

# SILENE MISHUDAGHENSIS (CARYOPHYLLACEAE), A NEW SPECIES FROM IRAN

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Received 2015. 05. 24; accepted for publication 2015. 08. 19

Gholipour, A. & Parsa Khanghah, N. 2015.12.31: *Silene mishudaghensis* (Caryophyllaceae), a new species from Iran.- *Iran. J. Bot.* 21 (2): 118-122. Tehran.

*Silene mishudaghensis* (Caryophyllaceae) from the section *Auriculatae* is described as a new species from Northwest of Iran. The new species is distinguished from its closely related species, *S. araratica* and *S. longisepala* by the shape of basal and cauline leaves, the shape of calyx, the length of alar and lateral pedicel and seed features.

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**Key words:** New species; *Silene*; Sect. *Auriculatae*; Flora; Iran

گونه *Silene mishudaghensis* متعلق به تیره میخکیان، گونه ای جدید از ایران

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گونه *Silene mishudaghensis* از بخش *Auriculatae*، تیره میخکیان به عنوان گونه ای جدید از شمال غرب ایران توصیف می شود. گونه جدید از گونه های نزدیک *S. araratica* و *S. longisepala* بواسطه خصوصیات نظیر شکل برگ های قاعده ای و ساقه ای، شکل کاسه، طول دمگل میانی و جانبی و ویژگیهای دانه قابل تشخیص است.

## INTRODUCTION

The genus *Silene* L. from the family Caryophyllaceae with about 110 species in Iran is known as one of the important genera of Flora of Iran (Melzheimer, 1988; Gholipour & Sheidai, 2009). Iranian *Silene* species was classified into 21 sections based on Chowdhuri's Classification (Chowdhuri, 1957; Melzheimer, 1988). Many species of this genus grow on mountainous areas of Iran particularly in Zagros, Elburz and Azarbaijan. Recently, some interesting specimens were collected by the authors of this article from Marand (Mishudagh Mountain) and Khoy (Avrine Mountain) in 2013. These specimens could not be identified using the identification key of Flora Iranica (Melzheimer 1988), Flora of Turkey (Coode & Cullen 1967) and Flora of the USSR (Shishkin 1936); however, it was recognized that these specimens belong to the section *Auriculatae* Boiss.

The specimens were compared with the related species in IRAN, G, W and Sari Payame Noor University herbaria, and also with some recently described species from Iran and Turkey such as *S.*

*ferdowsii* Joharchi, Nejati & F. Ghahrem. (Nejati edalatian & al., 2011), *S. parjumanensis* Podl. (Nejati edalatian & al., 2010) and *S. gevasica* Hamzaoğlu (Hamzaoğlu & al. 2011). According to the observations and available data, the newly collected specimens are described as a new species in this article.

## MATERIALS AND METHODS

Plant specimens were collected from natural habitats in Iran and the vouchers were deposited in IRAN, TARI and Sari Payame Noor University herbaria. The specimens were identified using Flora Iranica (Melzheimer 1988) and compared with the type specimens deposited in G, W and IRAN herbaria. The matured seeds were collected from natural habitats during the fruiting phase. Five fully developed seeds per species were selected and studied using binocular stereoscope at 15x and 30x magnifications. Seeds attached on stubs, were coated with thin layer of gold-palladium in a sputter-coater. The prepared samples were observed and photographed by Scanning Electron Microscope (SEM) model Cam Scan MV 2300 at an

acceleration voltage of 15 kV at Tehran University. Four micrographs were taken per taxon in lateral, dorsal and ventral views. The data were measured based on micrographs by image tool software and stereomicroscope observations.

## RESULTS

*Silene mishudaghensis* A. Gholipour & N. Parsa Khanghah **sp. nov.** (Sect. *Auriculatae* Boiss.) (fig. 1).

**Type:** Iran, East Azarbaijan, Marand, Mishudagh Mountain, 2200 m, 26 June 2013, Parsa Khanghah SPNH - 2445 (holotype: IRAN, isotypes: Sari Payame Noor University, TARI).

**Paratype:** Iran, West Azarbaijan, Khoy, Pasak, Avrine Mountain, 1850 m, 2 August 2013, Gholipour & Aminirad, SPNH-2467.

Caespitose perennial; Stems ascending to erect, 10.5-18 cm high; the lower internodes covered with eglandular hairs, and the upper one covered with glandular and eglandular hairs. Basal leaves narrowly oblanceolate, 23-60 × 2-5 mm, covered with eglandular hairs on both surfaces, acute. Cauline leaves linear or linear-oblanceolate, 16-24.5 × 1.5-3 mm, covered with short eglandular hairs on both surfaces. Inflorescence dichasia, usually with two flowers or solitary; alar pedicel 9-24 mm and lateral pedicel 3-11 mm long, with glandular hairs. Bracts lanceolate, herbaceous. Calyx cylindric-clavate, 25-32 mm long, with 10 reticulate nerves, covered with eglandular and glandular hairs; teeth triangular, rarely spatulate, 2.2-5 mm long, acute rarely obtuse, with ciliate margin. Petals pink; claw 7.5-9.5 mm long, glabrous, exerted from calyx, apex with two conspicuous auricle; coronal scales well developed; limb 5-9.5 mm long, divided to 1-3.5 mm. Alternate stamens 6.5-11 mm long and epipetal stamens 2.5-8.5 mm long, inserted 2-2.5 mm from the base of petals. Anthophore 17-24 mm long, pubescent. Capsule oblong-ovoid, 5.5-7.5 × 4.5-5 mm, dehiscent by 6 teeth. Seeds reniform, 1.24 × 1 mm, concave in lateral and dorsal surface, testa cells without ornamentation (figs. 1 & 2 A, B, C).

**Specimens examined:** Iran: West Azarbaijan province, Khoy, Ghotour, Habash bala, Mirzagol valley, 2523 m, 5.vi.2008, Gholipour, SPNH-326; Khoy, Ghotour, Habash bala, Mirzagol valley, 2523 m, 3.vii.2010, Gholipour, SPNH-320; Khoy, Ghotour, Razi, 2292m, 18.vii.2011, Gholipour, SPNH-322; Piranshahr to Naghadah, Gerdekashaneh, Likbin village, Landesheikhan Mountain, 2400 m, 2.vii.2010, Gholipour, SPNH-324; Khoy, Ghotour, Ghaniziyarat, 2844 m, 1.vii.2012, Gholipour, SPNH-325; Khoy, Ghotour, Ghaniziyarat, 2945 m, 5.vii.2010, Gholipour, SPNH-323; Khoy, Ghotour, Sharif Abad, Avrine, 2844

m, 1.vii.2012, Gholipour, SPNH-321; Urmiye, Anhar Road, Marmisho, 3007 m, 2.vii.2012, Gholipour, SPNH-654. *Silene longisepala* - Pakistan. Chitral, Turikho River, Rain, 2700 m, 23.v.1958, Stainton, 2505.

**Distribution and ecology:** The specimens of *Silene mishudaghensis* were collected from two localities in Northwestern area of Iran. Therefore the new species is endemic, with a restricted distribution. In these localities the individuals of species grow on calcareous rocks from 1850 to 2200 m.

**Etymology:** The new species was collected from Mishudagh Mt. Mishudagh is a picturesque and well-known mountain in East Azarbaijan province of Iran, and the epithet of new species refers to the name of mountain.

## DISCUSSION

Because of perennial and caespitose habit, large flowers, large and pubescens calyx and two auricles at the apex of claw, *S. mishudaghensis* belongs to the section *Auriculatae* Boiss. Among the species of *Silene* sect. *Auriculatae*, *S. araratica* Schischk. and *S. longisepala* Nasir are the most closely related species to *S. mishudaghensis*. *S. mishudaghensis* and *S. araratica* with the same habitat grow on the calcareous rocks in the northwestern mountains in Iran. However, the new species differs from *S. araratica* by some morphological features such as the shape and size of basal and cauline leaves, the shape of calyx, the length of alar and lateral pedicels and the size and ornamentation of seeds (table 1, fig. 3). In *S. mishudaghensis*, the size of seeds is 1.25 × 1 mm and testa cells are smooth but in *S. araratica* it is 0.98 × 0.73 mm with tuberculate ornamentation (table 1, fig. 2).

It is also similar to *S. longisepala* Nasir, but with some differences in morphological features. The stem in *S. longisepala* is covered with only eglandular hairs but there is glandular and eglandular hairs on the stem of *S. mishudaghensis*. A conspicuous difference between the two species is concerned with the length of internodes. In *S. longisepala* internodes are long, so that the cauline leaves can be shorter than internodes while it is vice versa in *S. mishudaghensis*. Another important difference is the pedicles length. In *S. longisepala* alar and lateral pedicels are 5 mm and 2 mm or subsessile, respectively, but those one are 9-24 mm and 3-11 mm in *S. mishudaghensis*. Furthermore, the two species have some differences in flower and fruit features such as claw of petal, antophore and capsule dimension (table 1). In conclusion according to the available data mentioned in this paper, *S. mishudaghensis* is known as a distinct taxon.



Fig. 1. *mishudaghensis*: A, habit; B, basal leaf; C, cauline leaf; D, alar bract; E, lateral bract; F, flower; G, Petal; H, capsule; I, calyx (Scale bar = 1 cm).

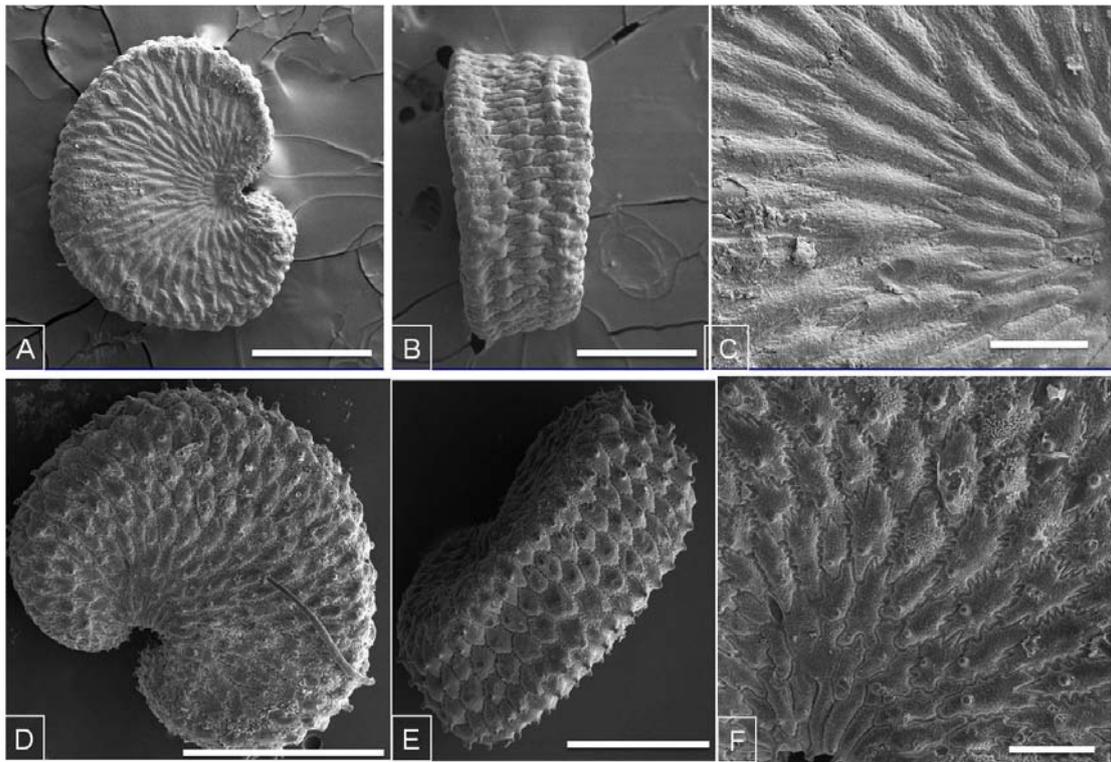


Fig. 2. SEM micrographs of Seed of species studied. A, B, C: *S. mishudaghensis*; D, E, F: *S. araratica*. A, D, general view from lateral surface, B, E, dorsal surface; C, F, shape and ornamentation of seed testa cells (Scale bar A, B, D, E = 500  $\mu$ ; C, F = 100  $\mu$ ).



Fig. 3. Herbarium specimens of species studied. A, *Silene mishudaghensis* (Parsa Khanghah SPNH-2445); B, *S. araratica* (Gholipour SPNH-322, Scale bar = 5 cm).

Table 1. Comparison of *Silene mishudaghensis* with *S. longisepala* and *S. araratica*.

Characters/ Taxa	<i>S. mishudaghensis</i>	<i>S. longisepala</i>	<i>S. araratica</i>
Plant height (cm)	10.5–18	Up to 30	4.5–15
Basal leaf shape	Narrowly oblanceolate	Narrowly linear to linear	Oblanceolate-Spathulate
Dimension of basal leaf (mm)	2.5 × 23–60	0.75-1.5 × 13–30	2.9 × 8-63
Cauline leaf shape	Linear or linear-oblanceolate	Linear or linear-lanceolate	Broadly oblanceolate or spathulate
Dimension of cauline leaf (mm)	1.5-3 × 16-24	1.5-2 × 11-19	2-14 × 9-35
Calyx shape	Cylindric-clavate	Cylindric	Cylindric-inflated
Alar pedicel length (mm)	9-24	5	1-9
Lateral pedicel length (mm)	3-11	1.5-2	0.5-5
Seed dimension (mm)	1.25 × 1 mm	-	0.98 × 0.73
Testa cell ornamentation	Smooth	Smooth	Tuberculate
Antophore	Pubescent	glabrous	Pubescent at base
Dimension of capsule (mm)	5.5-7.5 × 4.5-5	12.5-15 × 3.5-4	8.9 × 3-5

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