

Nomenclatural and taxonomic notes on some *Stachys* taxa (Lamiaceae)

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Abstract: *Stachys glechomifolia* (Lamiaceae), previously included under *S. mardinensis* as a synonym, is resurrected in this work based on extensive field and herbarium studies. In addition to its distribution in Turkey, *S. mardinensis* has firstly been recorded from Iran. Furthermore, the lectotypes of *S. fragillima*, *S. graveolens*, and *S. kurdica* var. *brevidens* are designated in this study. An expanded description and distribution map of *S. glechomifolia*, and some taxonomic notes on *S. graveolens*, *S. fragillima*, *S. mardinensis*, and *S. nephrophylla* are also reported.

Key words: Iran, Iraq, Labiatae, lectotypification, *Stachys*, taxonomy, Turkey

1. Introduction

Stachys L., with an almost subcosmopolitan distribution, consists of approximately 370 species (435 taxa) and it is also one of the biggest genera in the family Lamiaceae¹ (Harley et al., 2004). The genus is widely distributed in the Mediterranean region and south-western Asia, and less concentrated in North and South America; it extends into southern Africa, but is entirely absent from Australia and New Zealand (Bhattacharjee, 1973). The majority of these species grow in forests, rocky places, and on limestone. The genus is composed of annual and perennial herbs, and also small shrubs (Bhattacharjee, 1980).

In Turkey, *Stachys* is the largest genus in the family based on the taxa number, with 115 taxa and 89 species, 60 (52.1%) of these taxa are endemic to Turkey. The genus is widely distributed in the country, although more diverse in warm temperate locations of Mediterranean region (Bhattacharjee, 1982). In the first comprehensive taxonomic study on the genus in Turkey, Bhattacharjee (1982) reported 72 species (81 taxa). Recently, some works have been published regarding taxa and species numbers on the genus from Turkey: e.g., Akçiçek (2012) (89 species, 111 taxa), Güner and Akçiçek (2015) (91 species, 117 taxa), Akçiçek et al. (2016) (91 species, 118 taxa), Celep and Dirmenci (2017) (90 species, 118 taxa), Karaismailoğlu and Güner (2020) (90 species, 118 taxa), and finally Akçiçek (2020) (87 species, 113 taxa).

Section *Fragilicaulis* R. Bhattacharjee, belonging to the subg. *Stachys*, includes 30 taxa worldwide. These species are mostly distributed in Turkey, northern Iraq, and western Iran (Bhattacharjee, 1980; Güner, 2016; Karaismailoğlu and Güner, 2019). Most of these species prefer to grow at the mouth of limestone caves, on sloping limestone crevices, and steep screes, but a small number grow on damp rocks by waterfalls. All of the taxa are the same type of perennials and are fragile stem at the base. In Turkey, the section consists of 22 taxa and is divided into two subsections: sect. *Fragiles* Rechinger and sect. *Multibracteolatae* R. Bhattacharjee (Bhattacharjee, 1982; Davis et al., 1988). In addition, with the species described in this work, Turkey is now home to 23 species belonging to sect. *Fragilicaulis*, 17 of which are endemic.

In 1910, František Nábělek collected some interesting *Stachys* specimens from Çığlı (Haşitha) Village, in the province of Hakkari in the eastern Anatolia (Turkey). Subsequently, these specimens were described as belonging to a new species, namely *S. glechomifolia* Nábělek. This species was distinguished from the morphologically similar species *S. fragillima* Bornmüller (Nábělek, 1926). In Flora of Turkey, Bhattacharjee (1982) included *S. glechomifolia* as a synonym of *S. mardinensis* (Post) R. R. Mill and reported that *S. mardinensis* was only known from Turkey and northern Iraq.

Based on herbarium specimens and field studies, it was observed that the morphological characters of *S.*

¹ Govaerts R (2018). World checklist of selected plant families. The Board of Trustees of the Royal Botanic Gardens, Kew [online]. Website <http://apps.kew.org/wcsp/home.do> [accessed 01 October 2020].

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glechomifolia and *S. mardinensis* were different from one another, and therefore we paid particular attention on these species to clarify their taxonomic status. On the other hand, this study also focuses on typification of some species of *Stachys* sect. *Fragilicaulis* growing in southern Turkey. Several names of this section have been typified by Salmaki et al. (2012). In the present paper, we designate three lectotypes for the names *S. fragillima*, *S. graveolens* and *S. kurdica* var. *brevidens* (subsect. *Multibracteolatae*), to contribute to the stability of the nomenclature of these three names.

2. Materials and methods

The present research is based on field work and the thorough examination of herbarium specimens [ANK, BEI, BM, E, G, GAZI, HBG, ISTE, ISTO, JE, K, KNYA, LD, MO, P, PH, SAV, TBI, W; acronyms according to Thiers², especially those specimens collected by František Nábělek (at SAV). The holotype of *S. glechomifolia* was thoroughly examined. In addition, Tatiana Miháliková (Institute of Botany, Bratislava, Slovakia) provided detailed measurements and high resolution photographs of *S. glechomifolia* specimens. The herbarium specimens were compared with the relevant literature, such as Flora of Turkey (Bhattacharjee, 1982; Davis et al., 1988; Duman, 2000), Flora Iranica (Rechinger, 1982) and Flora Orientalis (Boissier, 1879).

Specimens of *S. mardinensis* were collected from their natural habitats in the provinces of Siirt, Batman and Mardin in the Southeastern Anatolia region of Turkey. *Stachys glechomifolia* specimens were compared with the morphologically similar species *S. mardinensis*, *S. nephrophylla* and *S. fragillima*.

Syntypes of some *Stachys* were cross-checked with the keys presented in Flora Orientalis (Boissier, 1879), Flora of Turkey and East Aegean Islands (Bhattacharjee, 1982), Flora Iranica (Rechinger, 1982) and especially the protologues of the corresponding names. In addition, high resolution photographs of *S. graveolens* specimens were provided by SAV (Bratislava, Slovakia). The designation of the corresponding types is based on the consultation of original material and the literature cited in the respective protologues. This nomenclatural act is necessary for a correct application of these names in this taxonomically difficult group.

3. Results

3.1. Resurrection

Stachys glechomifolia Nábělek (Figure 1).

Type: TURKEY. C9 Hakkari: mons Choarra–Sia prope pagum Hašitha dit. Gulamerik, in fissuris rupium calcar,

² Thiers B (2017) onward (continuously updated). Index Herbariorum: A global directory of public herbaria and associated staff [online]. Website <http://sweetgum.nybg.org/ih/> [accessed 15 October 2018].

1500 m, 16 June 1910, Nábělek 1551 (holotype SAV [barcode SAV0002394!, isotype (fragments) E!]).

Description: Suffrutescent perennial herbs. Flowering stems numerous, 6.5–13 cm long, slender, fragile, simple or sparingly branched from base, covered with glandular hairs mixed with villous hairs up to 1 mm long. Sterile stems few, slender, filiform, 5 cm long. Cauline leaves usually semiorbicular to orbicular, 16–17 × 16–22 mm, margin coarsely crenate, apex rounded to obtuse, cordate at base, densely villous on both sides, subsericeous; petiole 3–6 mm long, uppermost sessile. Floral leaves similar to cauline leaves but smaller, 7.6–15 × 4.7–13 mm, as long as calyx or slightly longer, uppermost abruptly cuneate at base, apex acute. Sterile stem leaves minute, suborbicular, base cordate, obsolete crenate or subentire, long petiolate. Verticillasters 2–4 flowered, the lower subremote, the upper 3–4 approximate. Bracteoles narrowly oblong-lanceolate, 4–7 × 0.3–0.6 mm, about as long as calyx tube, short acuminate, acute, long attenuate at base, covered by long stipitate glandular hairs and hirsute. Pedicels 1.3–3 mm long. Calyx subbilabiate, subcampanulate, 8–8.5 mm long, prominently 5-nerved, hairs patent and unequal, with glandular hairs mixed with hirsute, mouth without a ring of hairs; teeth ± equal, triangular-lanceolate, erect to subpatent, c. 1/2 of the tube length, 2–4.5 mm long, muticous. Corolla yellowish, 17–20 mm long, tube exceeding the calyx, twice as long as calyx, annulate; limb bilabiate, upper lip hirsute outside, cucullate, truncate, ca. 3 mm long, shorter than lower lip; the lower 3-lobed, middle lobe larger than 2 lateral lobes, middle lobe retuse, crenulate, ca. 3–6 mm long, lateral lobes rotundate, subretuse. Style not exceeding the upper lip, apex subequally bifid into subulate stigmas. Stamens 4, included in corolla. Nutlets obovate, trigonous, compressed, punctulate, dark brown, 2.5 × 1–1.5 mm (Figure 2).

Phenology: Flowering time: June; fruiting time: June–July.

Habitat and ecology: The species grows on calcareous rocky slopes and at ca. 1400–1500 m in Turkey. The type locality of this species is close to the Iraqi border.

Distribution and conservation status: Endemic to Turkey and it is distributed in the province of Hakkari in eastern Anatolia. The species grows at altitudes of 1400–1500 m and is represented by only one population in the region of Hakkari. The species is only known from the type locality, which has an estimated area of apparently less than 5 km² and the number of individuals is approximately 100 [CR: B2ab (i, ii, iii); C2a (ii)]. Its habitat is near the military area, which is protected, although there are some threats, such as overgrazing, road construction, and rock



Figure 1. Holotype of *Stachys glechomifolia* (SAV, barcode SAV0002394) (image by courtesy of the herbarium SAV, reproduced with permission).

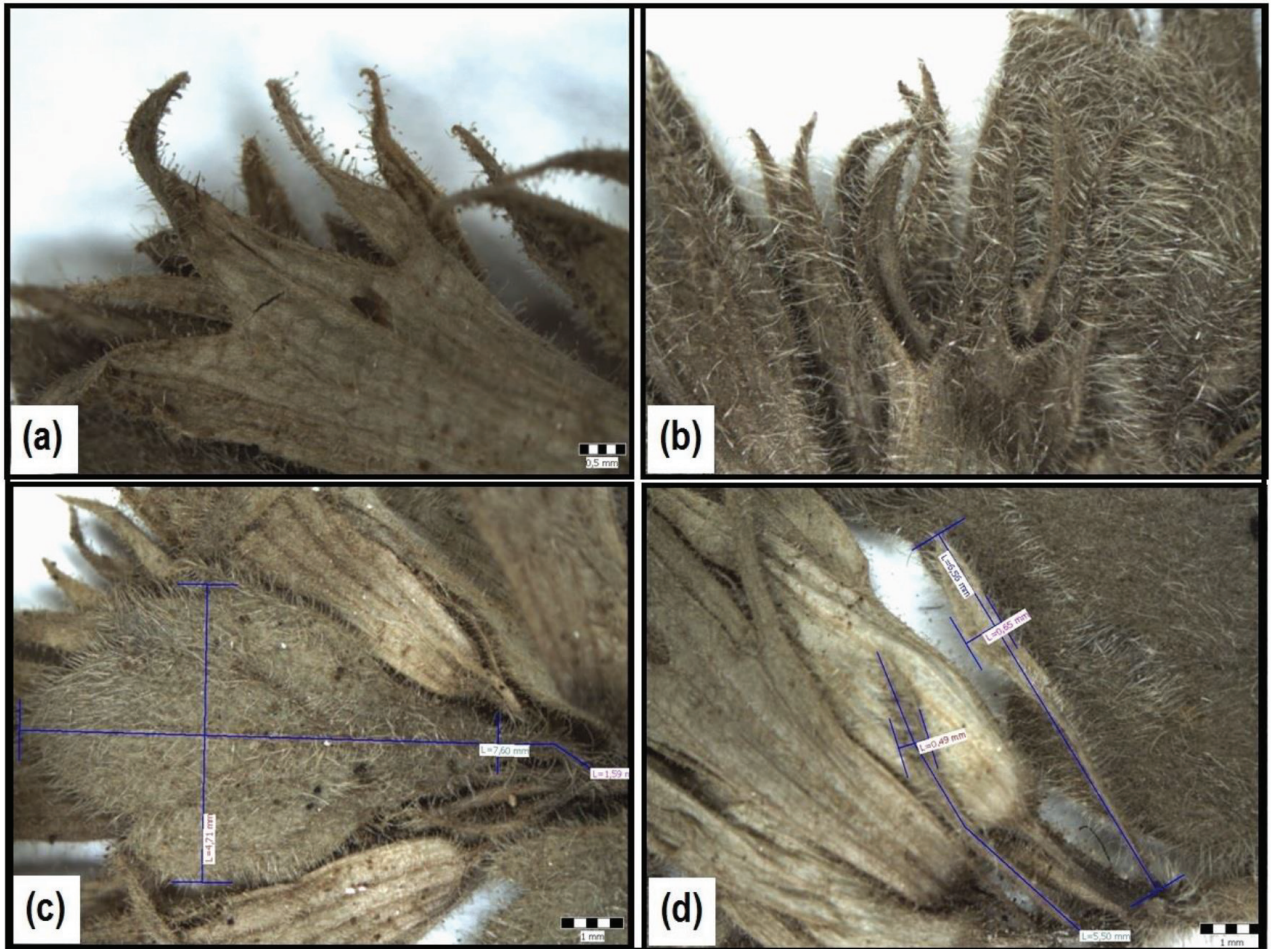


Figure 2. Images of some parts of *Stachys glechomifolia* in stereo microscope. (a) shape of calyx teeth, (b) calyx indumentum, (c) floral leaves, (d) bracteoles and pedicels.

extraction. Therefore, *S. glechomifolia* should be classified as critically endangered (CR)³.

Identification key for *Stachys glechomifolia* within the subsection *Multibracteolatae*

- 1. Bracteoles absent or inconspicuous, when present less than 1/2 length of calyx tube, usually setaceous
..... *S. kurdica*
- 1. Bracteoles conspicuous, at least outer ones 1/2 as long as or longer than calyx tube linear-lanceolate, herbaceous
- 2. Flowering stems 6–35 cm, verticillasters lower 1–2 remote, upper approximate
- 3. Stem sparsely and retrorsely pilose with eglandular hairs and subsessile glands *S. megalodonta*
- 3. Stem densely and patently pilose with large eglandular and shorter glandular hairs
- 4. Cauline leaves 3.4–5 × 2–3 cm; verticillasters congested into a dense ± globose head *S. brantii*

4. Cauline leaves 0.5–3 × 0.4–2.8 cm; verticillasters distinct

5. Flowering stems 5–15 cm, cauline leaves semi-orbicular to orbicular, corolla 12–17 mm *S. glechomifolia*

5. Flowering stems 10–40 cm, cauline leaves usually broadly ovate, corolla 10–15 *S. mardinensis*

2. Flowering stems 35–80 cm, verticillasters remote, 3–7 cm distant *S. viscosa*

3.2. A new record

Stachys mardinensis (Post) R. R. Mill (Figure 3).
≡ *Nepeta mardinensis* Post (1899: 159) [basionym]

Type: Turkey, Collines près de Mardin, July 1896, G. Post 75 [holotype BEI!, isotype G (barcode G00435919)!].

The Iranian specimens of these species does not differ morphologically from those already known from Turkey (for a comprehensive description of Iranian *S. mardinensis*, Bhattacharjee 1982).

³ IUCN Species Survival Commission (2017). IUCN Red List categories and criteria. Version 13 [online]. Website <http://www.iucnredlist.org/documents/RedListGuidelines.pdf> [accessed 30 October 2018].



Figure 3. Herbarium specimen of *Stachys mardinensis* from Iran (K). (image by courtesy of the herbarium K, reproduced with permission).

Phenology: Flowering time: May; fruiting time: May–June.

Locality of *Stachys mardinensis* from Iran: Iran, SE of Karind, heavy reddish clay among oak scrub on N. facing limestone hillside, 1520 m, 15 May 1966, J.C. Archibald 1926 (K!).

Habitat and ecology: The species grows only in the southeast of Karind on limestone hillsides at ca. 1520 m in Iran.

Stachys mardinensis grows in the southeast of Turkey and northwest of Iran. It grows on sloping limestone rocks in both countries. The species has more diverse

bigger populations on sloping limestone rocks than other habitats such as cliff crevices and igneous cliffs in Turkey. Although *S. mardinensis* is distributed in many localities in Turkey, it grows in a single locality in Iran. It shares habitat with *Campanula mardinensis* Bornm. & Sint., *Salvia hasankeyfense* Dirmenci, Celep & O. Guner, *Thymbra spicata* L., and *Origanum vulgare* L. in Turkey.

3.3. Nomenclatural notes

3.3.1. *Stachys fragillima* Bornm.

Lectotype (designated here): [Iraq] Kurdistania (Assyria orient.): in montis Kuh-Sefin (ditionis Erbil) regione superior; in fissuris parietium verticalibus, alt. 1200–1500 m. s. m.; *J. Bornmüller* 1666, 16. V. 1893 [exsiccata: “J. Bornmüller: Iter Persico-turcicum 1892–93. Number 1666] [W (barcode W18950001630)!] (Figure 4).

Isolectotypes: BM (barcode BM000950472)!, G (barcodes G00435872, G00435873, G00435874)!, HBG (barcode HBG518124)!, P (barcodes P00743633, P00743634, P00743635)!, PH (barcode PH00027426)!, MO (barcode MO149717)!, JE (barcodes JE00002240; JE00002239)!, E (barcode E00319627)!, K (barcode K000928772)!, TBI (barcode TBI1025472)!.

The protologue includes a complete description of this species followed by several comments and diagnosis in German, and a gathering includes in the section named “*Assyria orientalis* (Kurdistania)”, indicated as: “Erbil, Dschebel-Sefin, in parietibus verticalibus faucium supra pagum Schaklava, alt. 11–1200 m. s. m.; legi VI. 1893 (Bornm. iter Persico-turcicum, 1892–93, exs. Number 1666, 1666b).” (Bornmüller, 1899).

There are some Bornmüller’s specimens from the exsiccata numbered 1666 at several herbaria: e.g., at BM (specimen with barcode BM000950472), G (with barcodes G00435872, G00435873 and G00435874), HBG (with barcode HBG518124), P (barcodes P00743633, P00743634 and P00743635), PH (barcode PH00027426), MO (barcode MO149717), JE (barcodes JE00002239, JE00002240), E (barcode E00319627), K (barcode K000928772), TBI (barcode TBI1025472), W (number W18950001630). In all herbarium sheets, the material is well preserved and the plants are well developed and complete, with leaves and flowers. All the specimens are labeled with the same printed label belonging to the exsiccata “J. Bornmüller: Iter Persico-turcicum 1892–93”, with the number 1666, and all the specimen were collected on 16 May 1893 by J. Bornmüller.

All the data included in the label match with the data published in the protologue. However, the collection date is different. In this sense, we have not found any herbarium sheet labeled with the date collection indicated in the protologue (i.e. “legi VI. 1893”), and therefore it seems that there is an “error” in the protologue or in the label. The Art. 9.12 of the ICN indicates the preference of the syntypes

in the lectotype designation front uncited specimens and cited and uncited illustrations that comprise the remaining original material, if such exist (Turland et al., 2018). However, in our opinion, and due to the commented “error”, all the mentioned specimens should be treated as part of the gathering cited in the protologue, and therefore could be treated as syntypes according to Art. 9.6 and Art. 40. Note 1 of ICN.

In conclusion, all the specimens are in good state of preservation and correspond with the traditional and current concept and use of the name *S. fragillima*. Thus, we designate as the lectotype of the name *S. fragillima* the specimen preserved at JE, with barcode JE00002240.

3.3.2. *Stachys graveolens* Nábelek

Lectotype (designated here): Kurdistania Assyr. [Assyria]: ad pagum Mâr Jakub supra pagum Simel ad septentr. Ab ube Mossul, in fissuris rupium calcar., *Fr. Nábelek* 1507, 27. VI. 1910 [exsiccata: “Fr. Nábelek, Iter Turcico-Persicum 1909–10. Number 1507], SAV (barcode SAV0002386)! (Figure 5).

Isolectotypes: SAV (barcodes SAV0002387, SAV0002388, SAV0002389)!.

The protologue includes a complete description in Latin followed by a diagnosis front (Nábelek, 1926). The protologue also includes an image, cited as “[Tab. VII, fig. 3, pag. 63, fig. 19]” and three gatherings (syntypes): “Crescit in Kurdistania Turcica (Assyria): ad pagum Mâr Jakub supra pagum Simel ad septentr. Ab oppido Môsul, in fissuris rupium calcar. alt. ca. 900 m. Legi 27. VI. 1910 (No. 1507). Ad urbem Sêrt, in rupibus calcar. in fauce fluv. Bochtan, alt. ca. 800 m. 12. VII. 1910 (No. 1581). Ad pagum Chandúk inter Hassan Kef (Hisn Keifa) et Sêrt, in fissuris rupium calcar. alt. ca. 500 m, forma *congesta*. 12. VII. 1910 (No. 1580)”.

In the protologue of this species an infraspecific taxon “*forman aut vix varietatem congestam*” was also included followed by a description and an illustration of this plant “[Table III, Figure 5]”. In addition, Nábelek (1926) identified in the protologue that the gathering No. 1580 belonging to this taxon.

The illustrations cited in the protologue of *S. graveolens* “Table VII, Figure 3, page 63, Figure 19” and *S. graveolens* f. *congesta* “Table III, Figure 5” can be treated as original material and therefore eligible for the lectotype of the respective names. However, as in the protologue was cited three gathering, in the lectotype selection, the specimens that make these gatherings (syntypes according Art. 9.6) have preference according to Art. 9.12.

The herbarium collection of František Nábelek’s Iter Turcico-Persicum was first deposited in the herbarium of the Masaryk University in Brno (currently Czech Republic, BRNU) at the time of Nábelek’s professorship at this University, and after Nábelek left the Slovak (now

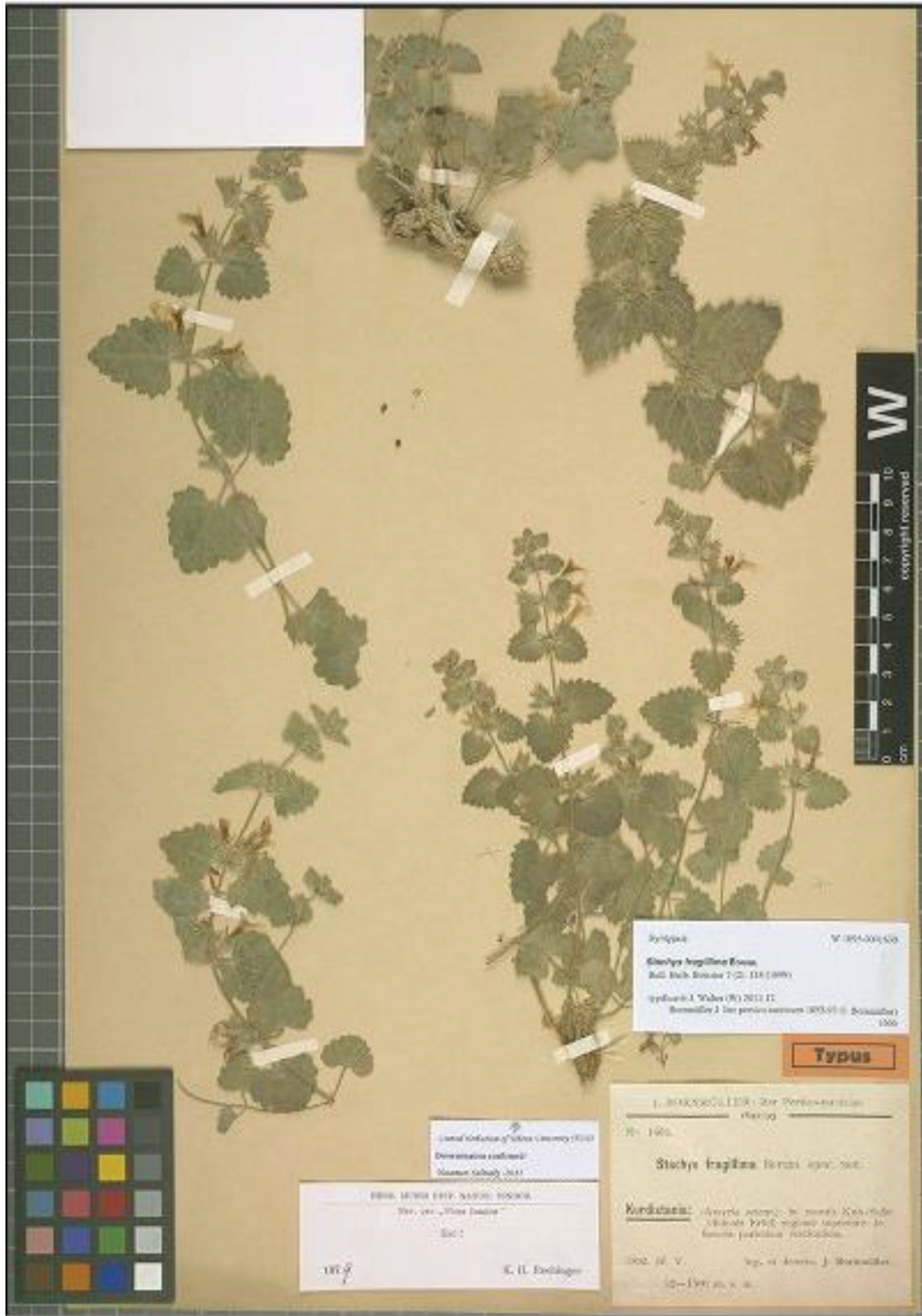


Figure 4. Lectotype of *Stachys fragillima*, W (W18950001630) (image by courtesy of the herbarium W, reproduced with permission).

Comenius) University, the herbarium was first kept in Arboretum Mlyňany, Slovakia (MLY), then at the Institute of Botany of the Slovak Academy of Sciences, Bratislava (acronym originally BAV, now SAV). The final place of

deposit of this collection is the herbarium SAV (Kempa et al., 2016)⁴.

In SAV, we found several herbarium sheets belonging to the three gathering or exsiccata mentioned in the

⁴ Slovak Academy of Sciences Institute of Botany (2021). Herbarium [online]. Website www.nabelek.sav.sk [accessed 00 Month Year].



Figure 5. Lectotype of *Stachys graveolens*, SAV (SAV0002386) (image by courtesy of the herbarium SAW, reproduced with permission).

protologue. However, all the specimens belonging to the exsiccata numbered 1581 (see e.g., barcodes SAV0002170 and SAV0002171) and 1580 (see e.g., barcode SAV0002169) can be identified as belonging to *S. mardinensis* (Post) R.R.Mill. We have not found any herbarium sheet of this specimen preserved in other herbaria (e.g., B, E, W or WU) where there is some fragments and duplicates of the Nábělek's Iter Turcico-Persicum herbarium (Staffleu & Cowan, 1981; Kempa et al., 2016).

On the other hand, the specimens (syntypes) belonging to the exsiccata No. 1507 (e.g., barcodes SAV0002386, SAV0002387, SAV0002388, and SAV0002389) can be identified as *S. graveolens*. All the sheets bear plants well developed and complete, with leaves and flowers, and correspond with the traditional and current concept and use of the name *S. graveolens*. Thus, we designate the specimen with barcode SAV0002386 as the lectotype.

3.3.3. *Stachys kurdica* Boiss. & Hohen. var. *brevidens* Bornm. ex Bhattacharjee

Lectotype (designated here): Kurdistania, Riwandous (ad fines Pers.) in m. Sakri-Sakran, monte reg. alpine., *J. Bornmüller* 1670, 23. VI. 1893, 2200 m.s.m. (exsiccata: "J. Bornmüller: Iter Persico-turcicum 1892–93. Number 1670), LD (barcode LD1059398)! (Figure 6).

Isolectotypes: JE (barcode JE00003654)! probable isolectotype, K (barcode K000928683)!.

Bhattacharjee (1974) indicated the type of *Stachys kurdica* var. *brevidens* as "Type: [N Iraq] Kurdistania: Riwandous (ad fines Pers.) in m. Sakri Sakran, 2200 m, 23 vi 1893, *Bornmüller* 1670 (K, LD). The name is validly published because a single gathering is cited (see ICN Art. 40.2, Ex. 3) though two different specimens (K, LD) were listed. Despite mentioning duplicate specimens (syntypes) Art. 40.7 (Turland et al., 2018) does not apply, since the publication date is before January 1, 1990.

The herbarium sheet at LD (acc. no. 1059398) bears a specimen, with leaves and flowers, and an original printed label belonging to the exsiccata mentioned in the prologue by Bhattacharjee (1974: 283) "J. Bornmüller: Iter Persico-turcicum 1892–93 / N° 1670 / *Stachys kurdica* Boiss. & Hoh. / Kurdistania: Riwandous (ad fines Pers.) in m. Sakri-Sakran, monte reg. alpine. / 1893.23.vi / leg. et det. J. Bornmüller/2200 m.s.m.".

In the herbarium at K there is a specimen of this species belonging to the exsiccata "J. Bornmüller: Iter Persico-turcicum 1892–93" (K, barcode K000928683). This sheet bears two fragments plant and the same printed label as the sheet at LD. However, the number of the exsiccata is 1669 and not 1670. We have not found any herbarium sheet at K with material of *S. kurdica* var. *brevidens* labeled with the exsiccata number 1670.

In lectotype designation, the syntypes have preference among the uncited specimens (Turland et al., Art. 9.12).

In this sense, we have found a specimen belonging to the Bornmüller's exsiccata numbered as 1670 (JE, barcode JE00003654) that is part of the gathering cited in the protologue, and therefore can be treated as isosyntytype (ICN Art. 9.4 footnote). In this sense, although the specimen K000928683 has a different exsiccata number, it could be treated as an isosyntytype, because it was collected in the same place, by the same collector and date that the specimens mentioned in the protologue.

In conclusion, we designate as the lectotype of *S. kurdica* var. *brevidens* the specimen LD, acc. no. 1059398. The specimen match with the traditional and current concept and usage of the name. In a comprehensive study on *S. kurdica* that grows in Turkey, because the infraspecific taxa of *S. kurdica* (var. *kurdica* and var. *brevidens*) share the same habitats in Hakkari province in Turkey, these taxa were accepted as a variety (Güner et al., 2019).

4. Discussion

Stachys glechomifolia, morphologically similar to *S. mardinensis* and *S. fragillima*, belongs to the sect. *Fragilicaulis*. *Stachys glechomifolia* is also superficially similar to *S. nephrophylla*. These four species are suffrutescent, with woody rootstock, and grow on rocky crevices. Their flowering stems are fragile at the stem base. Several morphological features of *S. glechomifolia* are used to discriminate between *S. mardinensis* and *S. fragillima* (Table 1), and help to shed further light into its taxonomic status. *Stachys glechomifolia* is also ecologically isolated from the other species. *Stachys glechomifolia* differs from *S. mardinensis* by its short flowering stem, semiorbicular cauline leaves, long calyx, long corolla and corolla tube long-exserted from calyx. The calyx and corolla length of *S. glechomifolia* is 6–10 mm and 17–20 mm, but the calyx and corolla length of *S. mardinensis* is 7–14 mm and 12–15 mm, respectively (Figure 7, Table 1). In the protologue, Nábělek distinguished *S. glechomifolia* from *S. fragillima*, which is an endemic species to Iraq, by its approximately 13 cm long flowering stems, short petiole, cauline leaves margin coarsely crenate, and calyx about 1/3 as long as the corolla (Nábělek, 1926).

Stachys glechomifolia distribution remains restricted to Turkey. Some *Stachys* specimens were collected from Iraq in 1957 (W) and annotated as *S. glechomifolia* were later identified by Rechinger as new species named *S. nephrophylla* (Rechinger 1980). Therefore, *S. glechomifolia* is an endemic species known only from its type locality in Turkey.

Stachys longiflora Boiss. & Balansa, *S. pinardii* Boiss., and *S. pseudopinardii* R. Bhattacharjee & Hub.-Mor., which belong to sect. *Fragilicaulis* and grow in the Mediterranean region (Bhattacharjee, 1982), are other species resembling *S. glechomifolia*. These four species have long corolla that exceeds calyx.

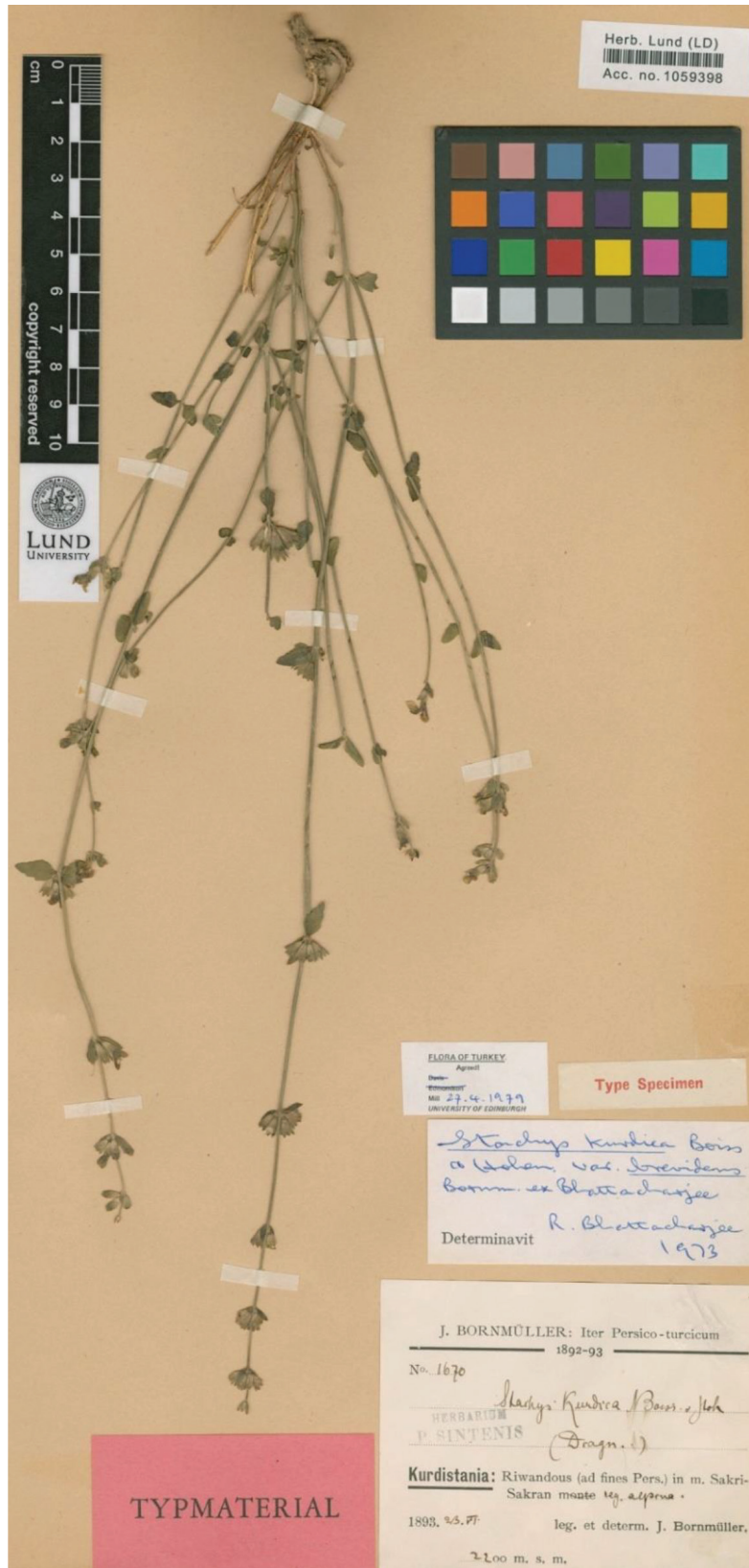


Figure 6. Lectotype of *Stachys kurdica* var. *brevidens*, LD (LD1059398) (image by courtesy of the herbarium LD, reproduced with permission).

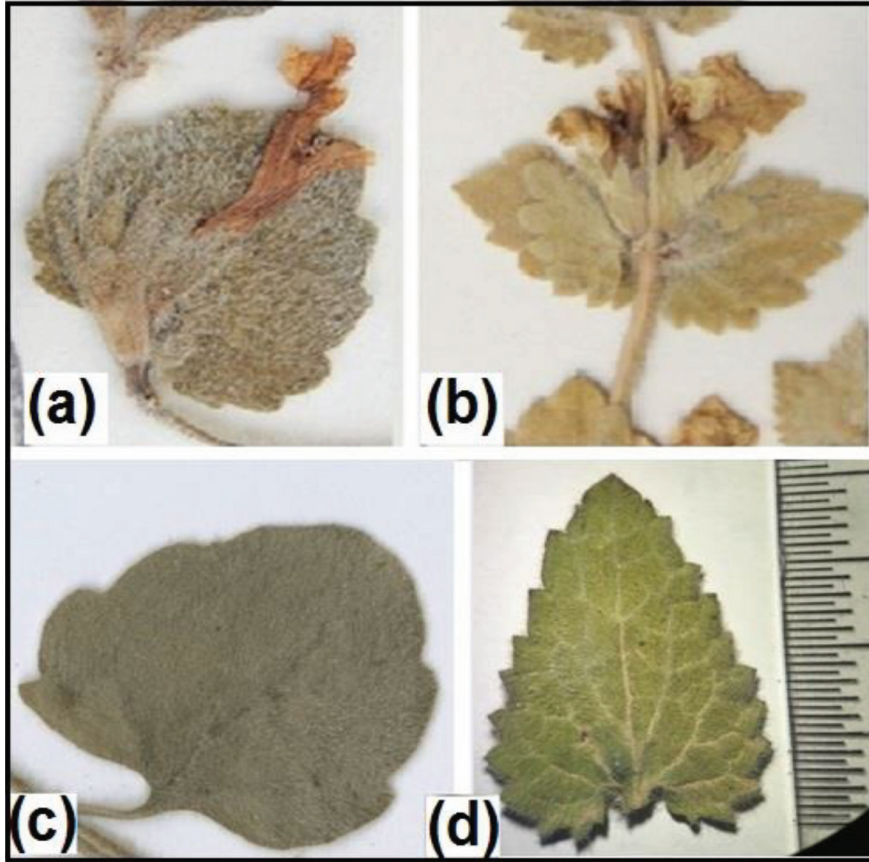


Figure 7. Morphological comparison between *Stachys glechomifolia* (a, c) and *S. mardinensis* (b, d). Verticillasters with floral leaves (a, b) and cauline leaves (c, d).

Table 1. Detailed morphological comparison of *Stachys glechomifolia* and *S. mardinensis*.

Features	<i>S. glechomifolia</i>	<i>S. mardinensis</i>
Flowering stems	6.5–13 cm long, covered with glandular hairs mixed with vilose pubescence	10–25(–35) cm long, covered with long eglandular and short glandular hairs and usually densely and patently pilose
Cauline leaves	usually semiorbicular to orbicular	usually ovate, sometimes ovate to broadly ovate
Floral leaves	petiolate (1 mm long)	subsessile to sessile
Verticillasters	2–4 flowered, the lower sub-remote, the upper 3–4, approximate	(2–)4–8 flowered, usually remote throughout, rarely uppermost approximate
Calyx	8–8.5 mm long	5–10 mm long
Calyx teeth	± equal, c. 1/2 × of corolla tube length	subequal, 1/2(–1) × corolla tube length
Corolla	17–20 mm long, tube markedly exceeding the calyx, twice as long as calyx	10–15 mm long, tube slightly exceeding the calyx
Nutlets	obovate–trigonous	trigonous

According to Bhattacharjee (1982), it is stated that *S. mardinensis* is distributed in the provinces of Mardin, Batman, and Siirt in south-eastern Turkey, and also grows in northern Iraq. However, its presence in northern Iraq

has not been confirmed until now. It is thought that this kind of information was probably given in Flora of Turkey because of the presumed distribution of *S. glechomifolia* (W) in northern Iraq and because it had been reported as

a synonym of *S. mardinensis*. Therefore, when all of the literature and herbarium specimens were comprehensively examined, it was found that *S. glechomifolia* and *S. mardinensis* are not distributed in Iraq.

Stachys mardinensis is also similar to *S. fragillima* and *S. brantii* Benth. within sec. *Fragilicaulis*. *Stachys mardinensis* differs from *S. fragillima* in several characters: subsessile, ovate cauline leaves with crenate-dentate margin and usually shorter yellow corolla. The species can also be distinguished from *S. brantii* not having larger leaves (c. 5 × 3 cm), densely spicate inflorescence and recurved calyx teeth.

During an examination of specimens at Kew herbarium, it was discovered that *Stachys* specimens, labelled with a pencil as *S. ballotiformis* Vatke, were actually *S. mardinensis* (Figure 3). The *Stachys* specimens were collected from Iran. However, neither of the former studies (Bhattacharjee, 1982; Rechinger, 1982), nor a current publication (Salmaki et al., 2012), noted that *S. mardinensis* was also found in Iran. To date, *S. mardinensis* was only known to grow in Turkey and Iraq. In this research, a new record is given of *S. mardinensis* for the Flora of Iran.

Morphologically, *S. mardinensis* is similar to *S. kermanshahensis* Rech.f., *S. lanigera* (Bornm.) Rech.f. and *S. veroniciformis* Rech.f. within the sect. *Fragilicaulis* in Iran. *Stachys mardinensis* is characterized by having glandular hairs and usually densely and patently pilose on flowering stems. The revisions of *Stachys* species in

Iran include little information about *S. lanigera* and *S. veroniciformis* Flora Iranica (Rechinger, 1982; Salmaki et al., 2012). To provide an identification key that includes *S. mardinensis* and its related species, these four species should be evaluated together in Iran.

Stachys graveolens is known from Batman and Siirt provinces in Turkey and in Iraq, according to its original protologue (Nábělek, 1926). Subsequently, Bhattacharjee (1982), who first revised Turkish *Stachys*, did not present any information of the specimens collected by Nábělek, which stored in SAV. When the specimens were compared with each other and check with the keys provided by Bhattacharjee (1982) and Rechinger (1982), we found that Turkish specimens, stored in SAV (collector numbers, Nábělek 1580 and 1581), belong to *S. mardinensis*. Therefore, *Stachys graveolens* is endemic species and only grows in Iraq.

Consequently, *S. glechomifolia* is a distinct species and resurrected here. Currently, including data of this study and excluding genus *Betonica* (Scheen et al., 2010), *Stachys* is represented by 115 taxa (89 species) and which is the centre of *Stachys* diversity. Section *Fragilicaulis* has 23 taxa and 17 of them are endemic. While *S. glechomifolia* is a endemic species to Turkey, *S. graveolens*, *S. fragillima* and *S. nephrophylla* are endemic to Iraq. In addition, *S. mardinensis* is known from Turkey and in Iran (Figure 8). This species might eventually be found in Iraq with increasing botanical exploration, particularly around

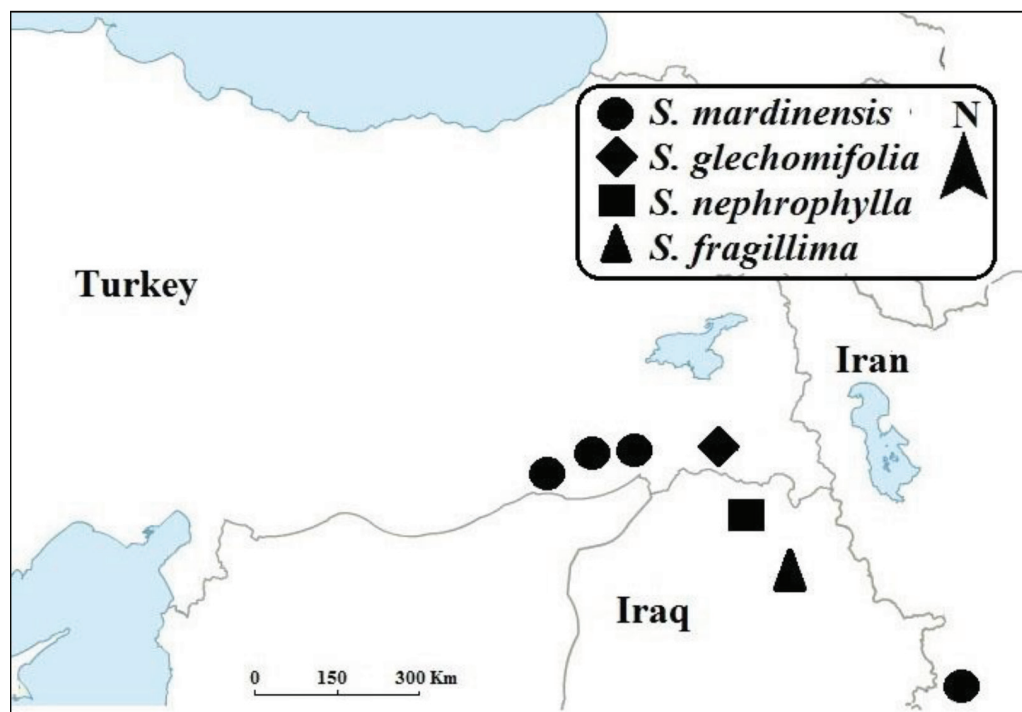


Figure 8. Distribution map of *Stachys fragillima*, *S. glechomifolia*, *S. mardinensis*, and *S. nephrophylla*.

Table 2. Former and present status of the *Stachys* taxa examined.

Taxa	The former studies	The present study
<i>S. glechomifolia</i>	included as synonym of <i>S. mardinensis</i>	<i>S. glechomifolia</i>
<i>S. mardinensis</i>	grows both Turkey and Iraq	grows both Turkey and Iran
<i>S. fragillima</i>	Lectotype: No designated	Lectotype: W, (W18950001630)
	Syntypes: BM (BM000950472), G (G00435872, G00435873, G00435874), HBG (HBG518124), P (P00743633, P00743634, P00743635), PH (PH00027426), MO (MO149717), JE (JE00002239, JE00002240), E (E00319627), K (K000928772), TBI (TBI1025472), W (W18950001630).	
<i>S. graveolens</i>	grows both Iraq and Turkey Lectotype: No designated	grows only Iraq Lectotype: SAV, (SAV0002386)
	Syntypes: SAV, (SAV0002387, SAV0002388, SAV0002389, SAV0002169, SAV0002170, SAV0002171)	
<i>S. kurdica</i> var. <i>brevidens</i>	Lectotype: No designated	Lectotype: LD, (LD1059398)
	Syntypes: LD (LD1059398), K (K000928683)	

mountainous regions nearby Turkish/Iranian borders. The former and current data of the *Stachys* taxa studied is given in Table 2.

Additional specimens examined: *Stachys mardinensis*. TURKEY. 4 km E. of Mardin, vertical and sloping limestone rocks, 1200 m, 25 May 1957, *P. H. Davis* 28575 (ANK!, E!, ISTE!); 12 km from Mardin to Ömerli, cliff crevices, 950 m, 10 June 2014, Ö. Güner 2408 (GAZI); ibid, 04 June 2015, Ö. Güner 2540 (GAZI!); 2 km from Mardin to Kızıltepe, limestone rocks, 805 m, 01 June 2015, Ö. Güner 2524 (GAZI!). Batman: 2 km behind the castle of Hasankeyf, 750 m, 2008, *A. Duran*, 7806 (KNYA!). Siirt: Botan Çay gorge, 15 km S. of Siirt, 450 m, 16 May 1966, *P.H. Davis* 43056 (ISTO!); 8 km from Siirt to Eruh, Botan Çay gorge, limestone rocks, 715 m, 11 June 2013, Ö. Güner 2334 (GAZI!). *Stachys fragillima*. IRAQ. in montis Kuh-Sefin (ditionis Erbil) regione superior; in fissuris parietum verticalium, 1200–1500 m, 16 May 1893, *J. F. N. Bornmüller* 1666 (W!). *Stachys nephrophylla*. IRAQ. Arbil, In fissuris rupium

calc. faucium prope Rowandiz, 700 m, 8–9 August 1957, *Rechinger* 11250 (holotype W!).

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