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Maianthemum harae (Asparagaceae), a new species from Taiwan

Chien-Ti Chao, Hsy-Yu Tzeng & Yen-Hsueh Tseng*

Department of Forestry, National Chung-Hsing University, 250 Kuo-Kuang Rd., Taichung 402, Taiwan (corresponding author's e-mail: tseng2005@nchu.edu.tw)

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Maianthemum harae Tseng & Chao, a new species of Asparagaceae from Taiwan, is described and illustrated. This species resembles *M. formosanum* in the shape and size of flower, but is easily distinguished from the latter by its tuberous rhizome, 9–12 leaves, lanceolate leaves and longer styles.

Maianthemum (Asparagaceae) comprises about 35 species and is distributed in eastern Asia, northern America, central America and northern Europe (Chen *et al*. 2000, Utech 2002). Nineteen of the species occur in China (Chen *et al*. 2003).

In the past decades, *Maianthemum* and *Smilacina* were considered distinct genera. They were separated by the floral morphology, the flowers being trimerous in *Smilacina* and bimerous in *Maianthemum*. LaFrankie (1986) transferred all species of *Smilacina* into *Maianthemum* based on anatomical and morphological features. The karyotype analysis by Meng *et al*. (2005) and the molecular biological study by Meng *et al*. (2008) also supported the lumping of these two genera.

So far only one species of *Maianthemum* was recognized in Taiwan, namely *M. japonicum* (Ying 2000, Boufford *et al*. 2003). According to Chao and Tseng (2010), that species was not distributed in Taiwan, and the name was a misinterpretation of *M. formosanum*. Recently, we have collected and studied abundant material of Taiwanese *Maianthemum* from the field and herbaria. We also reviewed the literature from the adjacent regions (Ohwi 1934, 1953, Hara 1987, Kim 1998, Chen *et al*. 2003) and local publications (Hayata 1908, 1917, 1920, Kawakami 1910, Sasaki 1928, Masamune 1930, 1936, 1954, Ohwi 1934, Yamamoto 1938, Liu & Ying 1978, Wang *et al*. 1978, Wang 1997, Ying 2000, Yang *et al*. 2001). After a thorough systematic study of *Maianthemum* in Taiwan we were able to find a new species which is described here.

Maianthemum harae Tseng & Chao, *sp. nova* (Figs. 1 and 2)

Holotype: Taiwan. Chiayi County, Alishan Township, Tefuyeh old trail, Tsuchung section 1.2 km, 23° 28´43.27´´N, 120°49´33.04´´E, 2426 m a.s.l., 20 March 2010 *C. T. Chao 1383* (TCF). — Paratypes: Taiwan. Chiayi County, Alishan Township, Tefuyeh old trail, Tsuchung section 1.2 km, 23°28´43.27´N, 120°49´33.04´´E, 2426 m a.s.l., 20 March 2010 *C. T. Chao 1382* (TCF). Nantou County, Randaishan, *T. Kawakami & U. Mori 3354* (TAIF); Hsinyi Township, Saddle of the Tatachia, *C. K. Yang 1001* (TNM). Chiayi County, Alishan Township, Alishan, *H. J. Chang 2386* (TAIF). Hsinchu County, Yuanyanghu (a lake), *B. L. Shih 372*. Pingtung County, Peitawushan, 1600–1800 m a.s.l., *D. W. Liu 372* (TAIF). Ilan County, Datong Township,

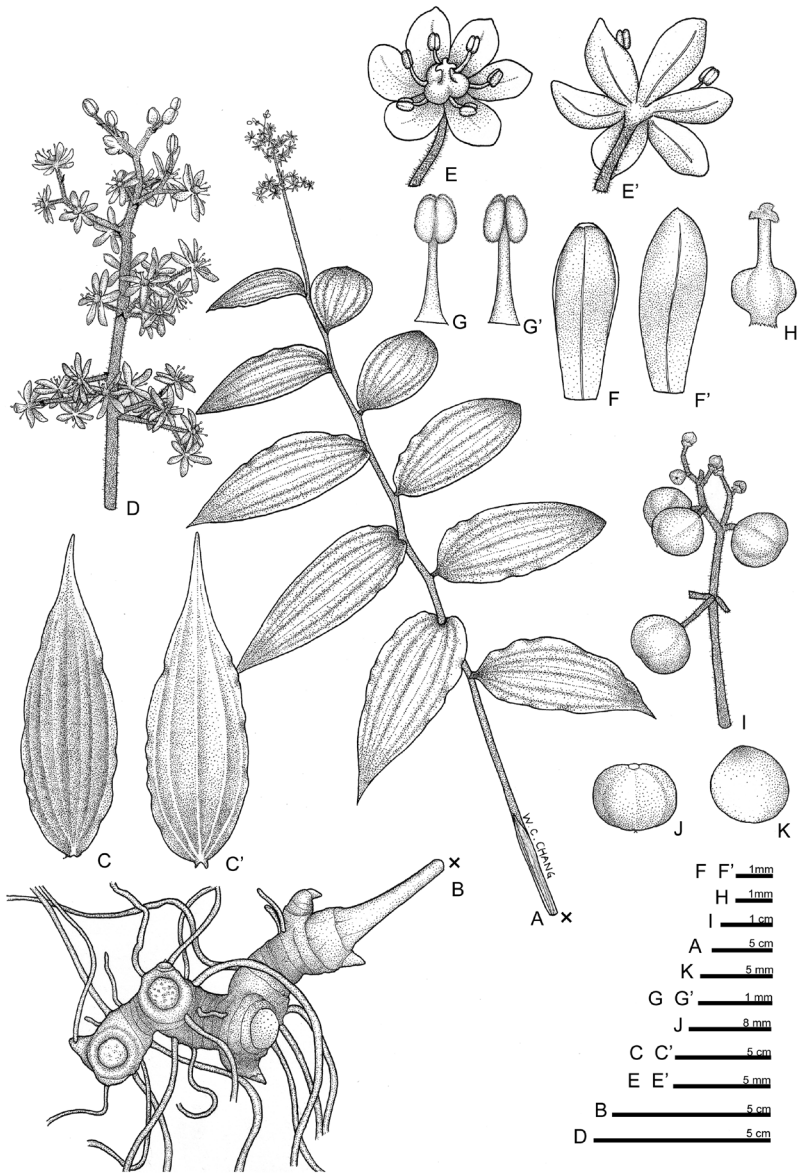

Fig. 1. *Maianthemum harae* (from the holotype). — **A**: Habit. — **B**: Rhizome. — **C**: Leaf adaxial surface. — **C'**: Leaf abaxial surface. — **D**: Inflorescence. — **E**: Flower ventral surface. — **E'**: Flower dorsal surface. — **F**: Tepal ventral surface. — **F'**: Tepal dorsal surface. — **G**: Stamen ventral surface. — **G'**: Stamen dorsal surface. — **H**: Pistil. — **I**: Infructescence. — **J**: Fruit. — **K**: Seed.

Chialohu lake, 2200 m a.s.l., *C. W. Chen 1541* (TAIF). Hualien County, Hsiulin Township, Tarokotaizan, 12 June 1933, *S. Sasaki s.n.* (TAI).

Etymology. The species epithet "*harae*" commemorates Dr. Hiroshi Hara (1911–1986) for his contributions to plant taxonomy of the Far East. Dr. Hara was a great Japanese botanist who devoted his life to studying the Liliaceae of eastern Asia, and left an unfinished paper of eastern Asian *Smilacina* (Hara 1987).

Perennial herbs. Rhizome tuberous, 7–10 mm in diam., with many fibrous roots, root hairs present. Stems suberect to arching, 30–75 cm long, pubescent at upper part, covered with scale leaves at basal nodes. Leaves deciduous, simple, estipule, chartaceous, alternate, lanceolate, 15–25 cm long, 5–10 cm wide, apex acute, base attenuate to obtuse, margin undulate, pubescent at abaxial surface and margin; petiole short, 3–5 mm long. Inflorescences terminal, panicle, pubescent, 6–10 cm long, 5–8 cm wide, bracts absent. Flowers bisexual, flattened, fragrant, perianth with 6 segments, arranged into inconspicuous 2 whorls of 3, white, segments ca. 5 mm long, 2 mm wide, 1-veined, slightly recurved, apex attenuate to acute; stamens 6, filaments ca. 2 mm long,

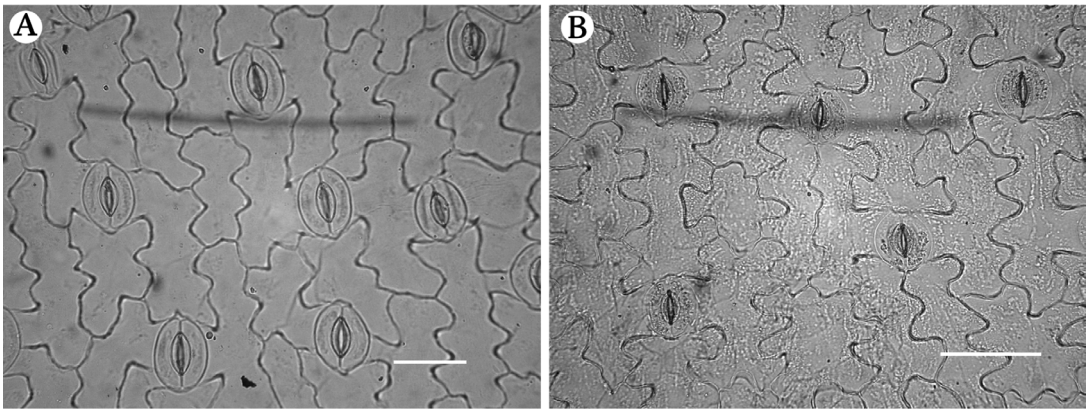

Fig. 2. Epidermal structure of *Maianthemum* in Taiwan. — **A**: *M. formosanum* (*Chao 972*). — **B**: *M. harae* (from the holotype). Scale bar = 30 μm.

anthers oblong, ca. 0.5 mm long; ovary superior, depressed globose, ca. 1.5 mm long, 2 mm in diam., glabrous, style 2–2.5 mm long, glabrous, stigma 3-lobed, pubescent. Fruits subglobose, 8–10 mm in diam., red at maturity.

Maianthemum harae is very similar to *M. formosanum*, but it is distinguished by having a tuberous rhizome, lanceolate and larger leaves and a 2 mm long style. *Maianthemum harae* also resembles *M. japonicum*, but it is distinguishable by having a tuberous rhizome, 9–12 leaves, and a 3-lobed stigma (Table 1).

There is also a conspicuous difference in the epidermis structure between *M. formosanum* and *M. harae*. Following the terminology of epidermis morphology by Dilcher (1974), the anticlinal cell walls of the two species are undulate, but the undulations are different. The undulations within the anticlinal wall in *M. formosanum* are V-type, with a sharper angle, but in *M. harae* they are U-type, with a smoother angle within the anticlinal wall (Fig. 2).

Maianthemum harae was found in the central mountain range at middle altitudes, grow-

Table 1. Comparison of *Maianthemum harae*, *M. formosanum* and *M. japonicum*.

	M. harae	*M. formosanum*	*M. japonicum*
Rhizome			
Shape	tubuler	moniliform	terete
Diameter (mm)	7–10	4–6	7–10
Stems (cm)	30–75	5–30	30–60
Leaves			
Number	9–12	3–6	4–9
Length (cm)	15–25	5–10	6–15
Width (cm)	5–10	1–5	3–7
Venation	5–7	3–5	5–7
Shape	lanceolate	oblong	ovate-oblong
Anticlinal wall	undulate, V-type	undulate, U-type	unknow
Inflorescences	panicle	raceme to panicle	panicle
Trichomes	pubescent	pubescent	pubescent
Flowers			
Tepals (mm)	5 × 2	3 × 1.5	3 × 1.5
Styles length (mm)	2	0.5	0.5–1
Stigmas	3-lobed	3-lobed	subentire
Pedicel length (mm)	5	2	2–6

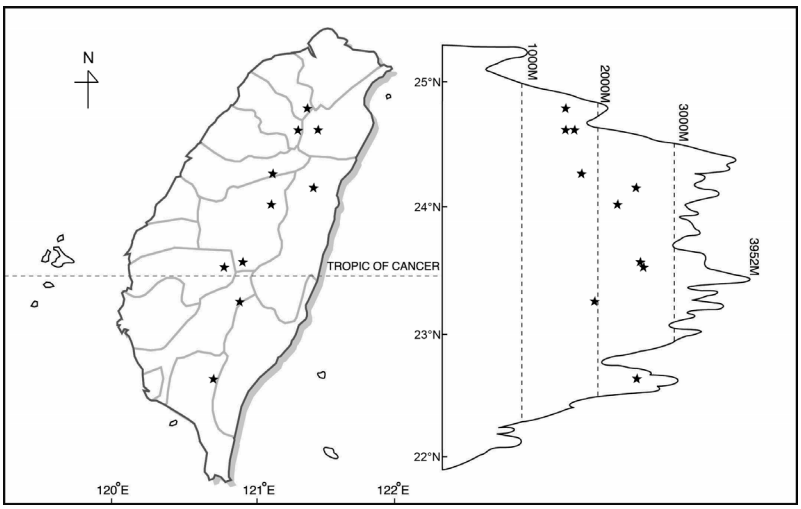

Fig. 3. Distribution of *Maianthemum harae* in Taiwan.

ing in the coniferous and broad-leaf forest with high humidity, often associated with *Ainsliaea latifolia* subsp. *henryi* (Asteraceae), *Yushania niitakayamensis* (Poaceae) and *Ophiorrhiza japonica* (Rubiaceae). Compared with *M. formosanum* which grows at altitudes 3000–3600 m a.s.l., *M. harae* grows at lower altitudes (1500–2800 m a.s.l.) with relatively high humidity. Both species are endemic to Taiwan (Fig. 3).

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