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Chamaesyce taihsiensis (Euphorbiaceae), a new species from Taiwan

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Abstract. A new species of Euphorbiaceae, *Chamaesyce taihsiensis* Chaw & Koutnik, sp. nov., from the western part of Taiwan is described and illustrated. Its glabrous appearance is similar to two weedy species, *C. makinoi* and *C. serpens*, but its stem does not produce adventitious roots at the node, and its emarginate leaf is serrulate at the tip. Furthermore, *C. taihsiensis* is restricted to coastal habitats.

Key words: *Chamaesyce taihsiensis* Chaw & Koutnik; *C. makinoi*; *C. prostrata*; *C. serpens*; Taiwan.

Chamaesyce Gray is a cosmopolitan genus of about 250 species, approximately 75% of which occur in the New World (Webster, 1967). The generic name was first used by Gray (1821), and the generic rank has since been recognized in many floristic works (e.g., Millspaugh, 1909, 1916; Small, 1933; Rydberg, 1932; Hara 1935, 1938; Croizat and Degener, 1936-1938; Hurusawa, 1954; Webster, 1967; Webster and Burch, 1967; Koutnik 1984, 1985, 1987). Webster (1967) has reviewed the generic circumscription in detail. He pointed out that it was sufficiently expedient to recognize such a widespread and large genus by its characteristic habit-the main stem is abortive just above the level of the cotyledons (Hayden, 1988). After a thorough study of African and Hawaiian *Chamaesyce,* Koutnik (1984, 1987) suggested that the collective use of the following traits can definitely differentiate the genus from *Euphorbia*- (1) apical abortion on main stem, (2) opposite, basally inequilateral oblique leaves with Kranz anatomy, (3) presence of interpetiolar stipules, (4) cyathia commonly with four or five appendiculate glands, (5) ecarunculate seeds, and (6) the possession of C_4 metabolism.

For the Taiwan Flora (including Penhu Islands, Hsiaoliuchiu, Lutao and Lanyu), the most recent revision of Lin *et al.* (1990) treated 13 species of *Chamaesyce* Gray, including one previously undescribed taxon and three recently naturalized species. Our new taxon described herein, *C. taihsiensis,* represents the fourteenth *Chamaesyce* species in Taiwan.

Chamaesyce taihsiensis Chaw & Koutnik, sp. nov. (Fig. 1, 2 & 3).-Type: Taiwan, Yunlin Co., Taihsi, Haikou [ca. 23°42'N, 120°11'E], on crevices of embankment, elev. 0 m, 18 Jul 1987, *Chaw 475.* (Holotype: HAST; isotypes: GH, HAST, K, P, TAI, TI, US, paratypes: *Chaw 730,* HAST, KYO, TAIF)

Ex affinitate Chamaesyce makinoi (Hay.) Hara et *C. serpens* (Kunth) Small, *ab utroque foliorum apices* et *calues ad nodos sine adventitiis radicantes distinctus.*

Prostrate, spreading, glabrous, likely perennial herb; branches to 25 cm long; internodes with pink to red strips when fresh. Stipules laciniate, free above, fused below. Leaves petiolate; petioles 0.2-0.5 mm long; blade elliptic to obovate, chartaceous, 2.5-6 mm long, 1.5-3.5 mm wide, apex truncate to emarginate, base unequal; margin serrulate at tip to entire. Cyathia solitary in axils of normal leaves or diminutive leaves of a condensed lateral branch, and borne alternatively at succeeding nodes; peduncle 0.5-0.7 mm long; involucre

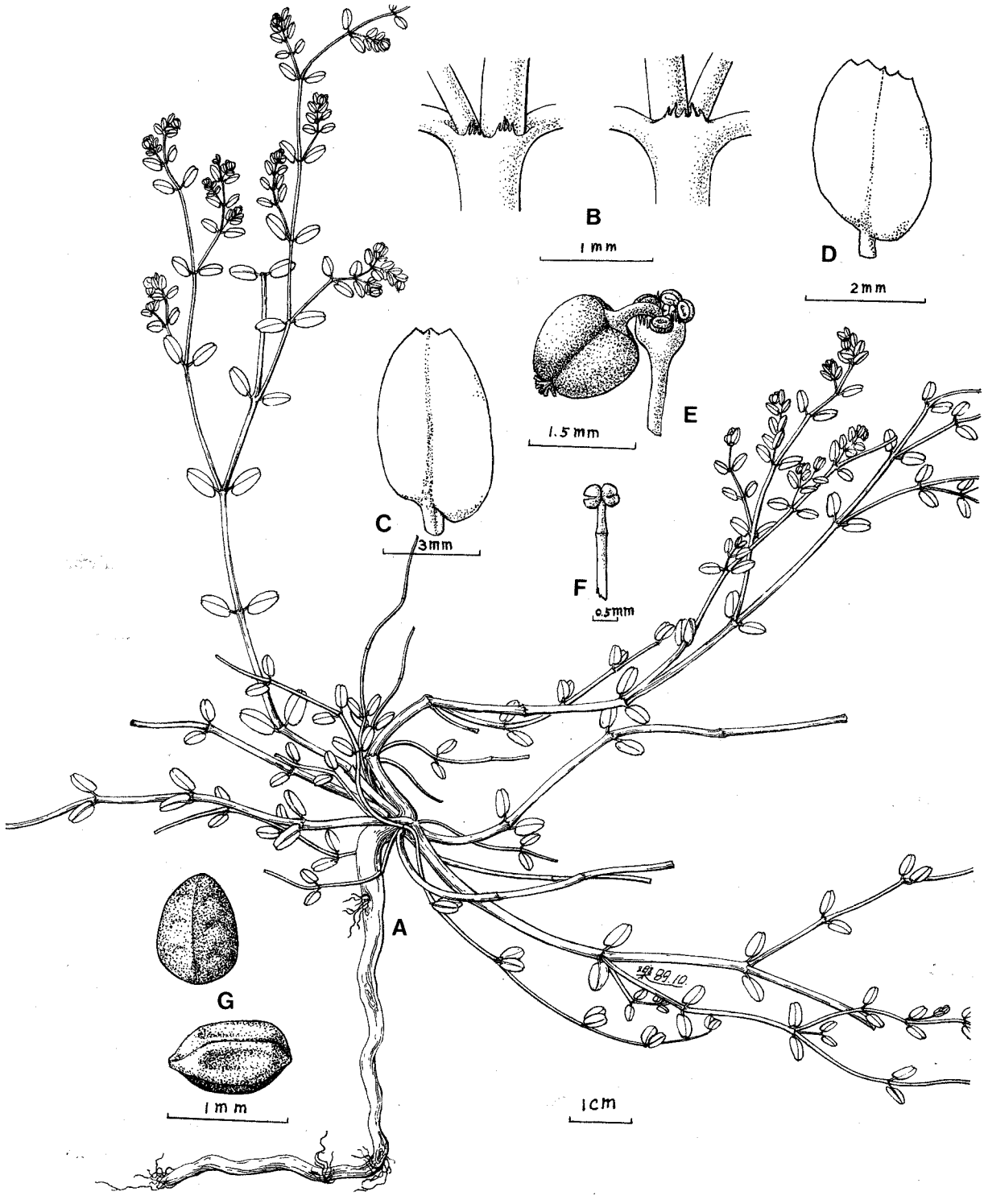

Fig. 1. *Chamaesyce taihsiensis*. A. Habit. B. Nodes: left, upper side of stem showing free stipules; right, lower side of stem showing fused stipules. C, D. Leaves with emarginate apices and serrulate tips. E. Cyathium. F. Male flower. G. Seeds: above, abaxial view; below, adaxial view. All from *Chaw 475*.

Fig. 2. *Chamaesyce taihsiensis*. From *Chaw & Lin 889*.

campanulate, glabrous outside, 0.8–1 mm long; lobes 5, acutely triangular, ca. 0.1 mm long; glands 4, red to green, elliptic, to 0.2 mm long, 0.3 mm wide, the appendages present or absent, crenate when present, to as wide as gland. Male flowers 3–10, 0.6–1 mm long; pollen 3-colporate, subprolate, ca. 22 x 22 μm, colpus nearly as long as polar axis, exine tectate-perforate. Female flower pedicellate, pedicel to 1.5 mm long, ovary usually without perianth to occasionally with 1 or 2 minute, linear sepals, style 3, bifid less than or equal to half the length, ca. 0.3 mm long, the stigma not thickened. Capsules glabrous, angles slightly keeled, acutely 3-lobed, 1.3–1.5 mm long; seeds smooth or slightly rugose, oblong tetragonal, ca. 1 mm long, 0.7 mm diam.

Ecology and Field Notes

This new species is apparently confined to coastal regions. It usually occurs in sandy crevices of cement embankments and coral reefs, or sometimes in sandy wilderness along coast. Field observation in Lukang showed that as the plant grows larger into a small mat-like mass (usually more than 2 dm in diam.), ants (*Paratrechina flavipes* Smith) often inhabit the soil beneath the plant and feed on nectar secreted from the cyathial glands. Plants of this new species found in Changhua and Yunlin counties commonly grow with *Rhynchelytrum repens* (Willd.) C. E. Hubb.

Additional Specimens Examined

Changhua Co.: Shenkang, Changpin 2nd Industrial District, *Lin 857* (HAST, THAI); Lukang, near Taiwan Fisheries Research Institute, *Chaw & Lin 889, Lin 852, 854* (HAST, THAI). Yunlin Co.: between Santiaolun and Chinhu, *Ou 5323* (TCF). Pingtung Co.: Hsiaoliuchiu, Taliao, *Hosokawa 1940, 1942*; Wukeitung, *Chaw & Lin 363* (HAST, THAI), *Lin & Chaw 77* (HAST, THAI); Hsioliuchiu, without further locality, *Hosokawa 1939* (TAI), *Kamiyoshi s. n.* 4 Aug

Table 1. *Characters distinguishing* ***Chamaesyce taihsiensis*** from ***C. makinoi*** and ***C. serpens***.

character	*C. taihsiensis*	*C. makinoi*	*C. serpens*
Adventitious root at node	absent	present	present
Stipules at node	fused below only	fused above and below	fused above and below
shape of leaf	elliptic to obovate	rounded ovate to ovate-elliptic	cordate-ovate to ovate-elliptic
Tip of leaf	retuse and serrulate (occasionally entire)	retuse to rounded and entire	retuse to rounded and entire
Number of sepal subtending ovary	0(-1)	0	(0-)1-3
Number of male flower	3-8(-10)	2-4	3-5

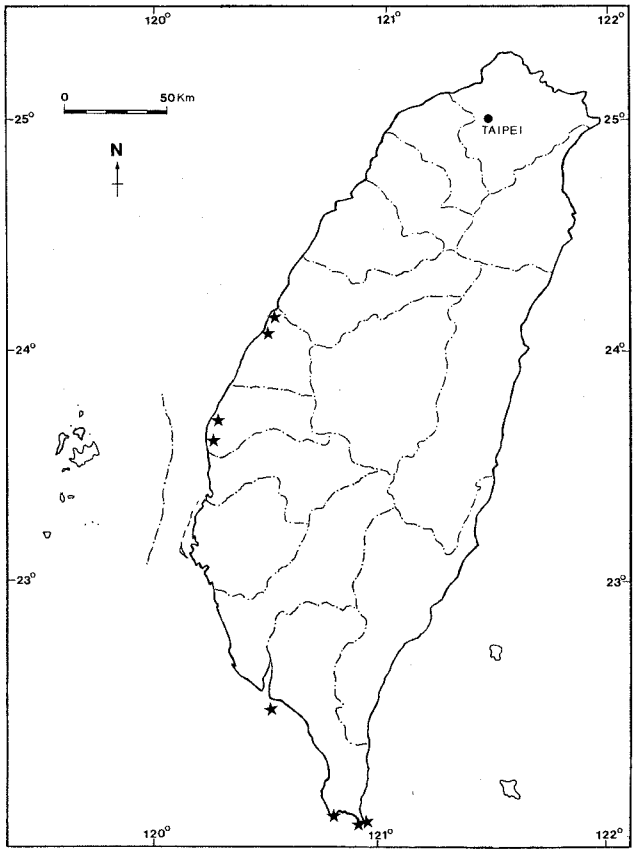

Fig. 3. Distribution of *Chamaesyce taihsiensis*. Star = population having been collected; dotted & dashed line = county boundary.

1977 (TI); Hengchun, Maopitou, *Lin 421, 563* (HAST, THAI), Oluanpi, *Lin 431* (HAST, THAI), Lungkeng, *Lin 432, 433* (HAST, THAI), Chiou *10188, 10191, 10192* (TAIF-H). Pingtung Co., without further locality, *Miyake s. n.* 14 Jan 1900 (TI).

Chamaesyce taihsiensis is characterized by its glabrous vegetative and reproductive parts, and the emarginate leaves being serrulate at tip. It is apparently a coastal species, whose range in Taiwan could be anticipated to be greater than thus far known. From our first encounter with the new species, we thought it unlikely that such a conspicuous plant in such an accessible locality should have gone unnamed. A search through the relevant literature and herbarium specimens, however, has failed to reveal any previous description of it, but has extended our knowledge on the geographical range and collection history of the new species.

The majority of herbarium specimens examined were attributed to *C. makinoi* (Hay.) Hara and a few to *C. prostrata* (Ait.) small. The latter species is easily distinguished from *C. taihsiensis* by having pubescent stem, leaves and capsules. In their glabrous appearances, *C. taihsiensis, C. makinoi* and *C. serpens* (Kunth) Small superficially resemble one another. However, the new species differs from the other two in several features as depicted in Table 1. *Chamaesyce serpens* is a recent naturalized species of American origin (Lin *et al.*, 1990). It is also found in the western part of Taiwan.

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Literature Cited

Burch, D. 1966. The application of the Linnean names of some New World species of *Euphorbia* subgenus *Chamaesyce*. Rhodora **68:**155-166.

Croizat, L. and O. Degener 1936-1938. *Chamaesyce*. *In*: O. Degener, Flora Hawaiiensis. Family 190. Honolulu.

Gray, S. F. 1821. A Natural Arrangement of British Plants. Vol. 2. Baldwin, Cradock & Joy. London.

Hara, H. 1935. Observationes ad Plantas Asiae Orientalis IV. J. Jap. Bot. **11:** 381-390, 509-514.

Hara, H. 1938. *Euphorbia* of Taiwan . J. Jap. Bot. **14:** 355-356.

Hayden, W. J. 1988. Ontogeny of the cotyledonary region of *Chamaesyce maculata* (Euphorbiaceae). Amer. J. Bot. **75:** 1701-1713.

Hurusawa, I. 1954. Eine nochmalige Durchsicht des herkömlichen Systems der Euphorbiaceen im weiteren Sinne. J. Fac. Sci. Univ. Tokyo sect. 3 Bot. **6(6):** 224-293

Koutnik, D. L. 1984. *Chamaesyce* (Euphorbiaceae) -a newly recognized genus in southern Africa. S. African. J. Bot. **3:** 262-264.

Koutnik, D. L. 1985. New Combinations in california *Chamaesyce* (Euphorbiaceae). Madroño **32(3):** 187-189

Koutnik, D. L. 1987. A taxonomic revision of the Hawaiian species of the genus *Chamaesyce* (Euphorbiaceae). Allertonia **4:** 331-388.

Lin, S.-C., S.-M. Chaw and C.-F. Hsieh. 1990. A taxonomic study of the genus *Chamaesyce* in Taiwan. (Manus. in prep.)

Millspaugh, C. F. 1909. Praenunciae Bahamensis II. Publ. Field Columbian Mus., Bot. Ser. **2:** 289-321.

Millspaugh, C. F. 1916. Contributions to North American Euphorbiaceae - VI. Publ. Field Columbian Mus., Bot. Ser. **2:** 401-420.

Rydberg, P. A. 1932. Flora of the Prairies and Plains of Central North America. New York Botanical Garden. New York.

Small, J. K. 1933. Manual of the Southeastern Flora. Facsimile ed. 1, 1953. The University of North Carolina, Chapel Hill.

Webster, G. L. 1967. The Genera of Eùphorbiaceae in the Southeastern United States. J. Arnold Arbor. **48:** 303-430.

Webster, G. L. and D. Burch 1967. Family 97. Euphorbiaceae. *In* Flora of Panama VI. Ann. Missouri Bot. Gard. **54:** 332-347.

臺灣地錦草屬一新種－臺西地錦

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本文記載臺灣發現之地錦草屬新種植物－臺西地錦*(Chamaesyce taihsiensis* Chaw & Koutnik)。其主要特徵是全株無毛，凹頭葉片頂端具小鋸齒。本新種與小葉大戟(*C. makinoi* (Hay.) Hara) 和匍根地錦 (*C. serpens* (Kunth) Small) 的外表形態相似；但後二者之莖節長有不定根，而本新種則無。臺西地錦僅分佈於本省西海岸，多生長於砂地、防波堤的裂縫、或礁岩上。