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The species of *Scrophularia* L. (Scrophulariaceae) with white margined leaves in *Flora Iranica*

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ABSTRACT
The white-margined leaf is a recognizable character in some species of *Scrophularia* L. This character is observed in the specific group of *Scrophularia deserti* Delile and its synonyms. The taxonomic identity of these species in *Flora Iranica* is reviewed. Detailed studies on the type specimens, protologue information and herbarium material of the taxa clearly indicated that the taxonomic status of *S. marginata* Boiss. is not correct. Here, this species is resurrected as a distinct species rather a synonym for *S. deserti*. In addition, *S. cabulica* Benth. is an incorrect synonym for *S. deserti*. In fact, after careful investigation on *S. deserti* complexities, it is considered as a valid taxon. The status of *S. moniliformis* Pennell is accepted here as a correct synonym for *S. deserti*. Also, the situation of *S. kotschyi* Boiss. is clarified as a printed matter and considered as a new synonym for *S. deserti*. Finally, *S. sinaica* Benth. resynonymized for *S. deserti*. Additionally, *S. deserti* and *S. marginata* are assigned to *Scrophularia* sect. *Albomarginatae*, sect. nov., based on some special morphological characters. A key as well as detailed descriptions along with illustrations and a distribution map for the studied taxa are provided. Finally, three lectotypes are designated for the group.

KEY WORDS
Iran,
conservation,
Scrophularia,
new section,
new synonym,
lectotypification.

RÉSUMÉ
Les espèces de Scrophularia *L. (Scrophulariaceae) à marge foliaire blanche de la* Flora Iranica.
La feuille à marge blanche est un caractère remarquable de certaines espèces de *Scrophularia* L., observé dans le groupe particulier de *S. deserti* Delile et de ses synonymes, dont la taxonomie est ici revue dans le cadre de la *Flora Iranica*. L'examen détaillé des spécimens types, du texte des protologues et des collections d'herbiers a clairement démontré que le statut taxonomique de *S. marginata* Boiss. était incorrect (synonyme de *S. deserti*), cette espèce étant ici pleinement rétablie. De même, *S. cabulica* Benth. avait été mise en synonymie de l'espèce complexe *S. deserti*, alors qu'une analyse plus approfondie de celle-ci montre qu'elle doit être considérée comme un taxon valide. En revanche, *S. moniliformis* Pennell est bien mise en synonymie de *S. deserti*, ainsi que *S. kotschyi* Boiss. dont le statut de publication est éclairci, l'espèce *S. sinaica* Benth. étant remise en synonymie de *S. deserti*. Enfin, *S. deserti* et *S. marginata* sont rapportées à *Scrophularia* sect. *Albomarginatae*, sect. nov., fondée sur des caractères morphologiques distinctifs. Une clé d'identification, des descriptions détaillées, des illustrations et une carte de répartition sont fournies pour tous les taxons étudiés du groupe *S. deserti*, dont la révision a conduit à trois lectotypifications nouvelles.

MOTS CLÉS
Iran,
conservation,
Scrophularia,
section nouvelle,
synonyme nouveau,
lectotypification.

INTRODUCTION

The genus *Scrophularia* L. (1753: 619) with nearly 200 to more than 300 species (Mabberley 1997; Willis 1973), is one of the largest genera of the family Scrophulariaceae. In Iran, this genus is represented by *c.* 60 species (Grau 1981; Attar 2011; Ranjbar *et al.* 2017; Ranjbar & Rahchamani 2018) and the taxonomic status of some of them needs a critical revision (Ranjbar *et al.* 2016). *Scrophularia* is among the most taxonomically difficult genera of this family and some confusion has surrounded the species of this genus and also their synonyms. Previous studies showed that there are many taxonomic difficulties within genus *Scrophularia* and species delimitation by only morphological characters has not provided an acceptable phylogenetic classification. These problems are due to the presence of high polyploidy and absence of strong genetic barriers among the taxa (Carlbom 1964). The opened-pollination and different pollinators lead to high diversity and speciation in the genus. The intermediate morphological characters can be a result of the hybridization phenomenon. Some of the species show high variation in their distribution range and leaf polymorphism is clearly seen in their different populations. In recent resources (Grau 1981; Attar 2011), *S. marginata* Boiss. (1844: 72), *S. cabulica* Benth. (1846: 316) and *S. moniliformis* Pennell (1943: 54) are considered as synonyms for *S. deserti* Delile (1813: 240) that formed a complicated group. In the earlier sources (Don 1838; Bentham 1846; Boissier 1879; Stiefelhagen 1910) these species have been often reported as a separate species. So Don (1838) cited *S. deserti* in one group (by compound thyrsoid cymes with many flowers) of the section *Canina* Don. However, the other mentioned species had not been introduced at that time. Bentham (1846) cited *S. deserti*, *S. marginata* and *S. sinaica* Benth. (1846: 314) the subsection *Lucidae* Benth. (by orbiculate or reniform staminode) and *S. cabulica* in the subsection *Caninae* (Don) Benth. (by linear-lanceolate or spatulate-tridentate staminode) of the section *Tomiophyllum* Benth. But, Boissier (1879) separately cited *S. deserti* and *S. marginata* in one group (by orbiculate, semiorbiculate or reniform staminode) and *S. cabulica* in another group (by narrowly linear staminode) of the section *Tomiophyllum*. Also, *S. sinaica* was considered as synonym for *S. deserti*. Stiefelhagen (1910) cited the mentioned species, *S. deserti*, *S. marginata* and *S. cabulica,* in the subsection *Lucidae* of the section *Tomiophyllum* and synonymized *S. sinaica* for *S. deserti*.

This research aims to clarify the taxonomical and nomenclatural status of *S. deserti* and its synonyms and reviews the literature of these species. Morphological data are inferred that the studied group is a specific complex and some characters such as size, shape and margin of the leaves and shape of the staminode could be important to separate its species. Additionally, *S. deserti* and its related species, *S. marginata,* are considered as a separate section due to morphological characters such as white-margined and coriaceous leaves, large mesophyllic idioblast along with special edaphic factor.

MATERIAL AND METHODS

Morphology

The present study is based on field observations made in different regions of Iran during 2012 to 2017. Additionally, herbarium specimens of *Scrophularia* deposited at BASU and T as well as digital images of type material at B, ED, FL, FMUH, FR, G, HBG, JE, K, LE, M, MPU, MSB, P, PH and NYBG herbaria were examined. In addition, the important taxonomic characters were determined to separate these species and scored their values.

Anatomy

In order to investigate stem indumentum, leaf stomata and blade structure in two available species, i.e., *Scrophularia deserti* and *S. marginata*, segments of stems and leaves from dried specimens were used. For study of stem indumentum, pieces of stem were preserved in a mixture of water-glycerine-ethanol (1:1:1) for two weeks. Then, they were washed with distilled water and transversal sections were prepared by manual cutting. The sections were cleared with dilute sodium hypochlorite and acetic acid. Then, they were stained with methylene blue and carmine solutions. Then, they were inspected by using an Olympus BX-51 photomicroscope at different magnifications and photographed using an Olympus camera.

For study of leaf stomata, mature leaves were chosen and boiled in water. The epidermal tissues were separated by scalpel. Then, these parts were cleared with dilute sodium hypochlorite and after, being washed with distilled water, stained with methylene blue. Then, they were inspected as described above.

For study of blade structure, the basal leaves were separated and preserved in a mixture of water-glycerine-ethanol (1:1:1) for a week. Then, transversal sections from ⅓ medial of the leaves were prepared by manual cutting. The sections were cleared with dilute sodium hypochlorite and acetic acid and stained with methylene blue and Bismarck brown. Then, they were inspected as described above.

RESULTS AND DISCUSSION

In previous molecular phylogenetic studies on the genus *Scrophularia*, *S. deserti* was generally placed within the clade including different species such as *S. xanthoglossa* Boiss., *S. canina* L., *S. syriaca* Benth., *S. libanotica* Boiss., *S. leucoclada* Bunge, *S. striata* Boiss., *S. lucida* M.Bieb., etc. (Navarro-Perez *et al.* 2013; Scheunert & Heubl 2014). This status is partly matched with the morphological groups. *Scrophularia deserti* with white-margined and coriaceous leaves and large mesophyllic idioblast could be treated as a separate taxon. In the mentioned studies, the synonym taxa for the species have been investigated under the name of *S. deserti*. While *S. marginata* is resurrected as a valid species and *S. sinaica*, *S. moniliformis* and *S. kotschyi* are accepted as the synonyms for *S. deserti* here. Therefore, *Scrophularia* sect. *Albomarginatae*, sect. nov. consisting of *S. deserti* and *S. marginata* is proposed as a segregate section. In addition, previous anatomical studies indicated that thick leaves and large mesophyllic idioblasts are special characters in these taxa (Lersten & Curtis 1997; Bayat & Attar 2016).

TAXONOMY

Scrophularia sect. *Albomarginatae* Ranjbar & Rahchamani, sect. nov.

Perennial herb, 20-55 cm tall, ascending to erect, at the base woody. Stems numerous, glabrous or with very sparsely short glandular hairs. Leaves thick, coriaceous, undulate, white-margined, glabrous or with very sparsely short glandular hairs on both surfaces, sessile to petiolate, venation pinnate. Basal leaves whorled, orbiculate to ovate to elliptic, obtuse, crenate to dentate, 5-40 × 5-50 mm. Cauline leaves alternate to opposite sometimes with lateral branches, ovate to obovate to elliptic, obtuse to acute, dentate to lobed to parted, 10-75 × 5-30 mm. Inflorescence bracteate, paniculate, cymous dichasium, many-flowered. Bracts to 5 mm long, bracteoles to 2 mm long, linear to lanceolate, entire, acute, with white mucro, glabrous or with very sparsely short glandular hairs. Peduncle 5-15 mm long, pedicel 1-3 mm long, glabrous or with very sparsely short glandular hairs. Calyx with a narrow white margin, glabrous or with very sparsely short glandular hairs. Corolla 4-5 mm long, ventricose, lobes unequal, purple when fresh, purple to red in dried status, glabrous. Stamens fertile, exserted, with loosely glandular points, anthers red to purple. Staminode rhomboid to orbiculate. Ovary globose to ovoid, glabrous. Style terminal, filiform, glabrous. Capsule globose to ovoid, mucronate, light brown, glabrous. Seeds ovate to triangular, dark brown to black.

TYPUS. — *Scrophularia deserti* Delile.

ETYMOLOGY. — The specific epithet "*Albomarginatae*" formed from the Latin words *albus* (white) and *marginatus* (margined), refers to the white band of margin that is characteristic of this section.

CHROMOSOME NUMBERS. — Karyological studies on the species reported the chromosome number $2n = 2x = 26$ (Snogerup 1985; Mohamed 1997). The basic number $x = 13$ was also already known for other species of the section.

KEY TO THE SPECIES OF *SCROPHULARIA* SECT. *ALBOMARGINATAE* RANJBAR & RAHCHAMANI, SECT. NOV.

1. Stem dark green to gray, purple at the base; cauline leaves 10-75 × 5-30 mm, dentate to lobed to parted; petioles to 50 mm long; staminode rhomboid ..... *S. deserti* Delile
— Stem light green to light brown, whitish at the base; cauline leaves 10-30 × 5-10 mm, crenate to dentate; petioles to 15 mm long; staminode orbiculate ..... *S. marginata* Boiss.

1. ***Scrophularia deserti*** Delile (Figs 1; 2)

In Description de l'Égypte, Histoire naturelle: 240 (1813). — Typus: **Egypt**. Vallée de l'Égarement, *s.d.*, *Delile s.n.* (holo-, MPU[MPU007068]!; iso-, P[P03414797]!).

S. sinaica Benth., *Prodromus Systematis Naturalis Regni Vegetabilis* 10: 314 (1846) (Fig. 3). — Typus: **Egypt**. 1836, *Aucher-Eloy s.n.*; Gleylé ou Zeret Arab., Désert du Sinaï, VI.1832, *Bové 73*, lectotype and isolectotype here designated (lecto-, G-DC[G00672007, G00672020]; isolecto-, G[G00418253]!, K[K001096260, K001096261]!, P[P03411959 at left, P03411964]!), HBG[HBG512037!]).

S. moniliformis Pennell, *Scrophulariaceae of the Western Himalayas*: 54 (1943) (Fig. 4). — Typus: **Pakistan**. Kacha Garhi, near Peshawar, northwestern India, 25.V.1928, *Qazilbash s.n.* (holo-, PH[PH00022890]!).

S. kotschyi Boiss., *in exsiccata*, **syn. nov.** — Typus: **Iran**. In arenosis ins. Korgo in Sinu Persico, 17.II.1942, *Kotschy s.n.*, lectotype and isolectotype here designated, (lecto-, K[K001096310]!; isolecto-, P[P03411947, P03411948, P03411950, P03411971 at right]!, FI[FI009675]!, K[K001096311]!, [K001096312]!).

PHENOLOGY. — Flowering and fruiting from March to July.

CONSERVATION STATUS. — Based on GeoCAT tool (Bachman *et al.* 2011), the extent of occurrence (EOO) of *Scrophularia deserti* is estimated to 3 745 503.646 km². This species is known from about 60 disjunctive populations, representing about 32 different localities. The widespread taxon could be categorized as Least Concern (LC) according to IUCN Red List criteria (IUCN 2012).

OTHER SPECIMENS EXAMINED. — **Afghanistan**. Nimroz, Strasse nach Chakhansur, 14 km SW Dilaram am der Khashrod, 780 m, 18.IV.1972, *Anders 8504* (KU020142!). — Farah, Dasht-e Dilaram N von Dilaram, 850 m, 20.IV.1972, *Anders 8549* (KU020141!). Kandahar, Halbwüste, 8 km E Keshkenakhud an der Straße, nach 980 m, 22.IV.1977, *Podlech 28926* (KU020146!). — Kandahar, 45 km W black, semidesertic hills, 2 km N of mainroad, 1000-1250 m, 20.V.1967, *Freitag 798* (KU020144!). — Spin Boldak, 10 km NE Dasht-I Wat Thana, 1400 m, 10.IV.1967, *Toncev 2150* (KU020143!). — Helmand, Hills near Shorab, about 45 km NW Girishk, 850 m, 16.IV.1968, *Freitag 2413a* (KU020145!).
Iran. Fars: Lar to Khonj, 27 km to Khonj, 24.III.2012, *Ranjbar 31143* (BASU!); 28 km from Darab to Bandar Abbas, 30.IV.2014, *Ranjbar 35503* (BASU!). — Ilam: Malekshahi to Meymeh and Darehshahr, 10 km after Malekshahi, 1371 m, 4.V.2017, *Ranjbar 40523* (BASU!). — Kermanshah: Sumar to Gilan-e Gharb, Sar Hal, Vijenan, 895 m, 19.IV.2014, *Ranjbar 35414* (BASU!); 5 km from Taze Abad to Azgaleh, 1200 m, 17.IV.2014, *Ranjbar 35473* (BASU!); 10 km to Taze Abad, 1320 m, 23.IV.2013, *Ranjbar 33392* (BASU!); Paveh, Nosud 719 m, 2015, *Ranjbar & Rahchamani 37611* (BASU!); Taze Abad to Javanrud, above the neck, 15 km to Javanrud, 1255 m, 6.V.2017, *Ranjbar 41143* (BASU!); Taze Abad to Javanrud, 35 km to Javanrud, 1126 m, 6.V.2017, *Ranjbar 40547* (BASU!); Khorasan-e Jonubi: Ferdows, nearby mountains, 3.IV.1991, *Gholami 24586* (T!); E Birjand, Between Fork and Asad Abad, 1400 m, 19.IV.1999, *Faghihnia & Zangooi 32054* (FMUH!). — Khuzestan: 5 km Haftkel to Ramhormoz, 168 m, 12.IV.2017, *Ranjbar 40078* (BASU!). — Lorestan: Bolouran, 33°33'22"N, 47°18'01"E, 1337 m, 26.IV.2015, *Ranjbar 37615* (BASU!); Near Bolouran, 65 km to Babazeyd, 1370 m, 1.V.2013, *Ranjbar 33781* (BASU!); 40 km to Kuhdasht, 1350 m, 25.IV.2013, *Ranjbar 59226* (BASU!). — Khorramabad: Chashm divan, 1000 m, 20.V.1999, Veiskarami 24148 (TUH!). — Markazi: 30 km from Nobaran to Tafresh, second crossroad, 1434 m, 26.V.2012, *Ranjbar 31322* (BASU!). — Sistan and Baluchestan: Bampour to Bazman, 50 km to Bazman, 1200 m, 10.IV.1998, *Ghahreman, Attar & Sheikh 21540* (TUH!). — Pr. Sser-tschah Persiae mediae orientalis, III.1859, *Bunge s.n.* (P03553855!).
Kuwait. 28°32'53"N, 48°23'04"E, 2.V.2012, *Abdullah s.n.* (ED00640324!); Wadi Al-Batin, 12 km N Al-Salmi border station with Saudi Arabia, carbonaceous sandstone, 280 m, 17.IV.1990, *Boulos & Cope 17668* (ED00655194!). — Al-Subiyah: facing Bubyan Island, coarse maritime sand near the Gulf shore, 29°35'N, 48°05'E, 0-5 m, 21.III.1985, *Boulos 15515* (ED00655196!). —

Fig. 1. — *Scrophularia deserti* Delile: **A**, habit; **B**, basal and cauline leaves; **C**, **D**, flower in front and side views; **E**, basal leaves (Kermanshah: Tazeh Abad to Javanrud, 15 km to Javanrud, 1255 m, 6.V.2017, *Ranjbar 41143*, BASU, Photographed by M. Ranjbar). Scale bars: A, B, 2 cm; C, D, 1 mm; E, 1 cm.

Fig. 2. — Holotype of *Scrophularia deserti* Delile (*Delile s.n.*, MPU007068).

Fig. 3. — Lectotype of *Scrophularia sinaica* Benth. (*Aucher-Eloy s.n.* and *Bové 73*, G-DC[G00672020]).

FIG. 4. — Holotype of *Scrophularia moniliformis* Pennell (*Qazilbash s.n.*, PH00022890).

Table 1. — Morphological comparison of *Scrophularia deserti* Delile and S. marginata Boiss.

Character	*Scrophularia deserti*	*Scrophularia marginata*
Stem color	dark green to gray, purple at the base	light green to light brown, whitish at the base
Basal leaves size	5-40 × 5-50 mm	5-20 × 5-15 mm
Basal leaves margin	crenate to dentate, 5-7 teeth	crenate to dentate, 7-9 teeth
Basal leaves petiole	to 30 mm	to 10 mm
Caulin leaves size	10-75 × 5-30 mm	10-30 × 5-10 mm
Caulin leaves shape	obovate to elliptic	ovate to elliptic to lanceolate
Caulin leaves margin	dentate to lobed to parted	crenate to dentate
Caulin leaves petiole	to 50 mm	to 15 mm
Leaves color	dark green with purple petiole	light green with whitish petiole
Staminode shape	rhomboid	orbiculate

Al Jahra: Sabiyah, 1.III.1981, *Armer 84* (ED00655203!); Al-Zout Mira Saud, 6.IV.1981, *Armer 149* (ED00655204!).
Oman. Musandam: approx. 1644 km from Khasab on road to Diba, 25°00'N, 56°00'E, 15.III.1994, *McLeish 3713* (ED00128527!); Musandam: Side wadi off wadi Khabb, North of Dibba, 28.IV.1989, *Western 1024* (ED00655192!); not specified, 16.III.1994, *McLeish 3843* (ED00100888!).
Pakistan. Kacha Garhi, Peshawar, IV.1937, *Nath 15834* (NY02684287!); Kacha Garhi, Peshawar, V.1929, *Stewart 10176* (NY02684288!).
Palestina. Jericho, in declivitatibus aridis ad Ain-i-Sultan et Wadi-Kilt, 200 m, 30.III.1897, *Bornmüller 216* (JE00010889!).
Saudi Arabia. Itarah-Harad: 5 km west of Sitarah, on Haradh road, 9.IV.1992, *Collenette 8140* (ED00540095!). — Al Bahah: near Al Bahah, on the Aqiq road, 13.III.1982, *Collenette 3388* (ED00655197!). — Al Qasim: Jebel al Asmar, 100 km south west of Buraydah on the road to Medina, 12.II.1980, *Collenette 1779* (ED00655202!). — Al Riyad: Riyadh, III.1978, *Chaudhary s.n.* (ED00655201!).
United Arab Emirates. Fundort: Dubai, felsiges Milieu des Jebel Hofir, Zwischen stark verwitterter Kalk und Kalksandstein, 500-800 m, 11.III.1986, *Müller-Hohenstein 86128* (ED00655195!). — Al Fujayrah: Fujairah Emirate: 5 km northeast of Uwaynat, along the highway to Dibba, 2.III.1986, *Boulos & Al-Hasan 15931* (ED00655191!). — Ra's Al Khaymah: North slope of Jebel Quwah. Ruus al Jibal, 5.V.1988, *Western 1124* (ED00655193!).

Description

Perennial herb, 20-55 cm tall, ascending to erect, at the base woody. Stems numerous, dark green to gray, purple at the base, approximately quadrangular, glabrous to very sparsely short glandular hairs. Basal leaves whorled, dark green, brown to purplish when dry, thick, coriaceous, white margined, glabrous to very sparsely short glandular hairs on both surfaces, orbiculate to ovate to elliptic, obtuse, 5-40 × 5-50 mm, sessile to petiolate, petiole to 30 mm long, venation pinnate, prominent and purple in base, undulate, crenate to dentate, with 5-7 teeth in one side; to 1 mm long, angle of teeth 60-80°, obtuse, apical and basal sides of tooth convex. Cauline leaves alternate to opposite sometimes with lateral branches, dark green, thick, coriaceous, white margined, glabrous or with very sparsely short glandular hairs on both surfaces, obovate to elliptic, obtuse to acute, 10-75 × 5-30 mm, sessile to petiolate, petiole to 50 mm long, venation pinnate, prominent and green to approximately purple in base, undulate, dentate to lobed to parted, with 4-5 teeth or part in one side; to 1-5 mm long, angle of teeth 30-80°, obtuse to acute, apical side of tooth convex, basal side of tooth convex to straight. Inflorescence 15-20 cm long, bracteate, paniculate, cymous dichasium, many-flowered. Bracts lanceolate, entire, acute, to 5 mm long, green, with white mucro, glabrous to very sparsely short glandular hairs. Bracteoles linear to lanceolate, entire, acute, to 2 mm long, green, with white mucro, glabrous or with very sparsely short glandular hairs. Peduncle 10-15 mm long, pedicel 1-3 mm long, glabrous or with very sparsely short glandular hairs. Calyx 1.5-2 × 2.5-3 mm, sepals equal, broadly ovate, obtuse, ⅓ corolla length or shorter, green, with narrowly white margin to 0.2 mm wide, glabrous or with very sparsely short glandular hairs. Corolla 4-5 × 4.5-5.5 mm, ventricose, lobes unequal, upper lobe 1-1.5 mm larger, obtuse, purple when fresh, purple to red in dried status, glabrous. Stamens 4, fertile, exserted, 4-4.5 mm long, filaments white, with loosely glandular points, anthers red to purple. Staminode rhomboid. Ovary globose to ovoid, 1.5-2 × 1.5-2 mm, glabrous. Style terminal, filiform, 4.5-5 mm long, glabrous. Capsule globose to ovoid, 4-5 × 4-5 mm, mucronate, mucro 0.5 mm long, light brown, glabrous. Seeds ovate to triangular, 1-2.2 × 0.5-1.2 mm, dark brown to black.

Typification notes

Delile (1813: 240) described *S. deserti* based on a specimen collected from Egypt, "Vallée de l'Égarement" without the herbarium number. This species is detected at ED, FR, JE, MPU and P herbaria. The MPU specimen combined with handwriting, which is apparently belonging to the author's species. It seems that this specimen (MPU007068) should be original material of this species. Since the specimens matching to original description were not found in other herbaria, then MPU specimen can be automatically considered as the holotype for *S. deserti*.

Additionally, Bentham (1846: 314) introduced *S. sinaica* based on the specimens of Aucher-Eloy, Schimper and Bové from Egypt. This species was considered as synonym for *S. deserti* by Boissier (1879), but later Grau (1981) was cited it as a separate species in *Flora Iranica.* By examining the specimens from different herbaria, it seems that this species has no significant differences with *S. deserti* and should be considered as a correct synonym for the mentioned species. However, this synonym species needs a typification. This species is tracked at HBG, K, LE, M and W herbaria. Since the type specimen is not selected in the original description, the mentioned specimens are considered as syntypes and the lectotype should be designed from them. The K specimens collected by Bové with herbarium number 73 could be the original material. These sheets have the number of the species "65" in the *Prodromus Systematis Naturalis Regni Vegetabilis* (Bentham 1846) account written on them by Bentham. Additionally, the epithet "*sinaica*" is likely written on the sheets

by Bentham himself (K00109660) and (K00109661). So the specimens are certainly original material. But these specimens are not perfect to select the lectotype and the leaf characteristics are unclear in them. Furthermore, Bentham has undoubtedly examined the specimens of G-DC herbarium and they are the original material, too. So, these specimens are preferred to others for the typification. There is the mix sheet of two plant pieces which are collected by Aucher-Eloy and Bové (G00672007 and G00672020). Since "v.s." in the protologue means that author had seen dried specimens of this plant and mentioned no specific herbarium, and as the also mentioned specimen in G-DC herbarium (G00672007 and G00672020) is a complete sheet consistent with the original description, it is selected as lectotype for *S. sinaica*.

Also, *S. moniliformis* was introduced by Pennell (1943) from Pakistan, but synonymized with *S. deserti* by Grau (1981). Since this species is not found in Iran and the observed specimens are few, final decision about its status is difficult and needs further studies. However, it seems that this symonymy might be correct. Then, the type specimen is cited in original description based on Qazilbash specimen in ANSP (PH herbarium). Since type specimen is selected in protologue and there is only one specimen in PH herbarium matched with mentioned information, so this sheet (PH00022890) is automatically considered as holotype for *S. moniliformis*. The other specimens are detected in NY herbarium, which definitely is regarded as paratypes of this species.

Among the observed specimens of *S. deserti*, there are three collections in FL, K and P herbaria that are labeled with the name *S. kotschyi* Boiss. based on Kotschy specimens with herbarium number 16 from "In arenosis ins. Korgo in Sinu Persico". In *Flora Orientalis*, these specimens are cited for *S. deserti*. It seems that at first Boissier named these specimens as *S. kotschyi,* but he did not publish it as a new species and identified it under the name of *S. deserti*. Additionally, this name is not in IPNI and The Plant List site. However, *S. kotschyi* has not the effective publication, but since it was written for some of the specimens of *S. deserti*, so this name should be considered as a new synonym for *S. deserti*.

2. ***Scrophularia marginata*** Boiss.
(Figs 5; 6)

In Diagnoses Plantarum Orientalium novarum, ser. 1, 4: 72 (1844). — Typus: **Iran**. Hamedan, Alvand (Elwend) mountain, *Aucher-Eloy 2898,* lectotype and isolectotype here designated (lecto-, G-DC[G00673693]!; isolecto-, G-BOIS[G00334025]!).

PHENOLOGY. — Flowering and fruiting from April to July.

CONSERVATION STATUS. — Based on GeoCAT tool (Bachman *et al.* 2011), the extent of occurrence (EOO) of *Scrophularia marginata* is estimated to 1 113.575 km². This species is known from about 20 disjunctive populations, representing about nine different localities. The relatively limited taxon could be categorized as Endangered (EN) according to IUCN Red List criteria (IUCN 2012).

OTHER SPECIMENS EXAMINED. — **Iran**. Hamedan: Alvand mountain, s.d., *Ranjbar et al. 757* (BASU!); Alvand mountain, s.d., *Ranjbar 758* (BASU!); Alvand mountain, Heydareh, 28.V.2013, *Ranjbar 33745* (BASU!); Tuyserkan, 6.V.2016, *Ranjbar & Rahchamani 59063* (BASU!); Malayer, Lolohar village, 21.V.1998, *Kulivand 655* (BASU!); Hamedan to Asad Abad, 20 km before Asad Abad, 1979 m, 20.VI.2011, *Ranjbar 29242* (BASU!). 20 km to Songhor from Asad Abad, 1904 m, 29.V.2012, *Ranjbar 29608* (BASU!); Darreh Morad Beyg, 34°75'20"N, 48°50'74"E, 2130 m, 29.III.2014, *Ranjbar 36940* (BASU!); Sarkan, 21.V.1988, *Cheraghali 962* (BASU!); Varkaneh, 2230 m, 34°40'34"N, 48°37'10"E, *Nuri 59227* (BASU!). **Kurdistan**. In montibus calcareis Avroman et Schahu, VI-VII.1867, *Haussknecht s.n.* (P03553852!, P03553853!).
Asie occidentale. 1837, *Aucher-Eloy s.n.* (P03553854!).

DESCRIPTION

Perennial herb, 30-45 cm tall, ascending to erect, at the base woody. Stems numerous, light green to light brown, whitish at the base, approximately quadrangular, glabrous or with very sparsely short glandular hairs. Basal leaves whorled, light green, brown to purple when dry, thick, coriaceous, white margined, glabrous or with very sparsely short glandular hairs on both surfaces, orbiculate to ovate to elliptic, obtuse, 5-20 × 5-15 mm, sessile to petiolate, petiole to 10 mm long, venation pinnate, prominent and light green to white in base, undulate, crenate to dentate, with 7-9 teeth in one side; to 1 mm long, angle of teeth 50-80°, obtuse, apical side of tooth convex, basal side of tooth convex. Cauline leaves opposite with lateral branches, light green, thick, coriaceous, white margined, glabrous with very sparsely short glandular hairs on both surfaces, ovate to elliptic to lanceolate, obtuse to acute, 10-30 × 5-10 mm, sessile to petiolate, petiole to 15 mm long, venation pinnate, prominent and green to approximately purple in base, undulate, crenate to dentate, with 6-11 teeth in one side; to 1 mm long, angle of teeth 50-80°, obtuse to acute, apical side of tooth convex, basal side of tooth convex to straight. Inflorescence 15-25 cm long, bracteate, paniculate, cymous dichasium, many-flowered. Bracts lanceolate, entire, acute, to 3 mm long, green, with white mucro, glabrous or with very sparsely short glandular hairs. Bracteoles linear to lanceolate, entire, acute, to 1 mm long, green, with white mucro, glabrous or with very sparsely short glandular hairs. Peduncle 5-10 mm long, pedicel 1-2 mm long, glabrous or with very sparsely short glandular hairs. Calyx 2-2.5 × 2-3 mm, sepals equal, broadly ovate, obtuse, ½ corolla length or shorter, green, with narrowly white margin to 0.2 mm, glabrous or with very sparsely short glandular hairs. Corolla 4-4.5 × 4.5-5 mm, ventricose, lobes unequal, upper lobe 1 mm larger, obtuse, purple when fresh, purple to red in dried status, glabrous. Stamens 4, fertile, exserted, 4-4.5 mm long, filaments white, with sparsely glandular points, anthers red to purple. Staminode orbiculate. Ovary globose to ovoid, 1.5-2 × 1.5-2 mm, glabrous. Style terminal, filiform, 4-5 mm long, glabrous. Capsule globose to ovoid, 4-5 × 4-5 mm, mucronate, mucro 0.5 mm long, light brown, glabrous. Seeds cylindrical to ovate to triangular, 1-1.8 × 0.5-1 mm, dark brown.

TYPIFICATION NOTES

Boissier (1844: 72) introduced *S. marginata* from collected specimens by Aucher-Eloy from Iran, Alvand [Elwend] mountain with number 2898. But it was considered as synonym for

FIG. 5. — *Scrophularia marginata* Boiss.: **A**, habit; **B**, flower; **C**, inflorescence; **D**, leaf (Hamedan: Tuyserkan, 6.V.2016, *Ranjbar & Rahchamani 59063*, BASU, Photographed by Rahchamani). Scale bars: A, 2 cm; B, 1 mm; C, 4 mm; D, 4 cm.

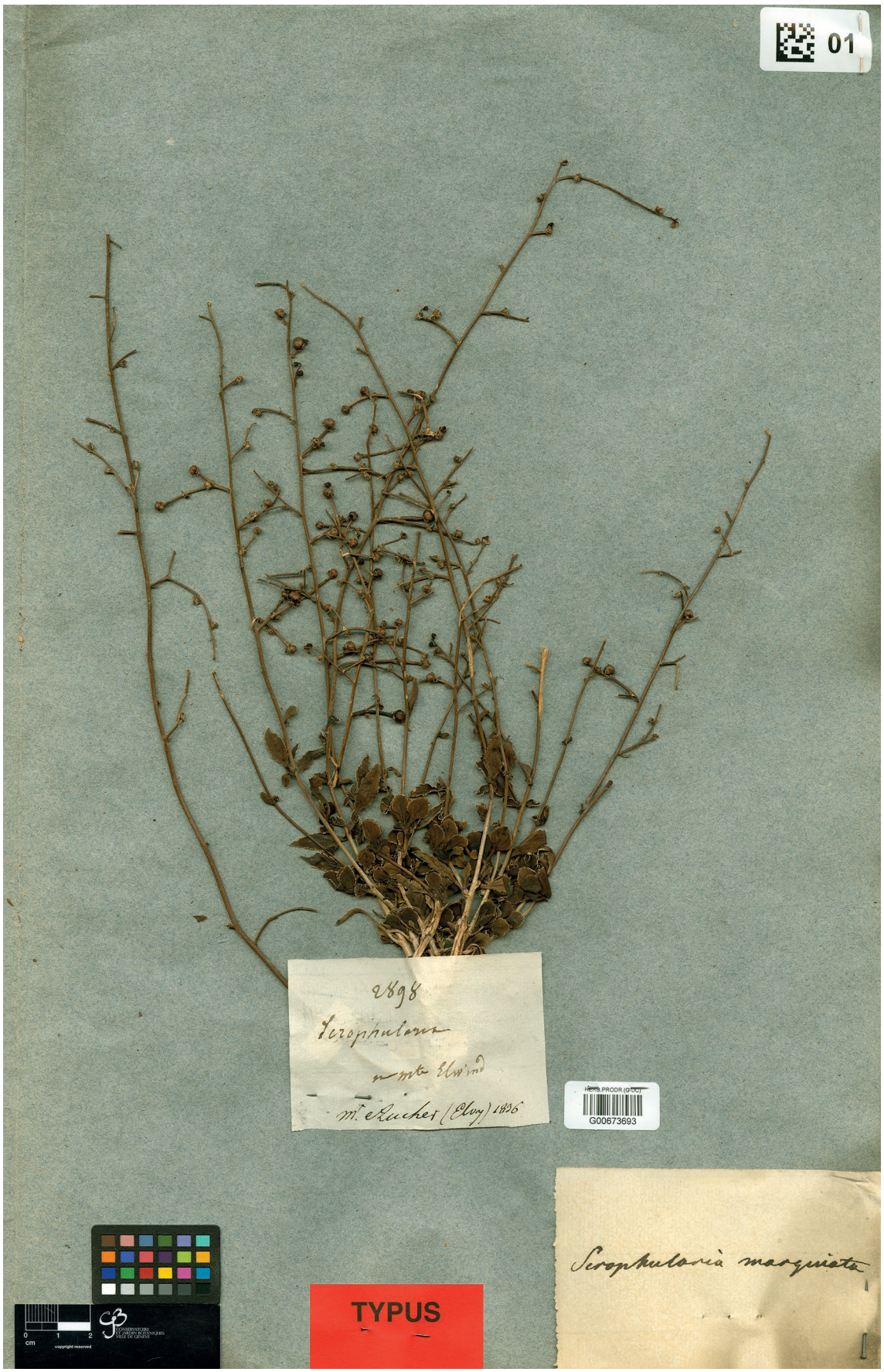

Fig. 6. — Lectotype of *Scrophularia marginata* Boiss. (*Aucher-Eloy 2898*, G-DC[G00673693]).

Fig. 7. — The base of *Scrophularia marginata* Boiss. specimens (*Aucher-Eloy 2898*): **A**, G-DC (lecto-, [G00673693]); **B**, G-BOIS (isolecto-, [G00334025]) (Photographed by Dr Gautier).

S. deserti by Grau (1981: 264). Based on the morphological studies, these species should be considered as two separated species because they differ in terms of plant color and leaf shape and margin. So *S. marginata* is resurrected as a valid species and needed to be typified. This species is tracked in G and P herbaria. There are one specimen in G-BOIS and another specimen in G-DC herbarium with the label information matching with the original description. Since this species is introduced by Boissier, the lectotype specimen should be selected from G-BOIS (G00334025), but this specimen is an incomplete sheet and the important characters, such as shape and margin in basal and cauline leaves, are not clear. It seems that G-BOIS specimens is really a branch detached from the G-DC specimen. Boissier probably didn't have this collection in his herbarium and asked his friend De Candolle for permission to remove a fragment from the specimen or alternatively, may be sent him a fragment. It is possible that Boissier has never seen De Candolle's specimen, but it is unlikely that the handwriting on the G-BOIS fragment is related to Boissier. So if De Candolle would have sent him a fragment, it would be DC's handwriting. However, we can never be sure about what happened and we have to take a pragmatic approach here (Fig. 7). Since the G-DC specimen (G00673693) is much better, so the specimen is designed as lectotype for *S. marginata*. Also, this opinion has been confirmed by G herbarium. "Generally, if a species has been described by Boissier, so its specimen in his herbarium should be as holotype. If there is another specimen, e.g. in G or G-DC, they should be considered as isotypes. However, this is a general rule and there may be some exceptions. I think you pointed out one of these exceptions. I would follow your suggestion and advise in this case to consider both specimen as syntypes and to designate the G-DC as lectotype, explaining clearly that you did not chose the G-BOIS as holotype because there is evidence that it was detached from the G-DC specimen and that you suspect that Boissier saw the specimen that was in the De Candolle herbarium, not only his fragment" (Dr Laurent Gautier pers. comm.).

Morphology

The examination of herbarium material clearly allowed to separate *Scrophularia deserti* from *S. marginata* as a distinct species. Results from morphological studies on about 60 populations of *S. deserti* and 20 populations of *S. marginata* indicated that although the white margined leaf is a character indicating the close relationship of these species, some characters such as stem color, leaves size, shape and margin, petiole length and staminode shape distinguish them well. In both species, basal leaves are approximately similar in term of size, shape and margin, but cauline leaves are clearly dentate to lobed or parted in *S. deserti* and crenate to dentate in *S. marginata*. Grau (1981: 266) believes that *S. deserti* has polymorphic leaves, forming usually undivided rosette which are strongly divergent from the cauline leaves. During fast growth in the

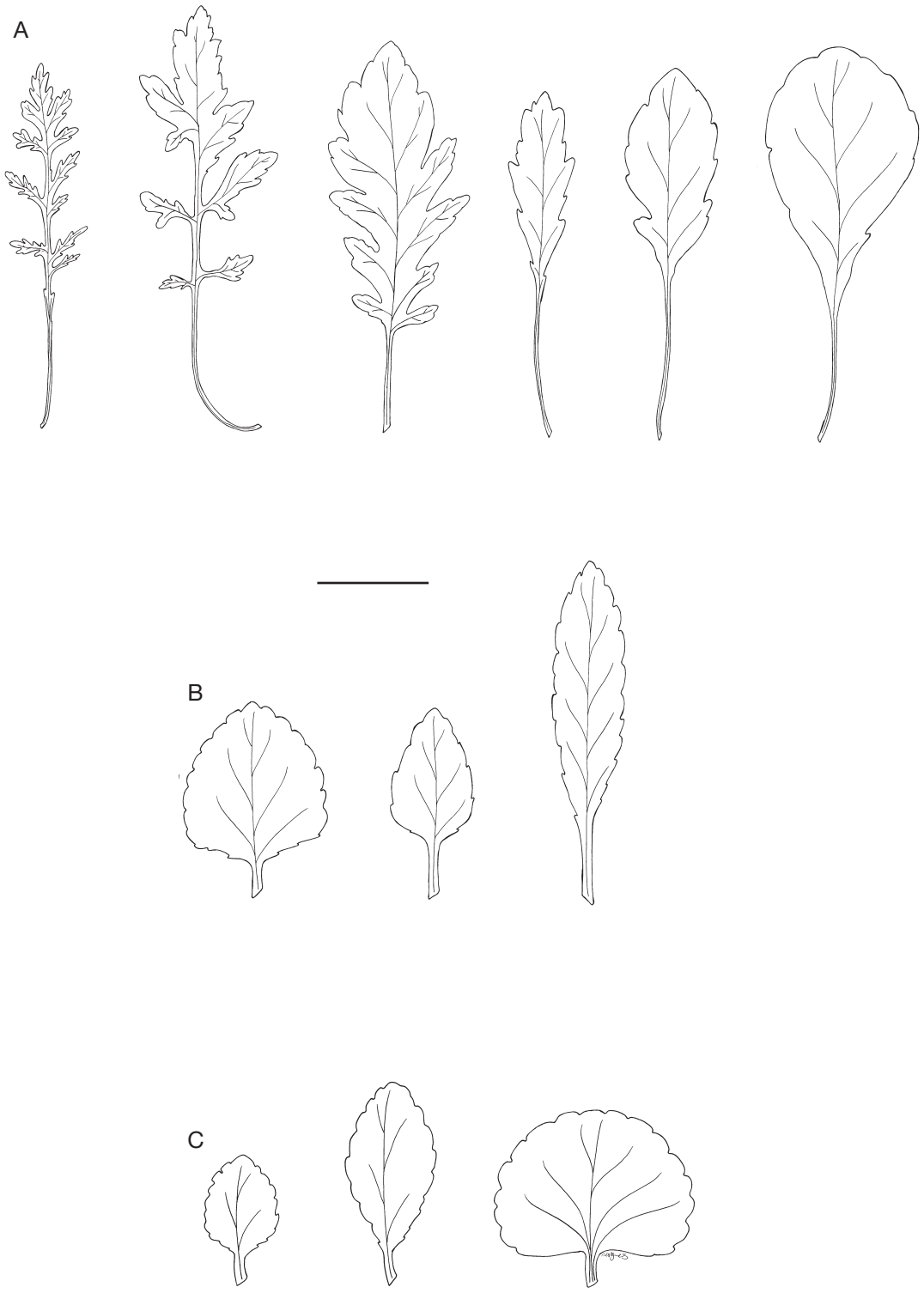

Fig. 8. — Variation of the leaf in: **A**, cauline leaves in *Scrophularia deserti* Delile; **B**, cauline leaves in *S. marginata* Boiss.; **C**, alike basal leaves in *S. deserti* and *S. marginata* (Drawn by Rahchamani). Scale bar: 1 cm.

first year, undivided leaves can be probably present also on the stem and old stems can build new shoots of leaf rosettes, which resemble to the basal leaves. So, *S. marginata* separated by Boissier, was synonymized for *S. deserti*. But, resulting from detailed studies on the numerous populations of both species, it seems that this hypothesis can be partly correct. In fact, in examining the type specimens and numerous collections from other herbaria, *S. deserti* reveals a wide variety of leaf size, shape and margin in its distribution range from Egypt to Pakistan. Leaf polymorphism is clearly seen in different populations of the species and even in an individual of a population. But *S. marginata*, with unique cauline leaves, appears in limited

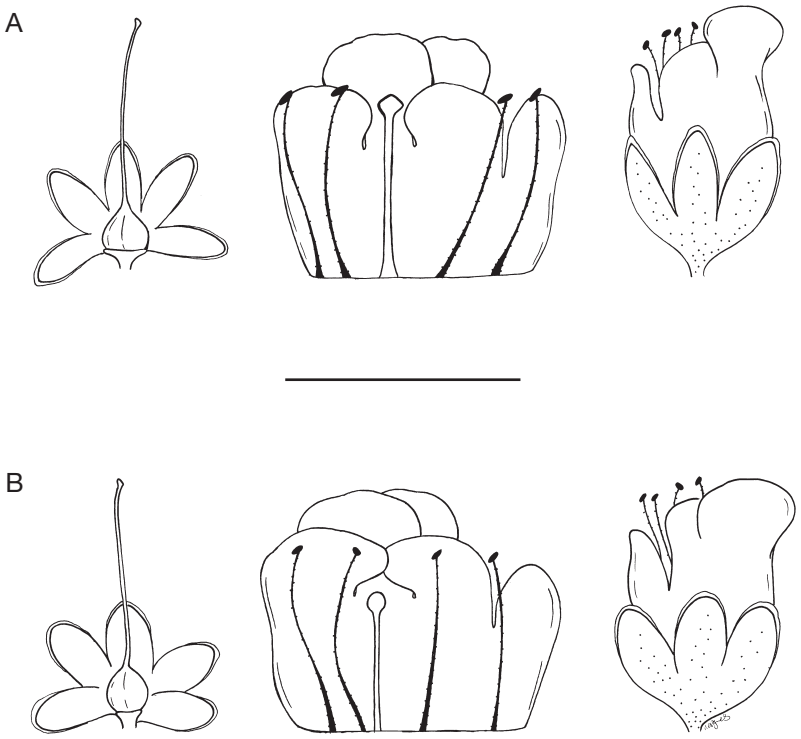

Fig. 9. — Structure of the flower in: **A**, *Scrophularia deserti* Delile; **B**, *S. marginata* Boiss., left to right: calyx, ovary, style and calyx; corolla, stamens and staminode; flower in side view (Drawn by Rahchamani). Scale bar: 5 mm.

range in Hamedan and Kurdestan provinces, Iran. Thus, the two mentioned species should be considered clearly as distinct taxa at the specific rank. About the species *S. moniliformis*, not found in Iran, final decision is difficult and needs further studies. However, it is apparently a correct synonym for *S. deserti* and it should remain in same situation. *Scrophularia sinaica* represented the symmetrical characters with *S. deserti* such as stem color, leaves size, shape and margin, white margined leaf, staminode shape, indumentum type, so despite cited as a separated species in *Flora Iranica* (Grau 1981), it is resynonymized for *S. deserti*. Additionally, *S. kotschyi* Boiss. is an unpublished name which is only written on some herbarium specimens of *S. deserti*. If these specimens are *S. deserti*, so this name should be considered as a new synonym for *S. deserti*. Table 1 provides the comparison of morphological characters between these species. Differences in leaf variation and flower structure are also illustrated in Figures 8 and 9, respectively.

Anatomy

Anatomical studies showed *Scrophularia deserti* and *S. marginata* are similar in term of indumentum, stomata type and blade features. In available references, these species are introduced by glabrous character. But more examination of many populations from the species indicated that stems and leaves are glabrous to sparsely covered with short glandular hairs (23.91-28.26 µm long), which have a sack-shaped head and short 1-cell base.

Also these species represented the anomocytic and anisocytic types of stomata on both leaf surfaces. However, the anomocytic type has the highest density (87.23%) and anisocytic type shows lower density (12.76%). In the species, shape of the guard cells is reniform and the subsidiary cells have irregular margin. The stomata are surrounded by 3, 4 and 5 subsidiary cells, which are equal or unequal in size. In leaves of *S. deserti*, the quartet subsidiary cells show the highest density (50.22%) and triplet cells (36.17%) and quintet cells (13.61%) have lower density. Likewise in leaves of *S. marginata*, the quartet subsidiary cells show the highest density (48.31%) and triplet cells (39.27%) and quintet cells (12.42%) have lower density.

In two mentioned species, blade structure is also similar. Some characters such as blade thickness, thickness of upper and lower epidermis, midrib thickness, mesophyll type and idioblast size were measured. In *S. deserti*, the blade thickness was 347.61-637.51 µm, epidermis thickness in both surfaces was 31.25-52.38 µm and midrib thickness was 261.91-338.09 µm. Mesophyll tissues were asymmetric, in which numerous and large idioblasts in forms elliptic to ovate and in size 104.76-214.28 × 71.42-95.23 µm were observed. In *S. marginata*, the blade thickness was 320.83-404.16 µm, epidermis thickness in both surfaces was 29.16-41.66 µm and midrib thickness was 213.54-325.78 µm. Mesophyll tissues were asymmetric, in which numerous and large idioblasts in forms elliptic to orbicular and in size 83.35-129.16 × 70.83-104.16 µm were observed. Details of anatomical study of stem indumentum, leaf stomata and blade structure of the studied species are illustrated in Figures 10 and 11, respectively.

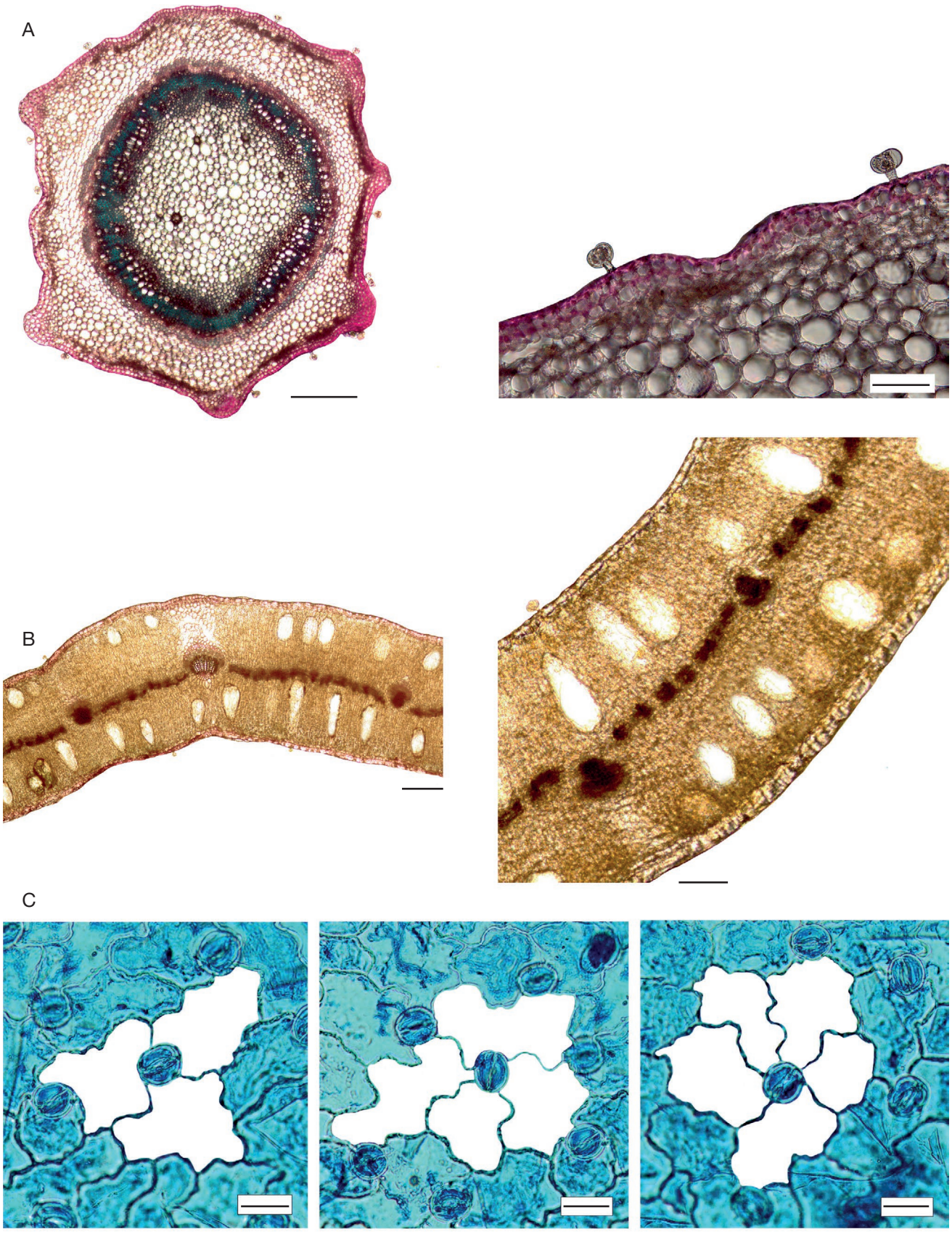

Fig. 10. — Anatomical review of *Scrophularia deserti* Delile: **A**, stem indumentum; **B**, blade structure; **C**, leaf stomata, subsidiary cells hollowed out (Kermanshah: Tazeh Abad to Javanrud, 15 km to Javanrud, 1255 m, 6.V.2017, *Ranjbar 41143*, BASU). Scale bars: A (left), B (left), 200 µm; A (right), 50 µm; B (right), 100 µm; C, 20 µm.

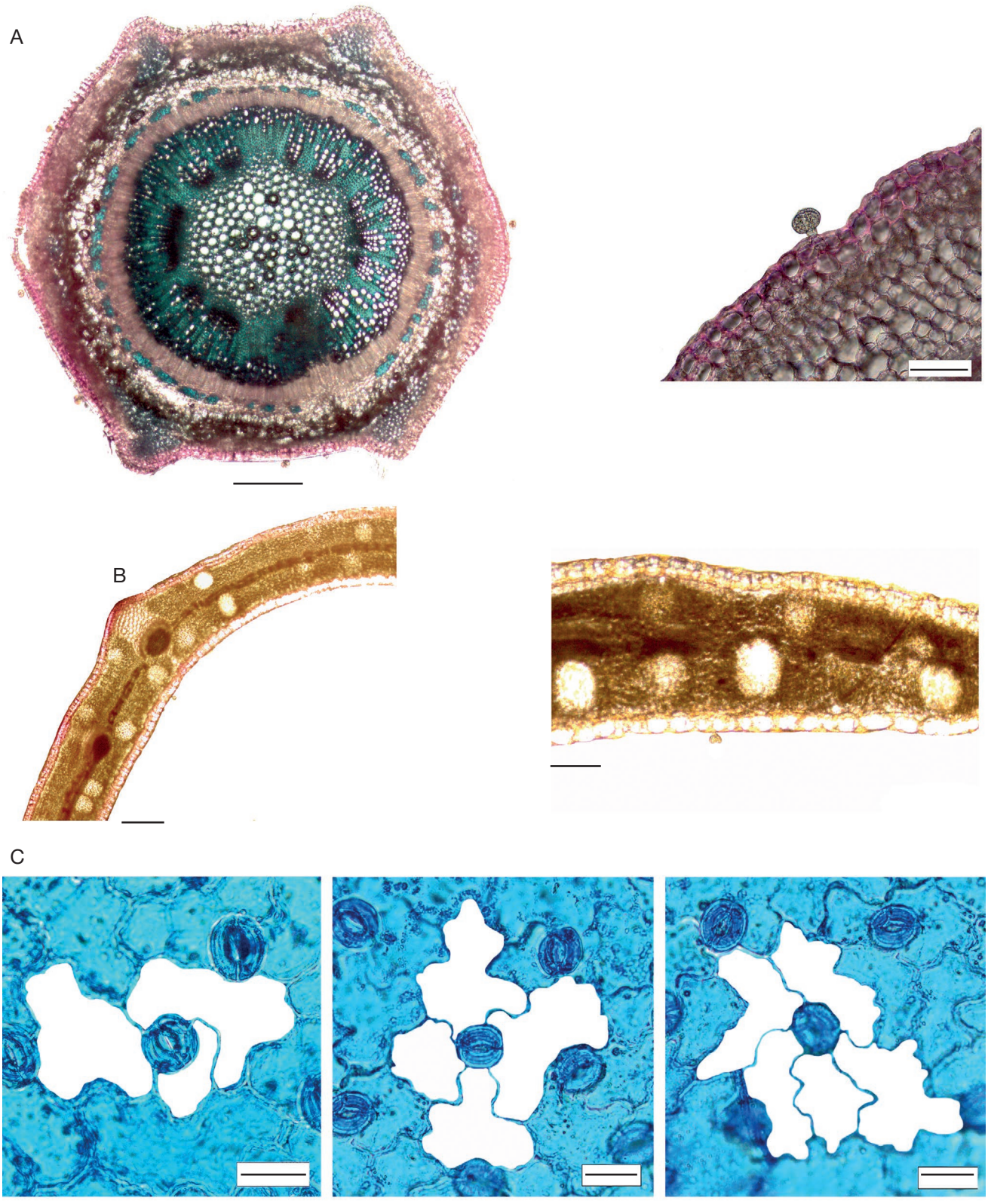

Fig. 11. — Anatomical review of *Scrophularia marginata* Boiss.: **A**, stem indumentum; **B**, blade structure; **C**, leaf stomata, subsidiary cells hollowed out (Hamedan: Tuyserkan, 6.V.2016, *Ranjbar & Rahchamani 59063*, BASU). Scale bars: A (left), B (left), 200 µm; A (right), 50 µm; B (right), 100 µm; C, 20 µm.

Distribution

The species belonging to this section are the Irano-Turanian and Saharo-Arabian elements and grow in gravelly stone habitats and sub-mountainous regions at elevation to 2500 m. The most numerous populations of the studied species are present in Asia. *Scrophularia deserti* is distributed

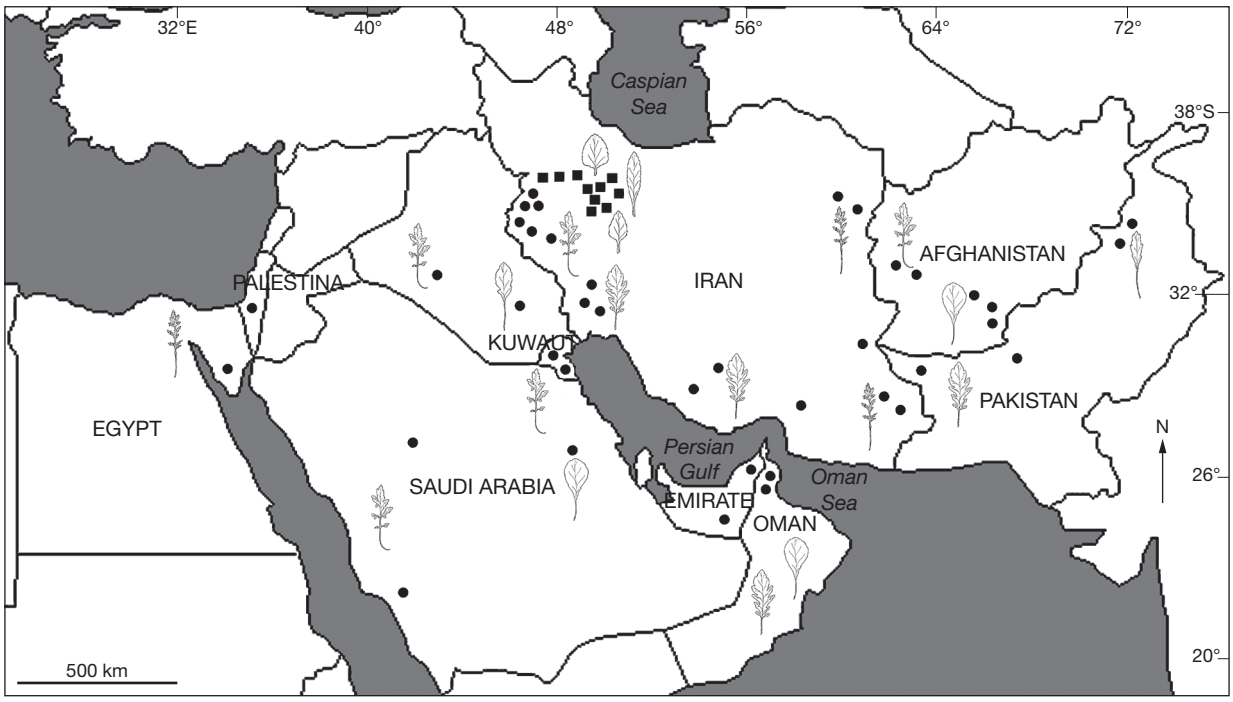

FIG. 12. — Distribution map of *Scrophularia deserti* Delile (●) and *S. marginata* Boiss. (■) (designed by Pasban).

in Afghanistan, Africa, Egypt, Iraq, Iran, Kuwait, Oman, Palestine, Pakistan, Qatar and Saudi Arabia. In Iran, it is widely collected from center, west, south and east, in Fars, Hormozgan, Kerman, Kermanshah, Khorasan-e Jonubi, Khorasan-e Razavi, Khuzestan, Kordestan, Lorestan, Markazi and Sistan and Baluchestan provinces, at elevations from 50 to 2500 m. *Scrophularia marginata* has limited distribution in Iran and is collected from west, in Hamedan and Kurdestan provinces, at elevations from 1000 to 2250 m. The distribution map of these species along with leaf variation is drawn in Figure 12.

AMENDED COMMENT

The studies on herbarium material and protologue information showed that *S. cabulica* cannot be a correct synonym for *S. deserti* and resurrected as a valid species. This species distributed in Afghanistan and Pakistan, differs in leaf size, shape and margin, calyx shape, staminode shape. In addition, the white margined leaf is not seen in this species. So, the species should be removed from the section and its complete description is presented below.

Scrophularia cabulica Benth.
(Fig. 13)

In Prodromus Systematis Naturalis Regni Vegetabilis 10: 316 (1846). — Typus: **Afghanistan**. In regno Cabulico, *Griffith 623*, lectotype and isolectotype here designated, (lecto-, P [P03412686!]; isolecto-, K[K001096273, K001096274, K001096322]!, LE[LE00017098]!, W[W0017303]!, P[P03412682, P03412684, P03412686]!).

S. elegantissima Rech.f. & Wendelbo, *Botaniska Notiser* 117: 366 (1964) (Fig. 14). — Typus: **Afghanistan**. Loman (Lomar) inter Qurabagh et Sang-I Masha, 33°15'N, 67°30'E, 2400 m, 30.VI.1962, *Rechinger 17424* (holo-, W[W19640005875!]; iso-, B[B100278243]!, ED[ED00327360]!, G[G00343799]!, K[K001096307]!, M[M0175818]!, S[S1028586]!).

PHENOLOGY. — Flowering and fruiting from April to July.

CONSERVATION STATUS. — Based on GeoCAT tool (Bachman *et al.* 2011), the extent of occurrence (EOO) of *Scrophularia cabulica* is estimated to 4968.740 km². This species is known from about seven disjunctive populations, representing about four different localities. The limited taxon could be categorized as Endangered (EN) according to IUCN Red List criteria (IUCN 2012).

OTHER SPECIMENS EXAMINED. — **Afghanistan**. Badghis, *Aitchison 491* (P0342685!); Chacar, N Sang-e Masha, 2700 m, 1.X.1973, *Anders 11189* (KU020154!); Chaharburja an der Straße von Orozgan nach Malestan, 2820 m, 29.VI.1978, *Podlech 31942* (KU20156!); Haji, 7 km to Malestan, 2800 m, 29.VI.1978, *Podlech 31971* (KU20157!); 3 km Gidergu an der Straße von Orozgan nach Malestan, 2740 m, 29.VI.1978, *Podlech 31934* (KU20588!).

DESCRIPTION

Perennial herb, 50-75 cm tall, erect, at the base woody. Stems numerous, brown to gray, light brown at the base, circular, glabrous. Lower leaves on the stem, opposite to alternate, green, glabrous, lanceolate, obtuse to acute, 20-50 × 5-10 mm, petiolate, petiole to 15 mm long, venation pinnate, prominent and green, entire to serrate, with 4-6 teeth in one side; to 0.5 mm long, angle of teeth 70-90°, obtuse to acute, apical and basal sides of tooth straight. Upper leaves on the stem, opposite to alternate, green, glabrous, lanceolate, obtuse to acute, 5-10 × 3-5 mm, sessile to petiolate, petiole to

Fig. 13. — Lectotype of *Scrophularia cabulica* Benth. (*Griffith 623*, P03412686).

Fig. 14. — Holotype of *Scrophularia elegantissima* Rech.f. & Wendelbo (*Rechinger 17424*, W19640005875).

5 mm long, venation pinnate, prominent and green, entire. Inflorescence 40-50 cm long, bracteate, paniculate, cymous dichasium, many-flowered. Bracts lanceolate, entire, acute, to 3 mm long, green, glabrous to sparsely short glandular hairs. Bracteoles linear to lanceolate, entire, acute, to 1 mm long, green, glabrous or with sparsely short glandular hairs. Peduncle 5-15 mm long, pedicel 1-2 mm long, glabrous or with sparsely glandular hairs, glabrous or with sparsely glandular hairs. Calyx 2-3.5 × 2-2.5 mm, sepals equal, broadly ovate to triangular, acute, ½ corolla length or shorter, green, with almost broadly white margin to 0.5 mm, glabrous. Corolla 4-5× 4.5-5 mm, ventricose, lobes unequal, upper lobe 1 mm larger, obtuse, yellowish when fresh, brown in dried status, glabrous. Stamens 4, fertile, exserted, 4-4.5 mm long, filaments white, sparsely glandular points, anthers yellow. Staminode linear. Ovary globose to ovoid, 1.5-2 × 1.5-2 mm, glabrous. Style terminal, filiform, 3-4 mm long, glabrous. Capsule globose, 4-4.5 × 4-5 mm, mucronate, mucro to 1 mm long, light brown, glabrous. Seeds ovate to triangular, 1.5-2 × 0.3-0.5 mm, dark brown to black.

Typification notes

Bentham (1846: 316) introduced *S. cabulica* based on the specimens of Griffith with herbarium number 623 from Afghanistan. But in *Flora Iranica* (Grau 1981) this species is cited as synonym for *S. deserti*, *S. elegantissima* Rech.f. & Wendelbo (Rechinger & Wendelbo 1964: 366) and *S. edelbergi* Rech.f. (Rechinger 1958: 103). Grau (1981: 266) believed that the type sheet at the Hookerianum herbarium is heterogenous. The left individual (K001096322) is clearly a fragment of the species described as *S. elegantissima*. The right individual (K001096321) is an old rhizome with some lateral shoots, which are possibly not completely typical. The identity of this individual cannot be unambiguously clarified and two species come into consideration, i.e., *S. deserti* or *S. edelbergii* written on the label. It seems *S. deserti* is correct because of the white margin of some right fragment. On the other hand, another sheet in Hookerianum herbarium (K001096274) has an author's handwriting and hand drawing of staminode shape, which refers to diagnostic characters of the species. Another specimen belonging to Benthamianum herbarium (K001096273) has the number of "77" in *Prodromus Systematis Naturalis Regni Vegetabilis* (Bentham 1846), which was written by Bentham. Additionally, the epithet "*cabulica*" was likely written on the sheets by Bentham himself. The specimens to describe *S. cabulica* are imperfect and its original description is also incomplete and should be amended. For example in the original description is cited "humilis", while the mentioned sheets have tall plants (50-60 cm). Hence, the name *S. cabulica* cannot be considered as synonym for several species and needs lectotypification. The original material of *S. cabulica* cited is certainly a syntype, which is represented by two specimens of *Griffith 623* in Hookerianum herbarium, both of them can be considered for lectotypification. The sheet (K001096274) is the most unambiguous one, with a single label and a single plant fragment, and a part of the description written on it by the author. These are good indications that this specimen can be preferred in lectotypification. Grau made no lectotypification of this name and only discussed the identity of one specimen mix with two fragments and neglected the other specimen. In this mix sheet of K herbarium (K001096321 and K001096322), the right specimen (K001096321) is different from the left specimen (K001096322) and also from other sheets (K001096273 and K001096274). The specimen is probably *S. deserti* and other specimens are *S. cabulica* that should be separated from each other. So, *S. cabulica* cannot be considered as synonym for *S. deserti*. *Scrophularia edelbergii* is written on the sheet of *S. cabulica* (W0017303), so this name is cited as synonym for *S. edelbergii*. However, both species are not the same and the synonymy also is not correct. The left specimen is apparently similar to two other sheets of K herbarium and also to other specimens in LE, P and W herbaria. So it should be considered as a valid species and needed a correct lectotype. The protologue cites a single syntype "*Griffith 623*" and based on labels of sheets "*Griffith 3874*" is the same gathering and therefore is also a type collection. But the protologue provides a restriction, not only citing "*Griffith 623*" but also indicating that particular specimens of this gathering were examined in "Hookerianum herbarium". For this reason the two specimens in Hookerianum herbarium are syntypes and those of other herbaria are isosyntypes. So the specimens in Hooker's collection have priority and should be designated as a lectotype. The K specimens are surely original material and good candidates for lectotype but they are incomplete and have not the diagnostic characters of the plant. On the other hand, P specimens have labels cited "Donné par Sir William Hooker, 1863" with numbers 3874, 3875 and 3876. It seems, that the specimens are the same and can be one collection. Also, the specimens are complete and exhibit the plant traits well. Since the specimens in "herb. Hook." are indicated in the protologue, the P specimen with number 3874 (P03412686) can be selected as lectotype.

Rechinger & Wendelbo (1964: 366) introduced *S. elegantissima* from Afghanistan based on the specimens collected by Rechinger. Grau (1981: 278) referred to this species and cited *S. cabulica* as its synonym. In fact, Grau (1981: 266) with regard to the mix sheet of K herbarium, proposed *S. cabulica* should be rejected. In the present research, by finding further specimens of the species in other herbaria during our research, *S. cabulica* is considered as a valid species. Additionally, it seems that Grau's diagnosis is correct to equate the two mentioned species. But based on priority principle, *S. cabulica* is an earlier name and *S. elegantissima* is considered as its synonym. In original description of *S. elegantissima*, authors selected W specimen (W19640005875) as holotype for the species and then there is no problem in its typification.

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