. Corolla white, apparently rotate, glabrous or subglabrous; tube 1.5–2 mm; lobes 5, ovate, ca. 5 mm. Stamens 5; anthers coherent, dehiscent by longitudinal slits, with prolonged connective. Capsules not seen. Fl. Mar.

- Wet sites in dense forests; ca. 600 m. SW Guangxi.

4. *Argostemma solaniflorum* Elmer, Leaf. Philipp. Bot. 1: 2. 1906.

水冠草 shui guan cao

Argostemma iriomotense Masamune; *A. taiwanense* S. S. Ying.

Herbs, to 30 cm tall, sometimes branched; stems erect, puberulent or villosulous to glabrescent. Leaves opposite, slightly to markedly anisophyllous, in larger leaf of a pair petiole 0.5–3 cm, villosulous to glabrescent; blade drying membranous, ovate, lanceolate, or elliptic-oblong, 25–100 × 12–30 mm, adaxially glabrous or sparsely hirsute or pilose, abaxially pilosulous or villosulous along principal veins and glabrous on

lamina, base cuneate to obtuse, margin entire and glabrous, apex acute to weakly acuminate; secondary veins 7 or 8 pairs; stipules persistent, oblong-elliptic or ovate, 3–7 mm, glabrescent, obtuse. Inflorescences cymose, 1–6-flowered, strigillose or villosulous to glabrescent; peduncles 1–2.5 cm; bracts triangular and 1–3 mm or resembling reduced leaves and stipules; pedicels 5–20 mm. Calyx villous, villosulous, or hirsute; hypanthium portion subglobose, ca. 1.5 mm; lobes 5, triangular, ca. 1.5 mm. Corolla white, rotate, glabrous; tube ca. 1.5 mm; lobes 5, narrowly lanceolate, ca. 7 mm, marginally densely ciliate. Stamens 5; anthers coherent, 5.5–7 mm, dehiscent by linear slits. Capsules cupuliform, 2–3 mm, leathery, densely hirsute or villosulous, with persistent calyx limb to 3 mm. Fl. Mar–Apr, fr. Jul.

Shady and moist streamsides; below 100–500 m. Taiwan [Japan (Ryukyu Islands), Philippines].

This species appears to vary widely in size of the plants, leaf size, and pubescence; it has sometimes been characterized (e.g., FRPS 71(1): 180–182. 1999) based only on larger plants, as described in the protologue. The two synonymous names listed here were not included in FRPS but were cited in Fl. Taiwan (ed. 2, 4: 247. 1998).

5. *Argostemma verticillatum* Wallich in Roxburgh, Fl. Ind. 2: 325. 1824.

小雪花 xiao xue hua

Dwarf herbs, 2–7 cm tall, unbranched, borne from subglobose tubers; stems erect, puberulent to glabrous. Leaves clustered at stem apex and usually apparently 4-verticillate, anisophyllous, subsessile; blade drying membranous to thinly papery, ovate, elliptic, elliptic-oblong, or obovate, 10–70 × 7–25 mm, both surfaces glabrous [or sometimes sparsely villosulous to villous], base obtuse to acute, apex acute to obtuse or shortly acuminate; secondary veins 4–7 pairs; stipules deciduous, elliptic to orbicular, 2–3 mm, obtuse to rounded. Inflorescences cymose to umbelliform, 2- to several flowered, glabrous; peduncles 1–3, 0.7–2 cm; bracts ligulate to ovate, 1–2 mm; pedicels 5–10 mm. Calyx glabrous; hypanthium portion broadly campanulate to obconic, ca. 1 mm; lobes 5, subtriangular, ca. 1 mm. Corolla white, rotate, glabrous; tube ca. 1 mm; lobes 5, oblong-lanceolate to triangular, 3–5 mm. Stamens 5; anthers free, 2–3 mm, poricidal. Capsules obovoid, ca. 2 mm, with persistent calyx limb to 2 mm. Fl. Jun.

Streamsides in forests; ca. 1500 m. S Yunnan [Bhutan, NE India, Myanmar, Nepal, Vietnam].

This species was reported from Thailand by Sridith (Thai Forest Bull., Bot. 27: 118. 1999) and as having filaments fused at their middles into a tube, but according to the Chinese specimens studied and descriptions of this species in other regions (e.g., Fl. Bhutan 2(2): 756. 1999) the filaments are free. The Thai distribution is provisionally excluded here pending further study of the delimitation of this species.

6. *Argostemma yunnanense* F. C. How ex H. S. Lo, Bull. Bot. Res., Harbin 6(4): 45. 1986.

滇雪花 dian xue hua

Herbs, 6–20 cm tall; stems procumbent and rooting with apices ascending, densely crisped pubescent. Leaves opposite, anisophyllous, in larger leaf of pair petiole to 1 cm; blade

Fl. China 19: 75–77. 2011.

drying pale abaxially, oblong-obovate, 20–60 × 15–25 mm, adaxially sparsely pilose to subglabrous, abaxially pubescent with pubescence denser on midrib and secondary veins, base obtuse, apex acute; secondary veins 7–10 pairs; smaller leaf of a pair sessile, ovate to suborbicular, 4–6(–10) mm; stipules ovate, 5–7 mm. Inflorescences umbelliform, 2- or 3-flowered; peduncles 2–2.5 cm; bracts lanceolate, 3–5 mm; pedicels 1–1.5 cm. Calyx glabrous; hypanthium ca. 2 mm; lobes 5, broadly triangular, 1–1.2 mm. Corolla white, rotate; tube ca. 2.5 mm; lobes 5, lanceolate, 8.5–11 mm, margins glabrous. Stamens 5; anthers coherent, 4–4.5 mm, dehiscent by longitudinal slits, with prolonged connective ca. 3 mm. Capsules not seen. Fl. May.

- Dense forests; ca. 900 m. Yunnan.

Fl. China 19: 75–77. 2011.