Introducing a new species, Silene ghahremaninejadiii (Caryophyllaceae), from Iran

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Abstract. Silene ghahremaninejadiii (Caryophyllaceae) is described as a new species to science in this article based on critical differences in certain characters of both vegetative and reproductive organs, compared with its closely related taxa, i.e. S. marschallii and S. ruprechtii. The new species has compact caudex, glabrous leaves and pedicles, cylindrical calyx without indumentums on its inner surface, deeply bifid petals without coronal scales and glabrous filaments. In addition, a hypothesis about the speciation process of the species is proposed.

Keywords. Flora Iranica, Lasiostemones, Sileneae, Silene marschallii, Silene ruprechtii

INTRODUCTION

Silene L., a diverse and well-distributed genus of the family Caryophyllaceae, has approximately 700 species around the world, of which nearly 98-101 species are thrived in Iran by various estimations (Edalatiyan et al., 2010, 2011; Gholipour & Sheidai, 2009; Gholipour & Parsa Khangah, 2015; Melzheimer, 1988).

Interestingly, at least 28 species out of them are considered as endemics (Edalatiyan et al., 2011); in other words, the distribution of 4 percent of Silene species is geographically confined to Iran.

Generally, Silene members were classified into 42 sections by Chowdhuri (1957), of which 21 sections are present in Iran (Melzheimer, 1988).

This could be considered to be a good indication of its marvelus diversity and strong appeal for this
speciation. After the publication of the number 163 of Flora Iranica (Melzheimer, 1988) which had been covered previously reported species, only two new species were introduced from Iran, i.e. S. ferdowsii Joharchi, Nejati & F.Ghahrem. (Edalatian et al., 2011) and S. mishudaghensis Gholipour & Parsa Khanghah (Gholipour & Parsa Khanghah, 2015).

Taxonomic studies on Silene in Iran have not resulted in a satisfactory conclusion yet. To fill in the gap, herbarium specimens from important herbaria i.e., W, TARI, FAR and T (Thiers, continuously updated) are studied, which led to the discovery of unidentified specimens in TARI herbarium with interesting characteristics. The authors assumed that those specimens do not belong to any previously described species; hence a new species to the science, Silene ghahremaninejadii sp. nov.

MATERIAL AND METHODS
The aforementioned specimens were previously collected from Khamin protected area and deposited in TARI herbarium. These specimens were not matched to any previously described species and could not be identified by the identification keys of Flora Iranica (Melzheimer, 1988), Flora of Turkey (Coode & Cullen, 1967) and Flora of the USSR (Schischkin, 1936). Then the specimens were compared with the type specimens and other related materials deposited in G, W, LE and TARI herbaria (Thiers, 2016) via virtual herbaria and personal attendance.

RESULTS
Silene ghahremaninejadii Hoseini & Assadi sp. nov. (Figs. 1, 2).

Holotypus: Iran, Kuhgiluye and Boyerahmad province, Gachsaran, ToleTchegah, Khamin protected area, Khamin mountain, 2700 m, 09.08.2002, Mehregan 85776 (TARI).

Perennial; Caudex compact, Stems branching mainly in below part, ascending to erect, upto 58 cm long, puberulent with eglandular hairs in lower parts (vegetative parts of the stems, i.e. before the initiation of inflorescent branches), then glabrous and highly viscid above.

Basal leaves rosette, pedicellate to sessile, linear-lanceolate to broadly lanceolate, subacute, 5-32×2-4.5 mm, glabrous; cauline leaves smaller in size and the same in shape. Inflorescence loose panicle, coinflorescence dichasium. Pedicles more than half of the length of the calyx, glabrescent to glabrous. Bracteoles small, with scarious margins, 1-1.5 mm long, ciliate.

Calyx cylindric, subcoriaceous, glabrous in inn-er surface and outer surface, 7-9 mm long, with 10 interconnecting nerves, sometimes with violet to purple shade; teeth obtuse, with ciliate and scarious margins. Petals white; claw without coronal scales, glabrous, with broad lateral margins, more or less included in the calyx; limb 2-3 mm long, glabrous, bifid to its base; Stamens more or less included in the calyx; filaments glabrous, more or less equal in length; Styles 3, glabrous; Capsule oblong, 6.5-7×2.5-3 mm; Anthophore (carpophore) glabrous to minutely puberulent, 2.5-4 mm long.

Distribution. The specimens of S. ghahremaninejadii were collected from an isolated high mountain in South-west of Iran. Therefore, the new species is a good candidate to be regarded as an endemic taxon with a very restricted distribution.

Etymology. The new species was named after Pr- of. Dr. Farrokh Ghahremaninejad (Tehran, Iran), a prominent Iranian botanist.

DISCUSSION
The most closely related taxa to S. ghahremaninejadii were S. marschallii C.A.Mey. and S. ruprechtii Schischk. Major differences between these species are listed in Table 1, but some additional notes must also be taken into consideration.

The distribution of neither of the related taxa stretched southward near the location of the discovered specimens of S. ghahremaninejadii, so there is no co-occurrence of S. ghahremaninejadii with S. marschallii or S. ruprechtii based on our present knowledge.

S. marschallii is more expansively distributed than the other related taxon, especially in Turkey, Iraq, Caucasus and North-western to the center of Iran. The southernmost known locality of the species in Iran is confined to the north of Semirom in Isfahan province.

Semirom is about 140 kilometers north of the Gachsaran, the area where the specimens of S. ghahremaninejadii have been collected.

S. ruprechtii is confined to the northwest of Iran, Caucasus and Turkey, hence fairly unconnected to the habitat of S. ghahremaninejadii.
Fig. 1. The type specimen of *Silene ghahremaninejadii*.
Table 1. Comparison of *Silene ghahremaninejadii* with *S. marschallii* and *S. ruprechtii*.

<table>
<thead>
<tr>
<th>Character / Taxa</th>
<th><em>S. ghahremaninejadii</em></th>
<th><em>S. marschallii</em> (s.s)</th>
<th><em>S. ruprechtii</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Caudex</td>
<td>Compact</td>
<td>Caespitose</td>
<td>Compact</td>
</tr>
<tr>
<td>Plant height (cm)</td>
<td>Up to 58cm</td>
<td>Up to 53cm</td>
<td>17-26cm</td>
</tr>
<tr>
<td>Leaves indumentum</td>
<td>Glabrous</td>
<td>Puberulent</td>
<td>Glabrous</td>
</tr>
<tr>
<td>Dimension of basal leaf</td>
<td>5-32×2-4.5mm</td>
<td>27-47×1-3mm</td>
<td>10-25(-40) ×0.5-3mm</td>
</tr>
<tr>
<td>Pedicel</td>
<td>Glabrous to Glabrescent</td>
<td>Puberulent</td>
<td>Glabrous</td>
</tr>
<tr>
<td>Calyx shape</td>
<td>Cylindric</td>
<td>Campanulate</td>
<td>Campanulate</td>
</tr>
<tr>
<td>Inner calyx indumentum</td>
<td>Glabrous</td>
<td>Pubescent</td>
<td>Pubescent</td>
</tr>
<tr>
<td>Patell Limbs</td>
<td>Bifid down to the base</td>
<td>Bifid up to 1/3 (-1/2)</td>
<td>Bifid down to the base</td>
</tr>
<tr>
<td>Coronal Scale length</td>
<td>Absent</td>
<td>1.5-2 mm</td>
<td>1-1.5mm</td>
</tr>
<tr>
<td>Petal Claw</td>
<td>Not auriculate, broad</td>
<td>Auriculate, narrow</td>
<td>Auriculate, narrow</td>
</tr>
<tr>
<td>Petal claw indumentum</td>
<td>Glabrous</td>
<td>Pilose</td>
<td>Pilose</td>
</tr>
<tr>
<td>Filaments indumentum</td>
<td>Glabrous</td>
<td>Pilose</td>
<td>Pilose</td>
</tr>
<tr>
<td>Style</td>
<td>Glabrous</td>
<td>Pilose</td>
<td>Glabrous</td>
</tr>
<tr>
<td>Antophore</td>
<td>Glabrescent</td>
<td>Pubescent</td>
<td>Pubescent</td>
</tr>
<tr>
<td>Capsule Shape</td>
<td>Ovoid-oblong</td>
<td>Ovoid</td>
<td>Ovoid-oblong</td>
</tr>
</tbody>
</table>

Fig. 2. A: Integrated floral parts (left) and Calyx (Right), B: Middle part of a petal; note the lack of auricles and coronal scales C: Integrated floral part.
The separation of *S. ghahremaninejadii* from *S. marschallii* subsp. *sahendica* (Boiss. & Buhse) Melzh. is justified based on the plant height and the diameter of the basal leaves. Moreover, it is also noteworthy that the new species resembles to *S. ruprechtii* more than the *S. marschallii* by having compact caudex, glabrous pedicles and leaves, oblong-ovoid capsule and glabrous styles. However, it could be assumed that both *S. ghahremaninejadii* and *S. ruprechtii* were diverged separately from adjacent populations of *S. marschallii*.

Thus, the shared features of *S. ghahremaninejadii* and *S. ruprechtii* should be regarded as the examples of parallelism.

The importance of petal appendages of flowers, e.g. auricles and coronal scales in *Silene*, in attracting pollinators was emphasized by Endress & Matthews (2006). Therefore, the differences in the shape, size and development of those visual signs among related taxa could alter the pollinators visiting the species, and therefore, place an additional obstacle against the gene flow among them, and promote the speciation process.

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REFERENCES


