

Notes on the Flora of Taiwan (27)— The Genus *Argostemma* Wall. (Rubiaceae)⁽¹⁾

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ABSTRACT : The genus *Argostemma* in Taiwan is revised. One species, *A. solaniflorum* Elmer, is recognized. *A. taiwanense* Ying is treated as a synonym of *A. solaniflorum*. This species is reported for the first time from Taiwan proper and it possibly reached there through wind-dispersal.

KEY WORDS : *Argostemma*, Revision, Taiwan.

INTRODUCTION

Argostemma contains about 220 described species of which about 100 species may prove to be distinct in Asia and Africa with the highest species richness in Malesia (Bremer, 1989; Willis, 1966).

Masamune (1938) first mentioned that *Argostemma solaniflorum* Elmer occurred in Lanyu Is., an island between Taiwan proper and the Philippines. Liu *et al.* (1955) confirmed this record. Chao (1978) recorded this species for the Flora of Taiwan and Ying (1989) added a new species *A. taiwanense* from Lanyu Is. for the Flora of Taiwan.

In Taiwan, *Argostemma* was thought to be confined to the island Lanyu. Recently, a specimen, deposited in TAI-Herbarium, collected in 1967 from roadside in Lanshan, Hualien Hsien, without identification was determined to be *A. solaniflorum* Elmer, which represents a new generic record for the flora of Taiwan proper and initiates an interesting question on the disjunct distribution pattern.

MATERIAL AND METHOD

Dried herbarium specimens of *Argostemma* in TAI-Herbarium, Department of Botany, National Taiwan University and descriptions from published literature on *Argostemma* were compared.

Pollen grains were prepared by the method proposed by Erdtman (1952). The acetolyzed grains were dehydrated in an ethanol series. The dehydrated pollen grains were then dried with critical point drying. Dried pollen grains and the oven-dried seeds taken from the specimens were coated with gold and then examined with SEM, Hitachi SM 2400.

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TAXONOMIC TREATMENT

Argostemma Wall. in Roxb., *Flora Indica* 2: 324. 1824; Ridley in *J. Bot. London* 65: 25-41. 1927; van den Brink in *Blumea* 7: 329-334. 1953; Chao in *Fl. Taiwan* 4: 251. 1978; Bremer in *Ann. Missouri Bot. Gard.* 76: 7-49. 1989.

Argostemma solaniflorum Elmer in *Leaflet. Philip. Bot.* 1: 2, 5. 1906; Masamune in *Trans. Nat. Hist. Soc. Form.* 28: 234. 1938; Liu, Sasaki & Keng in *Quart. J. Taiwan Mus.* 8: 321. 1955; Chao in *Fl. Taiwan* 4: 251. 1978.

Fig. 1. 水冠草

Argostemma iriomotensis Masamune in *Trans. Nat. Hist. Soc. Form.* 25: 248. 1935. (Type: Iriomote, Kahara, G. Masamune s.n., TAI!).

Argostemma taiwanense Ying in *Mém. Coll. Agr. NTU.* 29(2): 56, photo 10. 1989, syn. nov.

An ascending herb, 5-22 cm high. Stem unbranched, hairy in the upper part. Leaves opposite, the pairs subequal; blades ovate or oblong, acute to acuminate at both ends, 3.5-7.5 cm long, 1.5-3 cm broad, spreadingly hairy above, densely hairy along veins beneath, ciliate at margin; petioles 0.5-2 cm long, hairy; stipules broadly ovate, 2-6 mm long, 1.5-2.5 mm broad. Flowering branches axillary or terminal, usually with two abruptly smaller leaves at the first node from which arise an erect peduncle; inflorescences 1-4-flowered corymbiform; pedicels long hairy, 2-10 mm long; calyx 5-lobed, long hairy at lower portion outside; lobes triangular-ovate, 1.5-2 mm long, glabrous inside; corolla 5-10 mm long, cleft nearly to the base; lobes oblong to ovate, ciliate at margin; stamens 5, inserted at the base of corolla, 3.5-7 mm long, connate; filaments absent to about 1 mm long; anthers 1.5-3 mm long, slit longitudinally; connective larger than the anther, papillate; upper sterile appendages 1.5-3 mm long; pollen grains 3-colporate with reticulate ornamentation, prolate spheroidal to subprolate and 15-17 μ m long in equatorial view, spheroidal and 13.6-14.7 μ m in polar view (Fig. 6-11); ovary inferior; style filiform, 5-10 mm long, glabrescent; stigma shallowly 2-lobed or capitate. Fruit a capsule with persistent calyx. Seeds minute, many, angular, reticulate with a ring in each cell of the surface (Fig. 2-5).

Habitat: In the forest floor; on rocks along a shaded river in the forest; roadside.

Altitude: ca. 200 m in Lanyu Is.; 800 m in Batan; 1900 m in Taiwan proper (according to the collector's notes).

Flowering: April on Lanyu Is.; August to October on the Ryukyus; October on Taiwan; November on Batan.

TAIWAN: Hualien, Mt. Lanshan, T. C. Huang 4272. **Taitung:** Lanyu Is., T. Hosokawa 8121, C. E. Chang 16793, S. F. Huang & Y. C. Hsu 4725. **RYUKYUS:** Iriomote, Kahara, G. Masamune s. n. (Type of *A. iriomotensis*, TAI!); Iriomote, Komidake, G. Masamune 1711; Iriomote, Y. Doi 64. **PHILIPPINES:** Batan, S. Hatusima & M. Sato 29064.

The specimen from Taiwan proper differs from the others by the following characteristics: (1) larger corolla, 10 mm long against 5-8 mm long; (2) inflorescences 3-4-flowered against 1-3-flowered. Since only one specimen was examined from Taiwan proper, we treat the specimens as conspecifics for the time being.

Argostemma taiwanense, quite similar to *A. iriomotensis*, is a dwarf form of *A. solaniflorum*.

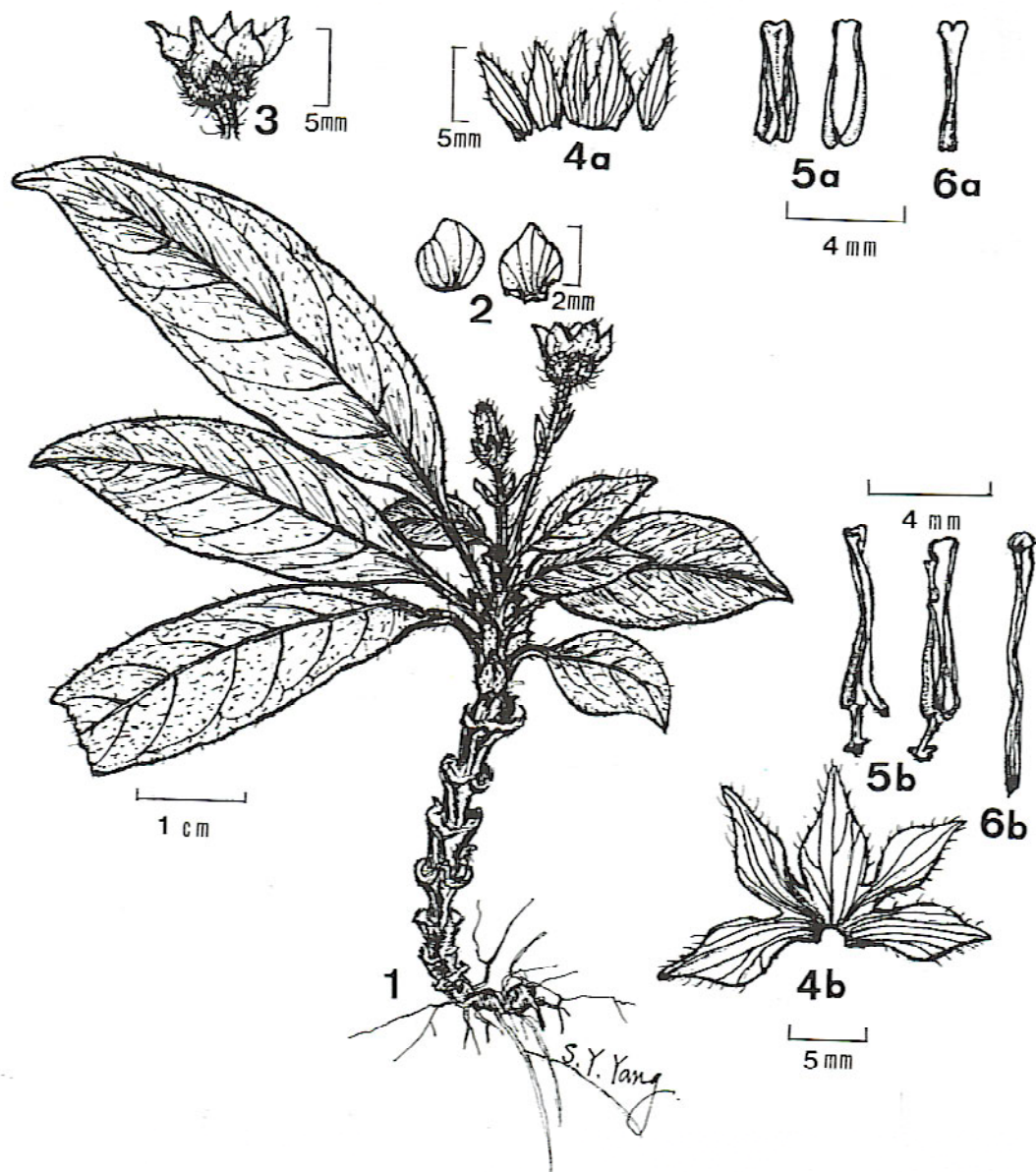
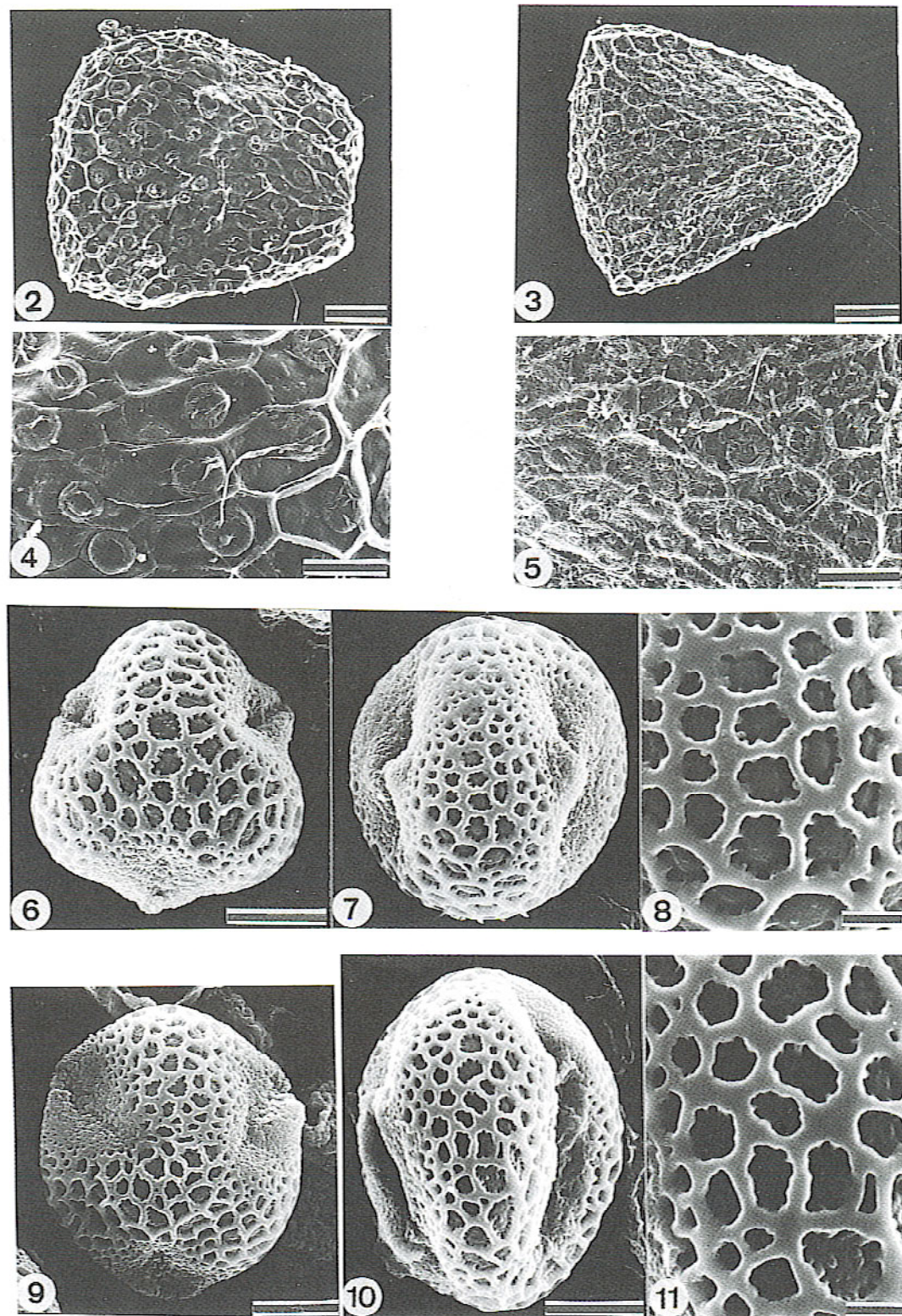


Fig. 1: *Argostemma solaniflorum* Elmer (1-3, 4a, 5a, 6a from Lanyu Is., S. F. Huang & Y. C. Hsu 4275; 4b, 5b, 6b from Lanshan, T. C. Huang 4272). 1. habit; 2. stipule; 3. flower; 4. corolla; 5. stamens; 6. pistil.

DISJUNCT DISTRIBUTION IN TAIWAN (Fig. 12)

Argostemma solaniflorum, distributed in the Philippines (Mindanao to Batan), Lanyu Is. and the Ryukyus, not certainly distinctive from Malayan *A. montanum* Blume (Merrill, 1923), belongs to the section *Pomangium sensu* van den Brink (1953) which is distributed in Malesia (Ridley, 1927). Since the related species of the same section are not found in mainland China, it is very clear that the plant in Taiwan proper originated in Malesia.

In Taiwan, the common species shared only with the Ryukyus and the Philippines always inhabit Lanyu Is. or occur at low altitudes in the southern and southeastern part of



Figs. 2-5: SEM of seeds of *Argostemma solaniflorum* Elmer. (2, 3 scale bar=100 μ m; 4, 5 scale bar=50 μ m; 2,4 S. F. Huang & Y. C.Hsu 4275; 3,5 T. C.Huang 4272). Figs. 6-11: SEM of pollen grains of *Argostemma solaniflorum* Elmer (6, 7, 9, 10 scale bar=5 μ m; 8, 11 scale bar=1 μ m; 6-8 S. F. Huang & Y. C. Hsu 4275; 9-11 T. C. Huang 4272).

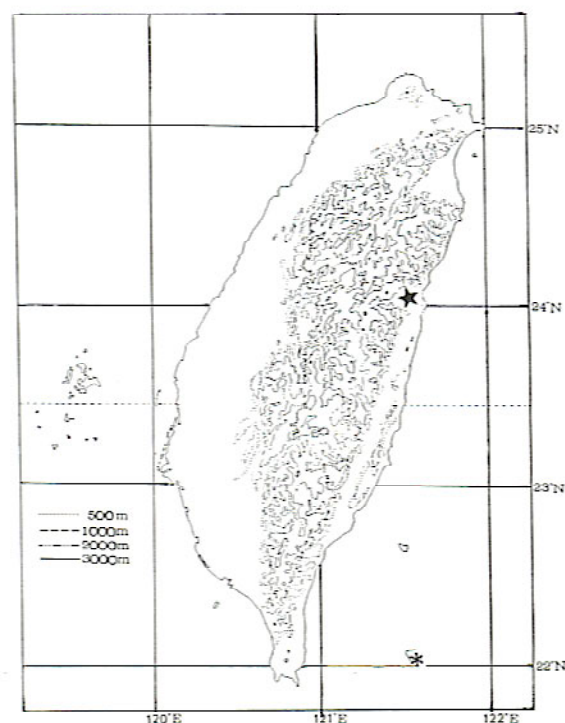


Fig. 12: Distribution map of *Argostemma solaniflorum* Elmer in Taiwan. * Lanyu Island; ★ Mt. Lanshan.

Taiwan if they are of Malesian origin, as *Psychotria manillensis* DC. and *Garcinia subelliptica* Merr. The 1,900 m altitude in the eastern part of Taiwan can be considered a temperate area (Su, 1984) which is usually beyond the capacity of occurrence for plants of Malesian origin, and *A. solaniflorum* is the only case found there. Thus this plant in Taiwan proper possibly reached there by chance and by long-distance dispersal, though the plants of *Argostemma* usually have no great facilities for dispersal (Ridley, 1927).

It is unlikely dispersed by man because it is still difficult to climb to the top of Lanshan. The fruit of the species is a small and semi-dry capsule of probable little interest to birds so that the possibility of bird-dispersal is also quite unlikely. The probable way to reach Lanshan is by wind-dispersal. Though this plant inhabits damp forest floors, the minute seeds, about 0.5 mm in length, 0.1-0.4 mg in weight, could be transported a long distance by typhoons, which occur at times in these areas.

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台灣植物誌之觀察(27)—水冠草屬(茜草科)⁽¹⁾黃星凡^(2,3)、黃增泉⁽²⁾

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摘 要

本文訂正台灣之水冠草屬(*Argostemma*)植物。僅確認水冠草(*A. solaniflorum* Elmer)一種。台灣水冠草(*A. taiwanense* Ying)處理為水冠草之異名。水冠草在台灣僅分布於蘭嶼, 本文首次報導其亦出現於花蓮嵐山海拔約1,900公尺處, 並認為可能是經由風傳播而來。

關鍵詞: 水冠草屬, 訂正, 台灣。

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