

An Unrecorded Species in Korea: *Monochasma shearer* (S. Moore) Maxim. ex Franch. Et Sav. (Scrophulariaceae)

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Plants of a genus and species previously unrecorded in Korea were collected from the hillside along a forest road at the Gwaneum peak in the Byeonsanbando National Park, Buan-gun, Jeollabuk-do, together with plants belonging to Gramineae and Cyperaceae. *Monochasma shearer* (S. Moore) Maxim. ex Franch. et Sav. (Scrophulariaceae) is most similar to *M. savatieri* Franch. ex Maxim., but differs distinctively in several morphological characters. Whereas *M. shearer* exhibits a slender stem, and a calyx that is longer than the corolla, plants of *M. savatieri*, which is distributed in Japan and China, have stout stems with glandular pilose trichomes, along with calyxes that are shorter than their corollas. In addition, seeds of *M. shearer* are elliptical, with falcate trichomes on their surfaces. This new plant has been given a Korean name, "Byeon-san-but-sal-i-pul", based on its parasitic habit and features of its natural habitat. Here, we describe its morphological characters and provide a taxonomic key and illustrations, plus photographs of the flower, fruit, and roots.

Keywords: Byeonsanbando National Park, *Monochasma shearer*, Scrophulariaceae, unrecorded

The genus *Monochasma* Maxim. belongs to the tribe Rhinanthae Benth. (Scrophulariaceae). It was previously thought to be distributed only in China and Japan, especially in the temperate regions (Ohwi, 1984). Plants of *Monochasma* are recorded as being hemiparasitic (Yamazaki, 1993). This genus comprises two species -- *M. savatieri* Franch. ex Maxim. and *M. shearer* (S. Moore) Maxim. ex Franch. et Sav. Both are listed as 'threatened' in the Japanese red data book (Anonymous, 2000). Neither had previously been included as part of the Korean flora.

Except for some morphological descriptions in a regional flora report, overall taxonomic investigations had not been performed earlier for these two species (Moore, 1875; Ohwi, 1984; Makino, 1989; Yamazaki, 1993; Hong et al., 1998). Here, we describe the discovery of one previously unrecorded species in Korea, *M. shearer*, which was collected in April through June 2004 from the Byeonsanbando National Park, Buan-gun, Jeollabuk-do.

MATERIALS AND METHODS

Monochasma plants were collected from the hillside along a forest road at the Gwaneum peak in Byeonsanbando National Park. Our examination of their external morphology revealed several unique features (Fig. 1). Micro-morphological characters of the seed were recorded by SEM from living materials. Seed samples were first soaked in water for 1 h before being dehydrated in 90% alcohol. They were then washed in solution, with ultrasonic shaking, for 2 to 3 min, dried at room temperature, coated with gold ions, and observed under a Hitachi 3200N (Fig. 2). Voucher specimens of these plant materials were deposited at TUT (Daejeon University Herbarium, Korea), and additional specimens were examined at TI (Tokyo University Herbarium, Japan).

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DESCRIPTIONS

Monochasma Maxim.

Herbs. Leaves sessile, linear, opposite, scale-like below, gradually increasing in size upward, entire. Stems numerous. Flowers solitary in axils. Bracteoles 2, linear lanceolate. Calyx tubular, 4-lobed. Stamens 4, didymous. Ovary incompletely 2-loculed, many-ovuled, enclosed in the calyx. Capsule ovoid, usually enclosed by persistent calyx. Seeds small, numerous.

Korean name: But-sal-i-pul-sok nom. nov.

Monochasma shearer (S. Moore) Maxim. ex Franch. et Sav., Enum. Pl. Jap. 2: 458, 1876 (Fig. 1, 2)

Bungea shearer S. Moore in J. Bot. 13: 229 (1875)

Monochasma shearer (S. Moore) Maxim. var. *japonicum* Maxim. ex Franch. et Sav., Enum. Pl. Jap. 2: 458 (1877)

Monochasma japonicum (Maxim.) Makino in J. Jap. Bot. 7: 29 (1932)

Small herb, semi-parasitic plants, 10-30 cm tall. Leaves opposite, lower leaves scale-like, linear shape, sessile, entire, 1-nerved, green or greenish purple, sparsely white pubescent, 1.0-2.5 cm long, 1.0-3.0 mm wide. Stem diffuse, green or greenish purple, sparsely white pubescent. Flowers April to May, solitary in upper leaf axils. Pedicels 2-8 mm long, short pubescence. Bracteoles 2, linear shape, 3-10 mm long. Calyx lanceolate-tubular, deeply 4-lobed, tube 3-5 mm in flower, 7-8 mm long in fruit. Corolla tubular, white or white with pale pink. Capsule oblong-ovoid, 7-8 mm long, glabrous. Seeds flat, 1.0-1.5 mm long, brown, elliptical, many, with falcate trichomes on surfaces (Fig. 2).

Korean name: Byeon-san-but-sal-i-pul nom. nov.

Habitat: Deciduous and coniferous mixed forests in lowlands and mountain slopes, grows primarily with other genera, including several within Gramineae and Cyperaceae.

Additional specimens examined: *M. shearer* (Korea. Jeollabuk-do: Buan-gun, Jinseo-myun, Seokpo-ri, TUT 28001 - 28006. Japan. Pref. Tochigi: H. Hara, May. 31. 1958, TI 5640; Tokyo, M. Togashi, May. 3. 1951, TI 364; M. Togashi,

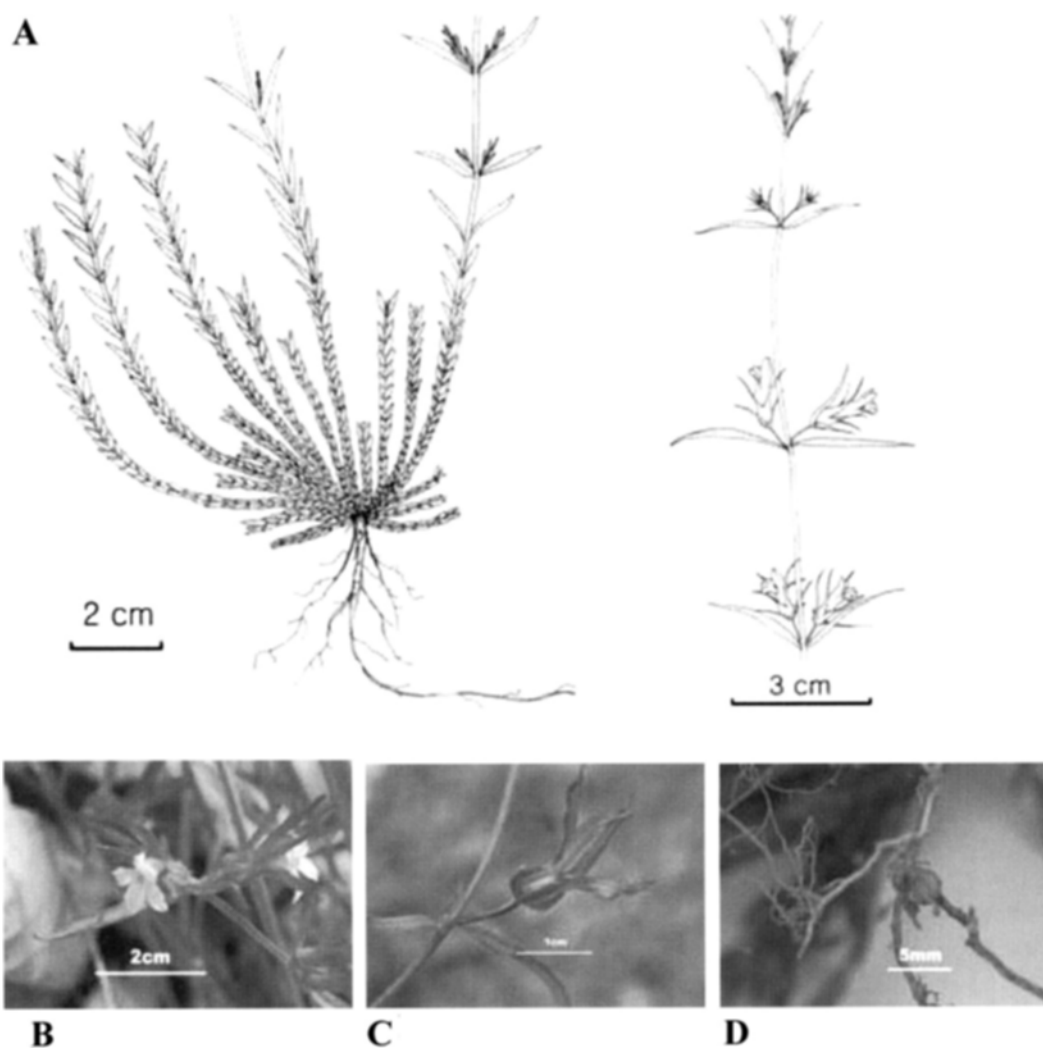


Figure 1. *M. sheareri* (S. Moore) Maxim. ex Franch. et Sav. A, habit; B, flower; C, capsule; D, root.

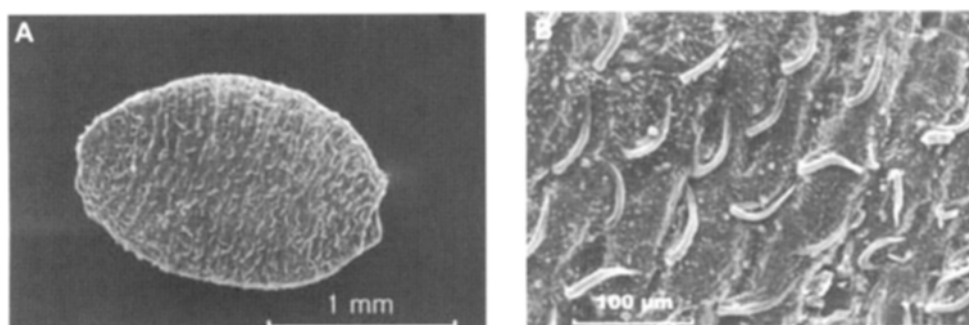


Figure 2. SEM photographs of seed (A) and trichomes at surface (B).

May. 1953, TI 8806; T. Yamazaki, May. 1. 1950, TI 779, TI 2562), *M. savatieri* (Japan. Kyushu: Y. Asahina & M. Togashi, Oct. 1959, TI 3698; M. Togashi, Nov. 30. 1959, TI 7861)

Distribution: China, Japan, Korea

A Key to the Two Species of *Monochasma*

- 1. Plants stout, basally woody, calyx shorter than corolla, glandular pilose, tube usually not inflated with age
 1. *M. savatieri*

- 1. Plants slender, herbaceous, calyx longer than corolla, not glandular pilose, tube inflated with age .. 2. *M. sheareri*

DISCUSSION

The genus *Monochasma* Maxim. consists of two species with hemi-parasitic habits. It belongs to the tribe Rhi-nantheae (Scrophulariaceae). While studying this genus and its related taxa in East Asia, we found a population of *M.*

shearer (S. Moore) Maxim. ex Franch. et Sav. that was previously unrecorded in Korea. These plants grow along the roadsides and hillsides of deciduous and mixed-conifer forests at the Gwaneum peak in Byeonsanbando National Park, Buan-gun, Jeollabuk-do, and are found with other genera, including members of the Gramineae and Cyperaceae families. Upon this discovery, we prepared voucher specimens and composed a physical description (Fig. 1). Although this species is most similar to *M. savatieri* Franch. ex Maxim., it differs in some important morphological characters. For example, *M. shearer* has slender stems and calyxes that are longer than the corollas. In contrast, plants of *M. savatieri* possess stout stems with glandular pilose trichomes, and their calyxes are shorter than their corollas. These comparisons are based on earlier descriptions by Yamazaki (1993) and Hong et al. (1998). Finally, the seeds of *M. shearer* are elliptical, with falcate trichomes at the surface (Fig. 2).

Both the genus *Monochasma* and the particular species *M. shearer* are newly recorded in the compilation of Korean flora. Its Korean common name, 'Byeon-san-but-sal-i-pul', is based on the region from which it was collected and also reflects its growth habit. Future research plans are to conduct continuous monitoring of these plants in their natural environs, and to investigate various other aspects of its existence in Korea.

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LITERATURE CITED

- Anonymous (2000) Threatened wildlife of Japan: Red data book, *In* Environmental Agency of Japan, Vascular Plants. Ed 2, Vol 8, Japan Wildlife Research Center, Tokyo, pp 660
- Hong D, Yang H, Jin C, Holmgren NH (1998) Scrophulariaceae, *In* Wu ZY, Raven PH, eds, Flora of China. Vol 18, Science Press and Missouri Botanical Garden Press, Beijing and St. Louis, pp 211-212
- Makino T (1989) Revised Makino's New Illustrated Flora of Japan. Hokuryukan, Tokyo, pp 569
- Moore S (1875) Description of some new phanerogamia collected by Dr. Shearer, at Kiukiang, China. *J Bot Brit Foreign* 13: 225-231
- Ohwi J (1984) Flora of Japan. Ed 2, Smithsonian Institution, Washington DC, pp 803-804
- Yamazaki T (1993) Scrophulariaceae, *In* Iwatsuki K, Yamazaki T, Bufford DE, Ohba H, eds, Flora of Japan. Vol a, Kodansha, Tokyo, pp 358-359