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A new subspecies of *Myriophyllum oguraense* (Haloragaceae) from China

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Myriophyllum oguraense Miki subsp. *yangtzense* D. Wang *subsp. nova* (Haloragaceae) from China, is described and illustrated. An identification key to the morphologically most similar taxa is provided. The new subspecies differs from *M. oguraense* subsp. *oguraense* by having large fruits and mericarps with two longitudinal ridges on the dorsal surface. The two taxa exhibit a disjunct distribution pattern, *M. oguraense* subsp. *yangtzense* being confined to the lower Yangtze valley in China, whereas *M. oguraense* subsp. *oguraense* is restricted to Japan.

Key words: Haloragaceae, *Myriophyllum*, new subspecies, taxonomy

Myriophyllum oguraense has been regarded as a Japanese endemic for some 60 years (Miki 1934, 1937, Hara 1954, Ohwi 1965, Iwatsuki 1992, Ohwi & Kitagawa 1992, Kadono 1994). However, it was recently reported as native from NE China and in the Chang Jiang River basin (lower Yangtze valley; Yu *et al*. 2002). This disjunct distribution, in China, is puzzling because the localities are separated by thousands of kilometers. Furthermore, during extensive field surveys throughout NE China by the first author in 2003 and 2004 no individuals of *M. oguraense* were collected. In an attempt to confirm the presence of *M. oguraense* in China further field collections in NE China and lower Yangtze valley were made and the specimens from China and Japan were re-examined.

All cited specimens from NE China referred to *M. oguraense* by Yu *et al*. (2002) were re-examined. It was found that the specimens were without fruits or flowers and that, without exception, the specimens were misidentified, belonging instead to *M. verticillatum*.

The individuals collected from the lower Yangtze valley do belong to *Myriophyllum oguraense*; however, our re-examination and critical comparison of the Chinese and Japanese materials revealed significant differences in fruit morphology. *Myriophyllum oguraense* (Miki 1934) was initially based on material from Japan, but no fruit description was given. Miki (1937) mentioned the rarity of fruits in Japanese materials. Our examination of Japanese specimens confirmed that specimens with mature fruits are very

few. We also found that Miki's (1937) illustration is accurate: the fruits are smooth on the dorsal surface and they are ca. 2 mm long, as was mentioned also by Kadono (1994). In contrast, the Chinese plants from the lower Yangtze valley have larger fruits, with each mericarp having two longitudinal ridges on the dorsal surface. These distinct characters, observed both in the field and in cultivated plants during the past several years, have remained stable.

These morphological differences together with the disjunct distribution between Japan and the lower Yangtze valley support recognition of a new subspecies.

Myriophyllum oguraense Miki subsp. ***yangtzense*** D. Wang, *subsp. nova* (Fig. 1)

A subsp. oguraensi differt fructibus majoribus 3.0–3.5 mm longis, 2.9–3.4 mm latis; mericarpio costis 2 longitudinalibus in pagina dorsali et cristis lateralibus ad juncturas mericarpiorum contiguorum praedito.

Type: China. Hubei: Ezhou City, Liangzi Lake, growing in lentic waters of 0.6–1.8 m deep. 30°12´651´´N, 114°30´896´´E, 27 m alt. 10.VIII.2003 *D. Wang 03810* (holotype CCNU, isotype PE).

Monoecious submerged herbs, perennial. Stems 10–190 cm long, 1.1–2.0(–2.5) mm in diameter, branching mainly at base, upper part usually emergent, pilose at least in upper parts; hairs white, erect 0.2–0.3 mm long. Leaves dimorphic. Submerged leaves in whorls of 4(–5), green, ovate to suborbicular in outline, 2.4–5.7 cm long, 2.3–5.5 cm wide, pectinate with 9–13 filiform pinnae; pinnae 1.1–2.9 cm long. Emergent leaves glaucous, light bluish-green, in whorls of 4(–5), oblanceolate in outline, 4.5–6(–9.5) mm long, 1.2–2.5(–4) mm wide, pectinate with 7–9(–13) tightly congested pinnae; pinnae linear-subulate, very shortly apiculate at tips, 1.0–2.2(–2.7) mm long, 0.2–0.3 mm wide, usually incurved and overlapping; pinnae tips reddish brown; scale hairs present near dorsal axils of pinnae, white, erect, 0.1 mm long. Inflorescence a simple spike, 2.5–9.5 cm long, with unisexual flowers borne in axils of upper leaves; flowers in whorls of 4(–5) and each flower subtended by two bracteoles, upper ones staminate, lower ones pistillate. Bracteoles white, trifid to pectinate with 2–3 pinnae, 0.6–1.2 mm long, 0.3–0.7 mm wide. One reddish purple gland usually present at tip of middle pinnae. Staminate flowers 4-merous, sessile; sepals 4, green, deltoid, 0.5–0.8 mm long, 0.4–0.6 mm wide, with apex acute and upper margins hyaline; petals 4, white to pale green, 1.8–2.8 mm long, 0.8–1.2 mm wide, hooded, weakly keeled at base, caducous at anthesis; stamen 8; filaments elongating to 1.2–1.6 mm long at anthesis, cream-coloured; anthers linear-oblong, yellow, 1.4–2.0 mm long, 0.2–0.4 mm wide; styles 4, pale-green to reddish, vestigial. Pistillate flowers 4-merous, sessile; sepals 4, 0.4–0.6 mm long, 0.3–0.5 mm wide, green, deltoid; petals 4, white, slightly hooded, 0.5–0.7 mm long, 0.3–0.4 mm wide, caducous, reddish brown at apex; styles 4, short, less than 0.4 mm long; stigmas shortly fimbriate, white, pinkish after anthesis; ovary 4-locular, 1.2–1.8 mm long, 1.0–1.7 mm wide. Fruit sessile, olive brown, shortly cylindrical, 3.0–3.5 mm long, 2.9–3.4 mm wide; styles persistent; mericarp separating readily at maturity, rounded at base, tapering gradually towards oblique apex, with 2 longitudinal smooth ridges on dorsal surface and lateral ridges at junction of adjoining mericarps. Flowering from early May to late September, fruiting from June to October.

Etymology. The subspecific epithet refers to the geographical distribution of the new subspecies in the lower Yangtze valley, China.

Myriophyllum oguraense subsp. *yangtzense* is morphologically similar to subsp. *oguraense*, and to a lesser extent to *M. verticillatum* and *M. aquaticum*. The two subspecies of *M. oguraense* possess similar leaf, floral and ovary morphology, but in subsp. *yangtzense* two longitudinal ridges develop in mature fruits, which are 3.0–3.5 mm long, while the ca. 2 mm long fruits of subsp. *oguraense* remain smooth at maturity. The new taxon resembles *M. verticillatum* and *M. aquaticum* in having whorled emergent leaves, which much exceed the flowers and fruits, and are laciniate-pinnatifid to the top of the spike. The four taxa can be distinguished using the following key:

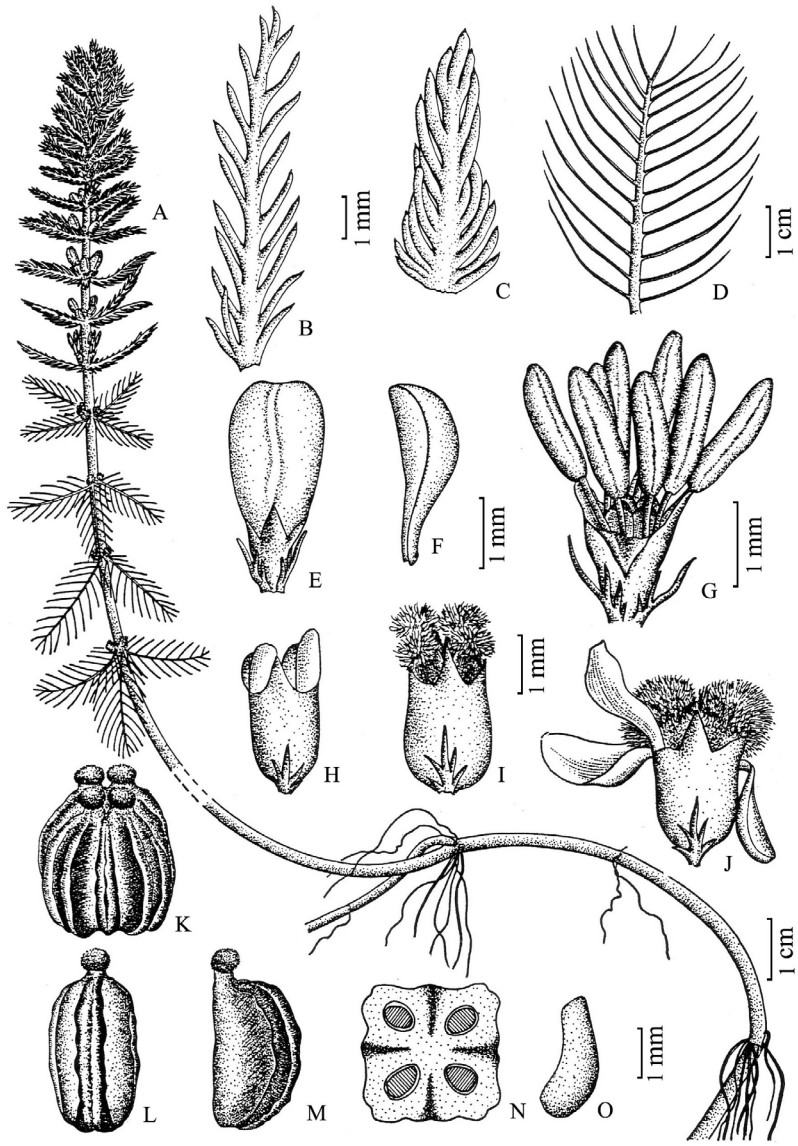

Fig. 1. *Myriophyllum oguraense* subsp. *yangtzense* (from holotype). — **A**: Habit. — **B**: Emergent leaf. — **C**: Leaf of turion. — **D**: Submerged leaf. — **E**: Staminate flower before anthesis, and its bracteole. — **F**: Petal of Staminate flower. — **G**: Stamen, petals removed. — **H**: Pistillate flower and bracteole. — **I–J**: Immature fruit. — **K**: Mature fruit. — **L**: Dorsal view of mature mericarp. — **M**: Lateral view of mature mericarp. — **N**: Diagrammatic transverse section of mature fruit. — **O**: Seed.

1. Dioecious; turions not developed; fruits not found; reproduction in China strictly vegetative (only female plants in China) ..... *M. aquaticum*
1. Monoecious; turions well-developed; fruits 4-sulcate 2.
2. Floral leaves light- to dark-green; turions 1–3 cm long; bracteoles pectinate or absent; fruits ovoid or subglobose ..... *M. verticillatum*
2. Floral leaves glaucous or light bluish-green; turions 2–8 cm long; bracteoles trifid to pectinate; fruits shortly cylindrical ..... 3.
3. Fruits ca. 3.0–3.5 × 2.9–3.4 mm; each mericarp with two longitudinal ridges on dorsal surface ..... *M. oguraense* subsp. *yangtzense*
3. Fruits ca. 2.0 mm long × as wide; each mericarp with smooth dorsal surface .. *M. oguraense* subsp. *oguraense*

Myriophyllum oguraense subsp. *yangtzense* is restricted to the lower Yangtze valley, China (Fig. 2). The plants, growing in water 0.6–1.8 m deep, are found in lentic habitats ranging from large, deep lakes to medium, shallow ponds, and sometimes in small ditches and sluggish streams. Occasionally, it is found stranded on damp mud, where the plants are just ca. 10 cm long, and in such habitats they produce clearly fewer flowers and no lateral inflorescences. The subspecies typically has erect spicate inflorescences or sometimes 2–10 lateral ones from the axils of the upper submerged leaves, during

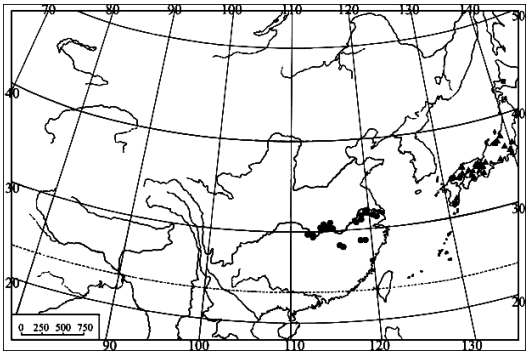

Fig. 2. Distribution of *Myriophyllum oguraense* subsp. *yangtzense* (●) and *M. oguraense* subsp. *oguraense* (▲) (the latter after Kadono 1994).

the late summer. The turions, formed in the late autumn and early winter, are 2.5–6.5 cm long. It grows in abundance in favorable habitats, often encountered with *Myriophyllum ussuriense*, *M. spicatum*, *Utricularis vulgaris* and *Limnophila sessiliflora*.

ADDITIONAL SPECIMENS EXAMINED (paratypes). **China**. Anhui: Chaocheng, 22.IX.1951 *Statio Orientali-Sinensis 3938* (PE); Xuancheng, 18.VI.1959 *T. Y. Liu 586* (PE); Dangtu, 30.VIII.1959 *T. Y. Liou 1018* (PE). Hubei: Ezhou, 20.V.2001 *D. Wang 699* (with flowers and immature fruits, WH); Ezhou, 6.VI.2001 *D. Wang 701* (with flowers and fruits, WH); Ezhou, 11.XI.2001 *D. Wang 1271* (with turions, WH); Ezhou, 28.XII.2001 *D. Wang 1271b* (with turions, WH); Ezhou, 20.VIII.2004 *D. Wang 04820* (with flowers and fruits, CCNU). Jiangsu: Suzhou, 13.V.1933 *H. Migo s.n.* (with flowers, WH); Jintan, 18.X.1956 *M. B. Deng 3654* (PE). Jiangxi: Dongxiang, 30.VII.2001 *D. Wang 808* (no flower or fruit, WH). Zhejiang: Quzhou, 15.X.1998 *Y. X. Chong* 9810067, 9810068 (WH); West Lake, 15.VI.1927 *H. H. Hu 1518* (PE).

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