

Synopsis of the sect. *Hymenocoleus*, sect. *Hymenostegis*, and sect. *Macrophyllum* belonging to *Astragalus* (Fabaceae) in Turkey

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Abstract: A synopsis of the sect. *Hymenocoleus* Bunge, sect. *Hymenostegis* Bunge, and sect. *Macrophyllum* Boiss. belonging to *Astragalus* L. in Turkey is given based on a revisional study carried out in Turkey. As a result of this study, an account of 19 species including keys and general distribution as well as their conservation status in Turkey is given. It is determined that *A. narmanicus* Karaman & Aytaç is new to science and *A. expetitus* Maassoumi, *A. pereshkhoranicus* Maassoumi & F.Ghahrem., and *A. marivanensis* Maassoumi & Podlech do not exist in Turkey. Additionally, the name of the sect. *Hymenocoleus* is preserved.

Key words: *Astragalus*, section, conspectus, Turkey

1. Introduction

The genus *Astragalus* L. (Fabaceae) has approximately 3000 taxa around the world. The genus is known to spread vigorously in cold, semiarid, and arid regions of the Old World (approximately 2400 species); in western regions of North America (about 450 species); and especially along the Andean Mountains in South America (about 100 species) (Maassoumi, 1998; Podlech and Zarre, 2013).

Astragalus section *Hymenostegis* was first named by Bunge (1868–1869) in his revision, entitled “Generis Astragali species gerontogae” under the subgenus *Calyphysa*. This section was revised by Rechinger et al. (1958) and then was included in the *Flora of Turkey* (Chamberlain and Matthews, 1970), *Flora of USSR* (Gontscharov, 1946) and *Flora of Iraq* (Townsend and Guest, 1974). The latest revision of the section was made by Zarre and Podlech (1996). *Astragalus* section *Macrophyllum* Boiss. was described first by Boissier (1872).

Species assigned to the section *Hymenostegis* Bunge are spread throughout western Asia. The origin and the diversification center of this section are in Iran. The section is represented by 12 species (*A. uraniolimneus* Boiss. has been recorded as a doubtful species) in the *Flora of Turkey* volume 3 (Chamberlain and Matthews, 1970) and one extra species in volume 11 (Aytaç, 2000), a total of 13 species, four of which are endemic. In 2008, *A. expetitus* Maassoumi was published as a new record for Turkey by

Podlech and Ekici (2008). According to Podlech and Zarre (2013), there are 54 species of sect. *Hymenostegis* in Iran, 14 in Turkey (including two endemics), three in Armenia, three in Azerbaijan, three in Iraq, and one in Georgia.

The number of species assigned to *A. sect. Macrophyllum* in the flora of Turkey was thought to be nine, five of them being endemic (Chamberlain and Matthews, 1970). However, Zarre (2000) reduced the number of species in Turkey to five and the number of endemic species to one. Karaman and Aytaç (2013) published *A. yukselii* Karaman & Aytaç within the sect. *Macrophyllum* and increased the number of species to six, two of which are endemic to Turkey.

The main objectives of this study were to clarify the taxonomic status of species belonging to *Astragalus* sect. *Hymenocoleus* Bunge, *A. sect. Hymenostegis* Bunge and *A. sect. Macrophyllum* Boiss. in Turkey based on field studies and herbarium surveys, and provide their emended descriptions, distributions, and ecology.

2. Materials and methods

Since 2011, as part of a revision of the genus *Astragalus*, extensive field surveys were conducted in Turkey and a large number of specimens were collected. The specimens were all cross-checked with the various *Astragalus* accounts given in the relevant literature: *Flora Uzbekistana* (Borissova, 1955), *Flora Tadzikistana* (Borissova, 1937), *Flora USSR* (Borissova, 1946), *Flora Kavkaza* (Grossheim,

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1952), *Flora Europaea* (Chater, 1968), *Flora of Turkey* (Chamberlain and Matthews, 1970; Aytaç, 2000), *Flora Azerbaijania* (Rzazade, 1954), *Flora of Iraq* (Townsend, 1974), *Flora Palaestina* (Zohary, 1987), *Flora of Iran* (Maassoumi, 2003), and other relevant literature (e.g., Yakovlev et al., 1996; Zarre and Podlech, 1996; Maassoumi, 1998; Zarre, 2000; Podlech and Zarre, 2013). The section keys were based on the work by Podlech and Zarre (2013), the authors' own samples, and examined specimens in both domestic (ANK, GAZI, HUB, KNYA, and VANF) and foreign herbaria (MSB, E, K, and G). Author abbreviations were given according to Brummitt and Powell (1992) and herbaria acronyms were given according to *Index Herbariorum* (Thiers, 2015). The conservation status was assessed according to the IUCN (2014). The examined specimens are listed in the Appendix. The species are given in alphabetical order in the article and Appendix.

3. Results and discussion

3.1. *Astragalus* L. sect. *Hymenocoleus* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg 11(16): 57. 1868. nom. cons.

Type (monotypic): *A. vaginans* DC., *Astragal.*: 210. 1802.

≡ *Astragalus* sect. *Hymenostegis* subsect. *Hymenocoleus* (Bunge) Podlech & Zarre, *Sendtnera* 3: 261. 1996. **nom. rej.**

Astragalus sections *Hymenostegis* and *Hymenocoleus* were recognized as two different sections in the *Flora of Turkey* (Chamberlain and Matthews, 1970). *Astragalus vaginans* as the only member of the sect. *Hymenocoleus* is separated from the sect. *Hymenostegis* by imparipinnate (not paripinnate) leaves and forming wide cushions (Chamberlain and Matthews, 1970). However, the section *Hymenocoleus* was reduced to the rank of subsection. Moreover, *A. vaginans* is characterized by stems 30–50 cm long, internodes 1–1.5 cm long, and imparipinnate leaves (Zarre and Podlech, 1996). As a result of our field work and specimen examinations, we agree with the previous literature (Maassoumi, 1995; Podlech et al., 2001; Bagheri et al., 2011; Podlech and Zarre, 2013) in contrast to Zarre and Podlech (1996) and we decided to keep *Hymenocoleus* at sectional level.

3.2. *Astragalus* L. sect. *Hymenostegis* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg 11(16): 66. 1868.

Güzeldere pass in Van (Turkey) Province is an important diversity center for *Astragalus* sect. *Hymenostegis*. It is possible to find *A. uraniolimneus* Boiss., *A. ciloensis* Podlech, *A. qoturensis* Podlech, *A. hirticalyx* Boiss. & Kotschy ex Boiss., *A. zohrabi* Bunge, and *A. hymenocystis* Fisch & C.A.Mey. in this region. The corolla in all these species is purple and the habits (e.g., peduncle length, leaflet shape and length, bract shape and length) are very similar to each other. For this reason, it is often very hard to distinguish the species from each other during field work in this region.

Podlech and Zarre (2013) stated that *A. marivanensis* Maassoumi & Podlech, a member of the section *Hymenostegis* described originally from Iran, is also found in Turkey. The plant materials of this species were collected from Bitlis Hanemir Mountain by T. Engel and there are two samples on one herbarium sheet labeled as T. Engel 109 stored in MSB. While the peduncle and rachis are spreading hairy in *A. marivanensis*, they are adpressed to subadpressed in *A. lagopoides* Lam. Our observation showed that while one of the samples (T. Engel 109) includes both spreading and adpressed to subadpressed hairs on the rachises, the other one has only adpressed to subadpressed hairs. Furthermore, especially among the older individuals representing *A. lagopoides*, we also observed erect hairs towards the base of the rachis along with semierect/subadpressed hairs. Our observations on herbarium specimens and field studies showed that the samples from Bitlis Hanemir Mountain deposited in MSB indeed represent *A. lagopoides*.

There are three samples (Cheese & Watson 2950! and Lemond 2650! and Hub-Mor 11444) described as *A. persicus* by Chamberlain and Matthews (1970) in the *Flora of Turkey*. Based on sample deposited in E, we found that this specimen belongs to *A. zohrabi* Bunge in fact. The specimen of Lemond 2562 was determined as *A. persicus* (DC) Fisch. & C.A.Mey. by Chamberlain and Matthews (1970). However, it was identified as *A. lagopoides* Bunge, which is present in E, by Douglas McKean. *A. persicus* is also reported from the Chasm of Çuh in the Güzeldere district of Van (Chamberlain and Matthews, 1970), where *A. ciloensis*, *A. qoturensis*, *A. zohrabi*, and *A. hirticalyx*, which are morphologically very similar to *A. persicus*, are widely distributed. The main discrepancy between *A. persicus* and the other species of the section *Hymenostegis* is the hairs on the inner side calyx. Moreover, Podlech and Zarre (2013) indicated that this species is endemic in the W Iranian Zagros mountains. All indications outside of this area are based on misinterpretations. In light of these data, *A. persicus* is here excluded from the flora of Turkey.

Astragalus expetitus Maassoumi was recorded as a new species for the Turkish flora by Podlech and Ekici (2008) based on an individual collected from Muradiye near Van (Sorger 81-10-1). However, Sorger's sample stored in W! was identified as *A. hymenocystis* Fisch. & C.A.Mey. by S Karaman Erkul. Some of the characteristics that separate *A. expetitus* from *A. hymenocystis* are as follows: leaflets ascending and spreading (not adpressed to subadpressed) hairy, and the bracts glabrous (not sparse or dense hairy). *Astragalus expetitus* is excluded from the list of Turkish species of *Astragalus*.

Our research shows that there are 13 species belonging to the sect. *Hymenostegis* in Turkey, three of which are endemic.

A revised key of *Astragalus* sect. *Hymenostegis* in Turkey

1. Petal yellow
 2. Stipules hairy
 3. Stipules 13–17 mm; leaves (1.5–) 3–8 cm; peduncles 1–4 cm *A. velenovskyi*
 3. Stipules 30–35 mm; leaves 9–20 cm; peduncles 24–28 cm *A. narmanicus*
 2. Stipules glabrous or only ciliate at the margins
 4. Peduncle ascending – spreading hairy
 5. Bracts deciduous; rachis adpressed to subadpressed hairy with sparsely ascending hairs *A. gueruenensis*
 5. Bracts persistent; rachis ascending–spreading hairy *A. sosnowskyi*
 4. Peduncle adpressed to subadpressed hairy *A. lagopoides*
1. Petal pink–purple or red–purple
 6. Inflorescence lax
 7. Peduncle ascending–spreading hairy *A. zohrabi*
 7. Peduncle adpressed to subadpressed hairy *A. rubrostriatus*
 6. Inflorescence dense
 8. Peduncle ascending–spreading hairy
 9. Rachis adpressed to subadpressed hairy with sparsely ascending hairs
 10. Standard angular–hastate *A. uraniolimneus*
 10. Standard not angular–hastate
 11. Standard glabrous *A. ciloensis*
 11. Standard hairy *A. qoturensis*
 9. Rachis ascending–spreading hairy
 12. Stipule hyaline–membranous; peduncle longer than leaves or equal
 13. Stipules with densely netlike nerves in lower part; legume 7–9 mm *A. uraniolimneus*
 13. Stipules without densely netlike nerves in lower part; legume 4–6 mm *A. hymenocystis*
 12. Stipule papery; peduncle shorter than leaves *A. hirticalyx*
 8. Peduncle adpressed to subadpressed hairy, with sparsely ascending hairs
 13. Leaflets 1–3 pairs, upper side glabrous, inner side sparsely hairy; stipule hairy .. *A. trifolium*
 13. Leaflets 4–6 pairs, both sides dense hairy; stipule glabrous *A. lagopoides*

Astragalus ciloensis Podlech, Feddes Repert. 120: 51. 2009.

Distribution: Irano-Turanian element. Endemic.

Conservation status: VU: B2 ab (i, ii, iv)

This species was published by Podlech (2009) based on a sample (P.H. Davis and O. Polunin 23974) that was collected in Turkey. Although the type specimens are available at both

E and ANK, we also collected more plant materials from the type locality and neighboring areas during our research.

Astragalus gueruenensis Podlech, Podlech D. & Zarre S. 2013. A taxonomic revision of the genus *Astragalus* L. (Leguminosae) in the Old World, vol. 2, 1290. Naturhistorisches Museum Wien.

Distribution: Irano-Turanian element. Endemic.

Conservation status: VU: B2 ab (i, ii, iv)

In the *Flora of Turkey*, footnotes under *A. hirticalyx* indicate that the sample collected by Simon & Hub.-Mor. 15070 is an intermediate species between *A. hirticalyx* and *A. persicus*. It was reported that it has a short peduncle and ovoid inflorescence like in *A. hirticalyx* and also a glabrous and hairy bract (Chamberlain and Matthews, 1970). This sample was published by Podlech (Podlech and Zarre, 2013) as a new species under the name *A. gueruenensis*.

Astragalus gueruenensis, which was only known from the type locality before our research, was collected during the field study in Van Province. Some missing items and measuring errors due to deficiencies of the type collection are improved in the description provided. In this study, the legume and seed characters were indicated; legumes sessile, ovate-ellipsoid, 7–8 × 4–5 mm long, keeled ventrally, flattened dorsally; densely villose hairy. Seed only one, ellipsoid-reniform, dark brown and black spotted, 2 × 3 mm. *A. gueruenensis* was initially identified by Podlech (Podlech and Zarre, 2013) as having purple flowers, despite actually having yellow flowers (at maturity sometimes turning purple).

Astragalus hirticalyx Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg 11(16): 67. 1868 in clave [et l.c. 15(1): 110. 1869].

Distribution: Iraq, Iran, Turkey. Irano-Turanian element.

It is well known that the flower is purple in *A. hirticalyx*. However, during the field study conducted in the Güzeldere region of Van Province, a specimen with a white corolla was also observed.

Astragalus hymenocystis Fisch. & C.A.Mey., Bull. Soc. Imp. Naturalistes Moscou 26(2): 449. 1853.

Distribution: Iran, Turkey. Irano-Turanian element.

A. hymenocystis Fisch. & C.A.Mey. was examined at specific level in the *Flora of Turkey* by Chamberlain and Matthews (1970). Later, Zarre (1996) identified two subspecies in his revisional study; subsp. *hymenocystis* and subsp. *confiniorum* Zarre & Podlech. *A. hymenocystis* subsp. *hymenocystis* was separated from all other species in the section *Hymenostegis* by its yellow–brown hairs.

Subsequently, *A. hymenocystis* subsp. *confiniorum* Zarre & Podlech was added to the flora of Turkey (Aytaç, 2000).

A. pereshkhoranicus was given as a new record for Turkey without any plant material or location being given (Özhatay and Kültür, 2006). Furthermore, the type locality of *A. pereshkhoranicus* Maassoumi & F. Ghahrem.

is known from Iran. On the other hand, *A. hymenocystis* subsp. *confiniorum* is considered a synonym of *A. pereshkhoranicus* by Podlech and Zarre (2013).

This taxon is considered a synonym of *A. pereshkhoranicus* Maassoumi & F. Ghahrem. (Podlech and Zarre, 2013). *A. pereshkhoranicus* was given as a new record for Turkey. However, no locality for Turkey was given and the type locality of the species was published as Iran. *A. hymenocystis* subsp. *confiniorum* subspecies is actually a synonym.

Astragalus hymenocystis is separated from *A. pereshkhoranicus* by the following characteristics: 3–6 pairs of leaflets (not 5–6 pairs), elliptic obovate (not narrowly elliptic) and 3–7 × 2–4 mm (not 5–8 × 1.5–2.5 mm), bracts hyaline on the edges (not hyaline-membranous), calyx teeth 4–7 mm long (7–12 mm) (Podlech and Zarre, 2013).

Astragalus hymenocystis was also recorded in the *Flora of Turkey* from Muradiye, Van (Aytaç, 2000). As a result of our field investigations in this region and visiting national and foreign herbaria, it was concluded that *A. pereshkhoranicus* does not exist in Turkey. Podlech and Zarre (2013) also stated that this species does not grow in Turkey.

Astragalus lagopoides Lam., Enycl. Méth. Bot. 1: 322. 1783.

Distribution: Azerbaijan, Armenia, Iran, Turkey. Irano-Turanian element.

Astragalus brachypodus, which is mentioned as a member of the sect. *Hymenostegis* in the *Flora of Turkey* is synonymous of *A. lagopoides* (Zarre, 1996). It is separated from *A. lagopoides* by the following characteristics: peduncle shorter than leaves and flowers are ovoid instead of rectangular (Chamberlain and Matthews, 1970). Specified locations where *A. brachypodus* is reported were investigated and specimens were collected. Our study showed that in some samples the peduncle does not exceed the length of the leaves, whereas in other samples it is longer. In addition, the inflorescence is ovoid or often cylindrical, indicating the high level of variability regarding this character.

Our intensive collection from the type locality of *A. sonamerensis* has shown that the only taxon of the sect. *Hymenostegis* distributed in this area is *A. lagopoides*. Therefore, in contradiction with Podlech (2011), we put *A. sonamerensis* under synonymy of *A. lagopoides*, not under *A. sosnowskyi* as suggested doubtfully by Podlech (2011) and Podlech and Zarre (2013).

There are footnotes under *A. lagopodioides* in the *Flora of Turkey* explaining that *A. lagopoides* was initially identified by Lamarck (1785) as having yellow flowers, despite actually having purple flowers. The footnote continues to clarify that this confusion resulted from dry material. Thus, it was stated that *A. lagopoides* should be

synonymous with *A. lagopodioides*. During field studies, several samples of *A. lagopoides* from different localities were collected. Samples show that flowers are mostly yellow when blooming and turn purple from the top of the standard. For this reason, corolla color of *A. lagopoides* is given both as purple and as yellow in two different places in our diagnostic key.

Astragalus narmanicus Karaman & Aytaç, sp. nov. (Figures 1–2).

Type: Turkey, A8 Erzurum: Between Narman and Oltu, steppe, 1916 m, 08.07.2014, S. Karaman 2897 & Z. Aytaç (holo. GAZI, iso. ANK, GAZI).

Diagnosis: It is closely related to *A. velenovskyi*, but differs from it by longer peduncle than leaves, (not as long as or shorter); longer stipules 30–35 mm, not (13–17 mm); leaflets 6–9 pairs [not (3–)4–6(–7)]; and longer bracts 25–30 × 7–10 mm [not 8–14 × 3.5–6(–9) mm]. It is also similar to *A. lagopoides*, but differs from it by longer stipules 30–35 mm (not 12–30 mm); longer peduncle 24–28 cm [not (2–) 6–15(–20) cm] and longer bracts 25–30 × 7–10 mm (not 14–23 × 3.5–8 mm). Sometimes can be mistaken for *A. hymenostegis*, but peduncle 24–28 cm (not 3–15 cm) and bracts 25–30 mm (not 18 × 7–12 mm) may be used for their separation.

Description: *Plants* subshrubby, caespitose, 25–45 cm tall, spiny. *Stipules* chartaceous, slightly hyaline toward the tip, yellowish, 30–35 mm, 23–25 mm adnate to the petiole, connate behind the stem for 8–10 mm, the free tips narrowly triangular, densely hairy at the midline, tip and ciliate at the margins with ascending hairs up to 2 mm. *Leaves* 9–20 cm; petiole 3–10 cm, like the rachis rather densely to very densely covered by adpressed and few ascending hairs 0.5–1 mm, spiny. *Leaflets* in 6–9 pairs, narrowly elliptic, 12–22 × 2–5 mm, acute to acuminate, with a pungent yellowish cusp 1.5–2 mm, on both surface densely adpressed to somewhat spreading hairy. *Peduncles* 24–28 cm, longer than the leaves, erect, densely adpressed hairy mixed with some ascending hairs, adpressed hairs 1–1.5 mm and ascending hairs 0.5–1 mm. *Racemes* long cylindrical, 8–13 cm long and 2.5–3 cm in diameter, densely many-flowered. *Bracts* persistent, glumaceous, pale yellowish, narrowly hyaline at the margins, 25–30 × 7–10 mm, widely ovate acuminate, with a cusp up to 5 mm, hairy dense hairy at the midline and ciliate at the margins, on inner side mostly hairy toward the tip. *Calyx* tubular at first, soon ellipsoid-inflated, 17–19 × 3–4 mm, pale yellow, with greenish teeth, rather densely covered with spreading hairs 3–4 mm and with long hairs up to 5 mm, mostly sparsely hairy in upper part of tube on inner side; teeth subulate, 5–6 mm. *Petals* yellow. *Standard* 14–18 mm, sometimes slightly shorter than the calyx; blade 6–8 mm wide, trullate to elliptic or ovate-panduriform and in this case shallowly constricted below the middle,



Figure 1. Type specimen of *Astragalus narmanicus* (GAZI).

slightly retuse, at the base sharply angular-hastate to obtusely angular, with widely cuneate claw. *Wings* 13–17 mm; blades narrowly oblong to narrowly elliptic, obtuse, 6–7 × 2–2.8 mm; auricle 0.3–0.6 mm, claw 7–10 mm. *Keel* 12–15 mm; blades obliquely obovate, subacute, with rectangularly curved lower edge and slightly convex upper edge, 5–6 × 2.5–3 mm; auricle minute, claw 7–10 mm. *Ovary* c. 4–5 mm, ellipsoid, densely hairy; style hairy up to the middle. *Legumes* sessile, 5–7 mm long, 1.5–2.5 × 2.5–3 mm, densely subadpressed hairy. *Seed* one, olive green to red or dark brown, 3–4 × 1.5–2.5 mm, pitted.

Etymology: The specific epithet is derived from the locality of the type specimen, Narman, Erzurum Province. Flowering time is late July.

Distribution, habitat, and ecology: Turkey, endemic, ca. 1900 m. It grows on high mountain steppe with



Figure 2. *Astragalus narmanicus* in natural habitat.

Astragalus lagopoides, *A. voronovianus* (Boriss.) Boriss., *A. oleaeifolius* DC., *Rosa canina* L. *Palirus spina-chrsti* P.Mill., *Stipa holsericea* Trin. *Poa bulbosa* L., *Poa longifolia* Trin., *Taeniatherum caput-medusae* (L.) Nevski, *Pimpinella corymbosa* Boiss., *Prangos pabularia* Lindl. etc.

Conservation status: This species is found in Narman. It can be found as a small, separate (less than five locations), and small-numbered population (less than 50 mature individuals) in the area. Its population is under anthropogenic effects (recreational activities, fire, and sometimes grazing). The new species should be regarded as critically endangered (CR B2ab (i, ii, iv) based on IUCN conservation status (IUCN, 2014).

Astragalus qoturensis Podlech, Fl. Iranica, *Astragalus* II, Lief. 175: 171. 2001 (July) and in Sendtnera 7: 209. 2001.

Distribution: Iran, Turkey. Irano-Turanian element.

A. qoturensis was known as endemic to Iran until the current study, but during our field studies we also collected it in Turkey in Van Province (Podlech and Zarre, 2013; Karaman Erkul et al., 2015). *Astragalus qoturensis* is the only species of the sect. *Hymenostegis* in Turkey having a hairy standard. Additionally, we observed that the indumentum of bracts may vary from glabrous to densely hairy in contrast to the description provided by Podlech and Zarre (2013).

Astragalus rubrostriatus Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg 11(16): 68. 1868 inclave [et l.c. 15(1): 113. 1869].

Distribution: Armenia, Iran, Turkey. Irano-Turanian element.

This species is characterized by lax inflorescences, striate calyces, and red to purple petals.

Astragalus sosnowskyi Grossh., Fl. Kavkaza 2: 299. 1930, in clave, [Russian], et in Trudy Tbilissk. Bot. Inst. 12: 236. 1948, descr. emend.

Distribution: Georgia, Iran, Turkey. Irano-Turanian element.

Astragalus trifoliastrum Hub.-Mor. & V.A. Matthews, Notes Roy. Bot. Gard. Edinburgh 29: 301. 1969.

Type: Turkey, B9 Van, Van – Hosap, 20 km N Van, 1950 m, 8.07.1951, *J. Renz & Simon* in herb. *Huber-Morath* 11467 (G!: photo. MSB!).

Distribution: Irano-Turanian element. Endemic.

Conservation status: VU: B2 ab (i,ii,iv)

Astragalus trifoliastrum was recently reduced to a synonym of *A. laguriformis* Freyn (Zarre, 1996). However, *A. trifoliastrum* is not actually synonymous; it is reclassified and recorded again (Bagheri et al., 2015). Morphologically, *A. trifoliastrum* can be distinguished from *A. laguriformis* by oblong to elliptic leaflets (not narrowly elliptic), ca. 6–12 mm wide (not ca. 2.0–3.5 mm), with upper side glabrous and lower side sparsely covered with very short adpressed hairs (not both sides densely covered with adpressed hairs), ovoid raceme (not globose to ovoid), ca. 4–7 cm long (not 2–5 cm), purplish calyx (not yellowish) with ascending to almost spreading hairs (not rather densely covered with short, spreading and with ascending to nearly spreading hairs) (Bagheri et al., 2015).

Astragalus uraniolimneus Boiss., Fl. Or. 2: 380. 1872

Distribution: Armenia, Iran, Turkey. Irano-Turanian element.

Astragalus uraniolimneus was recorded doubtfully from Turkey. *Astragalus woronowii*, which was considered a separate species in the *Flora of Turkey* (Chamberlain and Matthews, 1970), has been reduced to synonymy with *A. uraniolimneus* by Zarre and Podlech (1996).

Astragalus velenovskyi Nábělek, Spisy Prir. Fak. Masarykovy Univ. 35: 82, 1923.

Distribution: Irano-Turanian element. Endemic.

Conservation status: VU, B2 ab (i, ii, iv)

Astragalus zohrabi Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg 11(16): 68. 1868 in clave [et l.c. 15(1): 112. 1869].

Distribution: Iran, Turkey. Irano-Turanian element.

Astragalus zohrabi was given as a synonym of *A. lagopodioides* in the *Flora of Turkey* (Chamberlain and Matthews, 1970). Later, *A. lagopodioides* was reduced to a synonym of *A. zohrabi* (Podlech, 2011). *A. zohrabi* is separated from other species in the sect. *Hymenostegis* in Turkey by having a lax inflorescence.

Additionally, during our field study, *A. rubrostriatus*, another species of the section with lax inflorescences, which was thought to be endemic to Iran, was collected from the Van region as a new record for the Turkish flora (Karaman Erkul et al., 2015).

3.3. ***Astragalus*** L. sect. ***Macrophyllum*** Boiss., Fl. Or. 2: 214, 1872.

The number of species within *Macrophyllum* in the flora of Turkey was thought to be nine, five of which are endemic (Chamberlain and Matthews, 1970). However, Zarre's research reduced the number of species in Turkey to five

and the number of endemic species to one (Zarre, 2000). Our research published *A. yukselii* within the section *Macrophyllum* and increased the number of species within this section to six and the number of endemic species to two (Karaman Erkul and Aytaç, 2013).

A revised key of *Astragalus* sect. *Macrophyllum* in Turkey

1. Stipule hyaline–membranous
 2. Leaflets and rachis glabrous; bracts linear, glabrous; bracteoles absent...*A. isauricus*
 2. Leaflets and rachis hairy; bracts ovate–lanceolate, hairy; bracteoles present *A. yukselii*
1. Stipules chartaceous
 3. Leaflets densely to sparsely tomentose hairy above *A. dipodurus*
 3. Leaflets sparsely adpressed hairy or glabrous above
 4. Bracts linear *A. oleaeifolius*
 4. Bracts ovate–lanceolate
 5. Leaflets with obvious venation, median ones acute or obtuse, mucro 0.7–3 mm *A. longifolius*
 5. Leaflets without obvious venation, not mucronulate or with mucro shorter than 0.5 mm *A. cephalotes*

Astragalus cephalotes Banks & Sol., Russell, Nat. Hist. Aleppo, ed. 2: 260. 1794.

Distribution: Turkey, Georgia, Syria, Lebanon, Iran. Irano-Turanian element.

Because of having bracteoles, *A. cephalotes* was classified and placed in the section *Pterophorus* by Boissier (1872). However, Zarre (2000) transferred this species into the sect. *Macrophyllum*, by possessing large and glabrous leaves. In the *Flora of Turkey*, *A. cephalotes* is placed in the sect. *Rhacophorus* (Chamberlain and Matthews, 1970). However, our morphological findings support treating *A. cephalotes* under the sect. *Macrophyllum* in agreement with Zarre (2000).

Astragalus dipodurus Bunge, Mém. Acad. Imp. Sei. Saint Petersburg 11(16): 88. 1868, in clave et l.c. 15(1): 156. 1869.

Distribution: Iran, Syria, Turkey. Irano-Turanian element.

Astragalus isauricus Hub.-Mor. & V.A. Matthews, Notes Roy. Bot. Gard. Edinburgh 29: 298. 1969.

Distribution: Irano-Turanian element. Endemic.

Conservation status: EN: B2 ab (i, ii, iv)

Astragalus longifolius Lam., Encycl. Meth. Bot. 1: 322. 1783.

Distribution: Iraq, Turkey. Irano-Turanian element.

Astragalus oleaeifolius DC., Astragalogia: 192. 1802.

Distribution: Azerbaijan, Armenia, Iraq, Iran, Lebanon, Syria, Jordan, Turkey. Irano-Turanian element.

Astragalus yukselii Karaman & Aytaç, Turk. J. Bot. 37: 836–840, 2013.

Distribution: Irano-Turanian element. Endemic.

Conservation status: CR: B1ab (i, ii, iv)

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APPENDIX.

Specimens examined of sect. *Macrophyllum*, sect. *Hymenostegis*, and sect. *Hymenocoleus* belonging to *Astragalus* (Fabaceae) in Turkey**Sect. *Hymenocoleus******A. vaginans* DC.**

Turkey. A5 Amasya: ad pagum Sana, 400–450 m, 17.06.1889, *Bornmuller* 91 (G, photo.; K, MSB); A6 Tokat: Artova, Arabacı Musa village, Selvi–Söğüt Ağaçlandırma Sahası, 1200–1300 m, 25.06.1980, *R. İlarşlan* 780 (ANK). B5 Kayseri: Yahyalı, road to Faraşa village, 04.07.2003, 1450 m, *A. Duran* 6253 (KNYA). B9 Bitlis: Nemrut Mountain, steppe, 1950 m, 13.07.1956, *Hub-Mor.*, *H. Birand* & *K. Karamanoğlu* 282 (ANK). C4 Karaman: Ermenek, Göktepe, Dumlugöze village, Gavur area, 1300 m, 16.07.1984, *H. Sümbül* 3182 (HUB); 3 km S Bucakkışla, between Karaman and Ermenek, 600 m, 19.07.1978, *Nydegger* 13269 (G). C5 Adana: Pozantı, 3 miles N on eastward slopes of Toros Mountain, 750–800 m, 16.07.1971, *O.* 243 (E); Saimbeyli to Karakilisse, 09.07.1906, Post 921 (G); Hadjin, Kala Sekisi, 27.06.1893, *Förster* 912 (M); 5 km N Saimbeyli toward Pınarbaşı, 1240 m, 15.07.1977, *Nydegger* 12396 (G); 2 km N Saimbeyli toward Sarız, 1020 m, 02.07.1989, *Nydegger* 44321 (G, GAZI); Gülek–Bokhar [Gülek Boğazı], 28.07.1855, *Balansa* 266 (G); Amanus Gebirge (Nur Mountains), c. 3 km S oberhalb Yarpuz (29 km E Osmaniye), 1200 m, 13.07.1978, *Ehrendorfer* et al. 787–38 (MSB); Niğde: Ulukışla, Çiftahan, Horoz village, near the gardens, 1200–1350 m, 28.06.2013, *S. Karaman* 2776; *ibid.* 30.07.1984, *Ş. Yıldırım* 7117 (HUB); Bulgar Magara, Kızıl Tepe, 2800 m, 1896, *Siehe* 594 (G, E); Bolkar Mountains, persicus Alihoca Valley, Alihoca–Maden, 11.7 km from main road, road side bank, N side of valley, 19.07.1998, *R.D. Reeves* et al. 1960; Mersin: Çamlı plateau, İkiyazalan, 1620 m, 16.07.1995, *Z. Aytaç* & *N. Adigüzel* 7047 (GAZI). C6 Gaziantep: İslahiye, 200 m west of Kocçağz village, Kızılca Mountain, 980 m, 03.07.2007, *Ş. Çakır* & *L. Behçet* 1454 (VANF); Osmaniye: Yağlıpınar, S Yarpuz, 1150–1350 m, 02.07.1959, *Huber-Morath* 16154 (G); Kahramanmaraş: Çağlayancerit, Ziyaret Ağa hill, steppe, 1200–1300 m, 22.07.2011, *S. Karaman* 2672; Maraş–Göksun, 60 km S Göksun, 540 m, 01.06.1987, *Nydegger* 42588 (MSB); Engizek Mountain, 1400–1500 m, 23.07.1987, *H. Duman* 3694 (GAZI); Göksun road, Döngel village, *Pinus* sp., 800 m, 16.06.1981, *B. Yıldız* 2786 (HUB); Göksun, Fındık village, Kandil D, north slopes, 1600 m, 27.07.1981, *B. Yıldız* 3067 (ANK, HUB); 78 km N Maraş zwischen Maraş und Göksun, 1280 m, 07.07.1981, *Nydegger* 16713 (G); 43 km to Kahramanmaraş from Göksun, near the road, 750 m, 13.08.1997, *Sh. Zarre* 148; Kahramanmaraş–Göksun, 78 km N of Kahramanmaraş, 1280 m, 07.07.1981, *Hub.-Mor.* 16713; Ahır Mountain,

Ulucak hill, 1200–1500 m, 25.06.1992, *Z. Aytaç* & *H. Duman* 4822 (GAZI); 78 km N Maraş zwischen Maraş und Göksun, 1280 m, 07.07.1981, *Nydegger* 16713 (G, M, MSB).

Sect. *Hymenostegis****Astragalus ciloensis* Podlech**

Turkey. B9 Van: Gürpınar, Güzeldere pass, steppe, 2760 m, 13.07.2011, *S. Karaman* 2652; Hoşap, Çuh gediği, steppe, 2700 m, 11.08.2011, *S. Karaman* 2679; C10 Hakkari: Cilo Mountain, below Cilo yayla, 2743 m, 7.08.1954, *P.H. Davis* & *O. Polunin* 23974 (M; ANK, E).

***Astragalus gueruenensis* Podlech**

Turkey. B6 Sivas: 46 km from Gürün to Pınarbaşı, roadsides and steppe, 1700 m, 16.07.2013, *S. Karaman* 2777; *ibid.*, 07.10.2013, *S. Karaman* 2800; distr. Gürün, 20 km W Gürün gegen Pınarbaşı, 1700 m, 22.07.1958, *Huber-Morath* 15070 (MSB, G). B9 Van: Muradiye, Şeytan bridge, steppe, 1730 m, 24.06.2013, *S. Karaman* 2767; Erciş, Deliçay, Pay village, steppe, 2000 m, 12.07.2011, *S. Karaman* 2640.

***Astragalus hirticalyx* Bunge**

Turkey. A7 Bayburt: Osluk Köprüsü, open limestone slopes, 1700 m, 21.06.1967, *Tobey* 2154 (E). B9 Van: Hoşap–Başkale road, Güzeldere pass, steppe, 2616 m, 21.06.2011, *S. Karaman*, *F. Taeb* & *İ. Kaval* 2599; *ibid.*, 11.08.2011, *S. Karaman* 2681; Güzeldere pass, steppe, 2640 m, 21.06.2011, *S. Karaman*, *F. Taeb* & *İ. Kaval* 2600; Erciş, north of İkizçalı village, steppe, 2040–2240 m, 31.07.2005, *O. Karabacak* 3983 (VANF); Gürpınar, above Tutmaç village, steppe, 2600 m, 15.07.2003, *M. Ünal* 8682 (VANF); Gürpınar, Koçgüden village, steppe, 2950 m, 31.07.2002, *M. Ünal* 7834 (VANF); Van–Hosap, Güzeldere pass, mountain steppe, 2800 m, 08.08.1993, *Y. Altan* 5466 (GAZI); Van–Hosap Güzeldere pass, steppe, 22.08.1993, *Y. Altan* 5568 (GAZI); Hoşap, Kepir Mountain, 2800 m, 30.07.1954, *P.H. Davis* & *O. Polunin* 23337 (ANK, K, E); Van–Hakkari, 2 km to Güzeldere pass, steppe, 2700 m, 23.07.1983, *N. Adigüzel* & *T. Ekim* 7932 (GAZI, ANK); 34 km from Başkale to Hoşap, Güzeldere pass, rocky slopes in sandy soil (mountain steppe), 2800 m, 03.07.1966, *P.H. Davis* 45911 (K); Gevaş, Artos Mountain, 2590 m, 14.07.1954, *P.H. Davis* & *O. Polunin* 22713 (K, E); Gevaş, Artos Mountain, rocky slopes, 3048 m, 16.07.1954, *P.H. Davis* & *O. Polunin* 22769 (ANK, K, E); Gevaş, Artos Mountain, N facing snow line, 2896–3506 m, 03.08.1966, *M. Tong* 316 (E); 20 km S of Hoşap, dry stony hill side, 24.07.1965, *E.M. Rix* 335 (K); 34 km from Başkale to Hoşap, Güzeldere pass, rocky slopes in sandy soil (mountain steppe), 2800 m, 03.07.1966, *P.H. Davis* 45911 (E); Çatak, Kavussahap Mountain, rocky slopes, 3100 m, 23.07.1954, *P.H. Davis* & *O. Polunin* 23128 (K, E); in summo jugo inter

Bashkale et Hoshap, 2700 m, 30.06.1975, *Rechinger* 53882 (M); Bitlis: Adilcevaz, Ziyarettepe, kalker anakaya, 2000 m, 13.06.1988, *L. Behçet* 825 (VANF); Yeşiltepe, South part of plateau, 2200–2400 m, *L. Behçet* 123 (VANF). C10 Hakkari: top of Bajırge to Yüksekova pass by Delezi village, upland hills, shale, grassy area, meadow, subalpine flora, 2550 m, 29.06.1967, *Watson* et al. 2944 (K, E); between Van and Hakkari, Çuh Mountain, 2600 m, 19.07.1956, *H. Birand*, *K. Karamanoğlu* 988 (ANK); Mor Mountain, limestone, S of rocky slopes, 3100 m, 16.08.1967, *Watson* et al. 3633 (E).

***Astragalus hymenocystis* Fisch. & C.A.Mey.**

Turkey. A9 Erzurum: Oltu, Dutlu Mountain, Eski Dutlu village, 2200–2500 m, 19.07.1982, *N. Demirkuş* 1393 (HUB). B9 Van: Gürpınar, Güzeldere pass, steppe, 2760 m, 20.07.2013, *S. Karaman* 2752; Tendürek pass, volcanic rocky slopes, 2644 m, 12.07.2011, *S. Karaman* 2635; *ibid.*, 12.07.2011, *S. Karaman* 2636; Muradiye, Gülizar plateau, steppe, 2644 m, 24.06.2013, *S. Karaman* 2766; Muradiye, Babacan village, Derviş plateau, steppe, 2400 m, 24.06.2002, *O. Karabacak* 3257 (VANF); Güzeldere pass, steppe, 2650 m, 22.06.2013, *S. Karaman* 2756; in summo inter Bashkale et Hoshap, 2700 m, 30.06.1975, *Rechinger* 53881 (M). B10 Van: Özalp, 3 km from Özalp to Dorutay, steppe, 2126 m, 20.06.2011, *S. Karaman* 2591; Özalp, Salmanlı village, steppe, 2059 m, 20.06.2011, *S. Karaman* 2594; Muradiye, Gülizar plateau, steppe, 2644 m, 24.06.2013, *S. Karaman* 2765.

***Astragalus lagopoides* Lam.**

Turkey. A6 Tokat: Sivas, 1400 m, 26.07.1933, *W. Kotte s.n.* (ANK). A8 Erzurum: Aşkale–Bayburt road 17 km, roadsides, 1750–1800 m, 23.07.2001, *Z. Aytaç* 8322 (GAZI); between Narman and Oltu, 5 km to Oltu, gypseous slopes, 1327 m, 16.06.2011, *S. Karaman* 2568; between Erzurum–İspir, Eğerti village, Kelkaya, steppe, 2100–2200 m, 11.08.1988, *Z. Aytaç* (GAZI); İspir, roadsides, rocky slopes, 28.07.1961, *K. Karamanoğlu s.n.* (ANK); Tortum, şelale çevresi, 1110 m, 05.07.1975, *R. Çetık* 5547 (KNYA); Otlu, Hisar, *Pinus sylvestris* forest openings, alpine meadows, 2300 m, 06.07.1975, *R. Çetık* 5548 (KNYA); Tortum, 2 km northeast of Aksu village, roadsides, 1870 m, 05.07.1975, *R. Çetık* 5549 (KNYA); Oltu, Azort plateau, 1850 m, 02.08. *Demirkuş* 2348 (HUB); Erzurum, Hamami stream, 1900 m, 13.07.1971, *K. Baykal*, *M. Koyuncu*, *R. Apaydın*, *T. Orbey* & *S. Erik* 1983 (HUB); Oltu, 1 km west of Gökçedere village, steppe, 2300 m, 23.07.2013, *S. Karaman* 2798. A9 Kars: Kağızman, between Kötek and Çilehane villages, 1400–1600 m, 15.06.1980, *O. Güneş* 1626 (HUB); 120 km after Erçiş, 18 km after Tutak, Murat stream valley, 1610 m, 20.07.1956, *Hub-Mor*, *H. Birand* & *K. Karamanoğlu* 506 (ANK); Yağmurlu Mountain, between Sarıkamış and Karaorgan, igneous slopes, 2200 m, 07.07.1957, *P.H. Davis & Hedge* 30721 (K); Yağmurlu

Mountain, between Sarıkamış and Karaorgan, 2200 m, 07.07.1957, *P.H. Davis & Hedge* 30721 (ANK); Kars: Kisir Mountain, Susuz, 1900 m, 03.07.1957, *P.H. Davis & Hedge* 30533 (ANK, K). B4 Aksaray: Hasan Mountain, under Çavdarlık, upper sides of *Quercus* scrub, 1750 m, 12.07.1973, *A. Düzenli* 447 (ANK, KNYA). B5 Niğde: Melendiz Mountain, Asmasız village, 1900 m, 29.07.1982, *H. Ocakverdi* & *B. Eyce* 191 (KNYA); Kayseri: Kayseri, 31.07.1941, *A. Heilbronn* & *M. Başarman s.n.*, ISTF 1014 (ISTF); Talas, 29.07.1941, *A. Heilbronn* & *M. Başarman s.n.*, ISTF 927 (ISTF); Kiranardı, *Quercus* scrub, 1560 m, 17.07.1973, *R. Çetık* 4081 (KNYA); Ali Mountain, Talas, 1600 m, 17.06.1935, *Balls & Gourlay* 1395 (ANK, K); Nevşehir: Ürgüp, Aksalur village, steppe, 1490 m, 30.06.2011, *S. Karaman* 2618; Ortahisar, Gemil Mountain, kuzey yamaç, *Festuca* steppe, 1450–1500 m, 18.06.1989, *M. Vural* et al. 1989 (HUB, GAZI); between Nevşehir and Ürgüp, steppe, 1200–1300 m, 22.06.1952, *Dodds*, *Cetık* & *P.H. Davis* 19123 (K). B6 Sivas: Hafik, Çınarcık village, 1400 m, 25.07.1979, *T. Ekim* & *B. Çetin s.n.* (KNYA); 15 km from Sivas to Kayseri, Domuzlukıçı, slopes, 1500 m, 06.08.1985, *Ş. Civelek* 2076 (ANK); Sarkışla, steppe, 1100–1200 m, 10.07.2009, *A. İlçim* & *L. Behçet* 1761 (VANF); between Yıldızeli and Sivas, 30 km to Sivas, 1340 m, 26.06.1974, *K. Karamanoğlu*, & *M. Koyuncu s.n.* (HUB); 3 km from Yıldızeli to Tokat, steppe, 1375 m, 26.06.2011, *S. Karaman* 2616; *ibid.*, 23.08.2011, *S. Karaman* 2694; 46 km from Gürün to Pınarbaşı, roadsides, 1700 m, 16.07.2013, *S. Karaman* 2779; Yozgat: Çayıralan, Akdağ, calcareous slopes, 1600–1750 m, 16.07.1980, *T. Ekim* 4754 (ANK); B7 Tunceli: Pülümür, igneous slopes, 1600 m, 11.07.1957, *P.H. Davis & Hedge* 30926 (ANK, K); Erzurum: Çimin, Keşiş Mountain, rocky slopes, 2200 m, 26.07.1957, *P.H. Davis & Hedge* 31705 (ANK, K). B8 Erzurum: 18 km from Hınıs to Pasinler, S side of calcareous pass, 1900 m, 12.07.1966, *P.H. Davis* 46334 (K); Horasan, Hacı Ahmet village, steppe, 1750 m, 15.07.2011, *S. Karaman* 2662. B9 Van: Erçiş, Pay village, steppe, 2050 m, 14.06.2012, *S. Karaman* 2716; Horasan–Ağrı road, steppe, 2090 m, 14.07.2011, *S. Karaman* 2654; Horasan–Karaorgan, marly hillsides, 1650 m, 07.07.1957, *P.H. Davis & Hedge* 30754 (K); 18 km from Hınıs to Pasinler, S side of calcareous pass, 1900 m, 12.07.1966, *P.H. Davis* 46334 (K); Palandöken Mountain, 40 km from Çat to Erzurum, rocky igneous slopes, 2000 m, 27.07.1966, *P.H. Davis* 47413 (K); Erzurum road, 23.07.1947, *A.Heilbronn et M.Başarman s.n.*, ISTF 8034 (ISTF); Kop Mountain, 25.07.1947, *A.Heilbronn* 8115 (ISTF); İlica–Tezcan, 1900 m, 10.07.1957, rocky igneous slopes, *P.H. Davis & Hedge* 30888 (ANK, K); Karakaya Mountain from Ağvıran pass, 15 km N of Hınıs, upland ridge, limestone, 2250 m, 20.08.1967, *CM & W* 3675; Palandöken Mountain, 40 km from Çat to Erzurum, rocky igneous slopes, 2000 m, 27.07.1966, *P.H. Davis* 47413;

Karakaya Mountain, 15 km N of Hınıs, limestone, steppe, 2250 m, 20.08.1967, *Watson et al.* 3675; Kop Mountain pass, stony slopes, 8000 ft., 09.08.1962, *P. Furse* 3800 (K); Erzincan: Erzincan, Kızlarkalesi, steep slopes, steppe, 2100 m, 28.07.1990, *A. Güner* 7819 (HUB); Bitlis: Süphan Dag, above Adilcevaz, rocky S slopes, 9500 ft., 28.08.1954, *P.H. Davis & O. Polunin* 24702 (K); Ağrı: Suluçem (Musun) to Balık G., sloping meadow in gully, 2150 m, 23.07.1966, *P.H. Davis & O. Polunin* 47257 (E); Van: Lake Van, NE corner, 5 km SW of Sivekar, lake side meadow marsh, dense pasturage, 1750 m, 01.06.1966, *Watson et al.* 1407 (E); 5 km S of Bendimahi (Erciş), steppe slopes, 1750 m, 03.06.1966, *P.H. Davis* 44214 (E); Erciş, Pay village, steppe, 2095 m, 10.08.2011, *S. Karaman* 2677; Erciş, Hasanabdal village, steppe, 1950 m, 26.06.2005, *O. Karabacak* 3656 (VANF); Muradiye, between Beşparmak village and Köseveli Mountain, 2300 m, 17.07.1997, *L. Behçet & M. Ünal* 1620 (VANF); Gürpınar, Hacı village, roadsides, steppe, 2150 m, 10.07.2003, *M. Ünal* 864 (VANF); Muradiye, 3 km to Görecek village, steppe, 1900 m, 15.07.2002, *L. Behçet & O. Karabacak* 3434 (VANF); Muradiye, vicinity of Şeytan bridge, steppe, 1730 m, 18.06.2011, *S. Karaman* 2576; *ibid.*, 12.07.2011, *S. Karaman* 2644; 5 km S of Bendimahi (Erciş), steppe, 1750 m, 03.06.1966, *P.H. Davis* 44214 (E); Muradiye, Köprü village, Neri hills, steppe, 2005 m, 18.06.2011, *S. Karaman* 2581; Gürpınar, above Koçgüden village, steppe, 2200 m, 27.06.2001, *M. Ünal* 5319 (VANF); Gürpınar, 2 km to Bölmeçalı village, steppe, 2250 m, 27.06.2002, *M. Ünal* 7142 (VANF); Muradiye, Kemerköprü village, Akça Mountain, Neri hills, steppe, 2846 m, 21.06.2001, *O. Karabacak* 1844; Özalp, Sugeçer village, steppe, 2100 m, 23.06.2013, *S. Karaman* 2761; 10 km east of Erçek, steppe, 1914 m, 20.06.2011, *S. Karaman* 2592; Muradiye, from Adaklı village to Süphan Lake, road sides and steppe, 2300 m, 19.06.2011, *S. Karaman* 2584; 6 km from Obus village to Van, steppe, 2350 m, 20.07.2013, *S. Karaman* 2780; Çaldıran–Ağrı road, steppe, 12.07.2011, *S. Karaman* 2646; Erciş, between Erciş and Altındere, above Koçgüden dam, steppe, 1800 m, 19.06.2011, *S. Karaman* 2588; *ibid.*, 12.07.2011, *S. Karaman* 2643; Bitlis: crater of Nemrut Mountain, rough pasture, 2400 m, 11.08.1956, *McNeill* 559 (E); E flank of Nemrut Mountain, between Tatvan and Bitlis, 1829 m, 03.07.1954, *P.H. Davis & O. Polunin* 23542 (K); Tatvan, Kirkor Mountain, mixed forest, 1900–2700 m, 18.07.1972, *H. Peşmen* 3060 (HUB); Süphan Mountain, above Adilcevaz, 2896 m, 28.08.1954, *P.H. Davis & O. Polunin* 24702 (ANK); Nemrut Mountain, Tatvan, 1829 m, 03.07.1954, *P.H. Davis & O. Polunin* 23542 (ANK); SE face of Nemrut Mountain, volcanic ash, 3048 m, 30.06.1966, *M. Tong s.n.*; Adilcevaz, 07.07.1947, *C. Kass s.n.*, ISTF 7048 (ISTF); around Köy Hizmetleri, steppe, 1650 m, 01.07.2002, *L. Behçet & A. Altıok* 2668 (VANF); Adilcevaz, steppe,

2400–2700 m, 09.07.1987, *L. Behçet* 310 (VANF); Adilcevaz, Süte plateaus, near Süte lake, alpine meadows, 2000 m, 11.08.1993, *Y. Altan* 5505 (VANF); Tatvan, east slopes Kirkor Mountain, 1800 m, 23.07.1972, *H. Peşmen* 3099 (HUB); Nemrut Mountain, east slopes, steppe, 1950 m, 13.07.1956, *Hub-Mor., H. Birand & K. Karamanoğlu* 282 (ANK); W side of Pelli Mountain pass, schistose slopes, 2200 m, 07.07.1966, *P.H. Davis* 46012 (K); Ağrı: Patnos, Top Mountain, above Kışkapan village, steppe, 2000 m, 25.06.2006, *H. Emlik* 434 (VANF); between Horasan and Ağrı, pass Velibaba Gedik in etwa, 2500 m, 04.08.1962, *F. Höpflinger s.n.* (K); Horasan–Karaorgan, marly hill sides, 1650 m, 07.07.1957, *P.H. Davis & Hedge* 30754 (K); Muş: Malazgirt, north of Kardeşler village, steppe, 1672 m, 06.07.2006, *L. Behçet, F. Özgökçe & M. Ünal* 1351 (VANF); Malazgirt, between Aktuzla and Karıncalı, steppe, 1650 m, 23.06.2001, *L. Behçet & S. Almaner* 1592 (VANF); Malazgirt, around İyikomşu and Kırımkaça villages, steppe, 2095 m, 01.08.2007, *L. Behçet, F. Özgökçe & M. Ünal* 3360 (VANF). B10 Ağrı: between Tutak and Hamur, steppe, 23.07.2011, *S. Karaman* 2614; between Doğubeyazıt and Diyadin, dry clay to sandy loam, 1067–1220 m, 29.07.1969, *Hewitt* 172 (K); Doğubeyazıt, steppe, 1900–2100 m, 24.06.2013, *S. Karaman* 2783; Iğdır: 20 miles from Iğdir, hillside, dry loam, 1829–2134 m, 11.08.1970, *Hewitt* 352 (K); Ardahan: 5 km from Digor to Kars, steppe, 2050 m, 21.07.2013, *S. Karaman* 2794; Kars: Aralık, K. Ağrı Mountain, above Sultantopu Karakol, 2000 m, 05.07.1984, *M. Tanker, F. İlisulu & M. Koyuncu* 6941 (GAZI); Van: Başkale, Çaldıran village, south slopes of Türktepe, steppe, 2050 m, 01.07.2007, *L. Behçet & D. Avlamaz* 802 (VANF); Özalp, between Eğribelen and A. Tulgalı villages, steppe, 2150 m, 07.07.1997, *F. Özgökçe* 4875 (VANF); Özalp, Salmanlı village, steppe, 2059 m, 20.06.2011, *S. Karaman* 2593; Başkale, Geyna Mevkii, steppe, 1950 m, 03.06.2007, *D. Avlamaz* 347 (VANF). C5 Niğde: Dikilitaş, *Quercus pubescens* scrub, 1600 m, 21.07.1995, *N. Adıgüzel & Z. Aytaç* 7187 (GAZI). C7 Diyarbakır: Karaca Mountain, Turbelek, open ground on mountain, 5800 ft., 24.06.1958, *E.S. Brown* 548; *ibid.*, 11.07.1958, *E.S. Brown* 674 (K). C9 Van: Gürpınar, southeast of Çatakdişi village, steppe, 2500 m, 26.07.2006, *M. Ünal & F. Özgökçe* 111 (VANF). C10 Hakkâri: between Beytüşşebap and Uludere, Tanin Mountain, 2500 m, 25.07.1974, *M. Rix* 2355 (HUB).

Astragalus qoturensis Podlech

B9 Van: between Başkale and Hoşap, Güzeldere pass, steppe, 2760 m, 13.07.2011, *S. Karaman* 2653.

Astragalus rubrostriatus Bunge

C9 Van: Gürpınar, between Kırkgeçit and Taşınocak, steppe, 2207 m, 22.06.2011, *S. Karaman* 2603; Gürpınar, between Dikbiyık village and Tırşin Plateau, steppe, 2400 m, 03.08.2007, *M. Ünal & F. Özgökçe* 2371 (VANF).

Astragalus sosnowskyi Grossh.

Turkey. A8 Erzurum: Dutlu Mountain, NW Oltu, 2300 m, 15.07.2011, S. Karaman 2666; *ibid.*, 11.08.2011, S. Karaman 2666; *ibid.*, 16.07.1989, Podlech (G, GAZI, MSB); Narman–Oltu road, 5 km from Narman, roadside, 1327 m, 16.06.2011, S. Karaman 2569; Tortum–Oltu road 26 km, steppe, 2180 m, 15.07.2011, S. Karaman 2660; oberhalb Orman Evi, 21 km NW Oltu, 2000 m, 08.07.1992, Nydegger 46632 (MSB); Dutlu Mountain, NW Oltu, 16.07.1989, Nydegger 44454 (G, GAZI, MSB); 26 km from Tortum to Oltu, W side of pass, 2200 m, 29.07.1966, P.H. Davis 47545 (M). A9 Kars: Yağmurlu, between Sarıkamış and Karaorgan, 2200 m, 07.07.1957, P.H. Davis & Hedge s.n. (ANK); distr. Kagizman, Mt. Karaorgan, 24.07.1910, Nesterov (MSB). B9 Van: Erciş, east of Koçköprü dam, steppe, 1892 m, 17.06.2007, O. Karabacak 6269 (VANF); Gürpınar, above Koçgüden village, steppe, 2200 m, 27.06.2001, M. Ünal 5318 (VANF); Özalp, Savatlı village, steppe, 2100 m, 08.07.1997, F. Özgökçe 5789 (VANF); Muradiye, above Adaklı village, steppe, 2500 m, 20.06.1998, M. Ünal & L. Behçet 2898 (VANF); Çaldıran, steppe, 2000 m, 12.07.2011, S. Karaman 2639; Çaldıran, 4 km from Gönderme to Çaldıran, steppe, 2075 m, 24.06.2013, S. Karaman 2769; Erciş, Deliçay, Pay village, steppe, 2095 m, 12.07.2011, S. Karaman 2632; *ibid.*, 10.08.2011, S. Karaman 2676.

Astragalus trifoliatrum Hub.-Mor. & V.A.Matthews

Turkey. B9 Van: Gürpınar, between Hamurkesen and Işıkpınar villages, steppe, 2155 m, 13.07.2011, S. Karaman 2650; *ibid.* 13.07.2011, S. Karaman 2651; Kurubaş pass, steppe, 2000 m, 20.07.2013, S. Karaman 2781; Ereğ Mountain, western slopes, steppe, 2000 m, 10.08.1989, Z. Aytaç & Metzger 1991 (GAZI); 7 km from Van to Erçek, igneous slopes, steppe, 1850 m, 05.06.1966, P.H. Davis 44283 (K, E); Hoşap, dry mudstone hills, near Hoşap Castle, 10.07.1968, E.M. Rix et al. 827 (E). B10 Van: Özalp, Dambelk village, steppe, 2200 m, 05.07.1997, F. Özgökçe 5780 (VANF).

Astragalus uraniolimneus Boiss.

Turkey. A8 Artvin: Yusufeli, Ziyaret Mountain, Narlık plateau, alpine meadows, 2630 m, 23.07.2013, S. Karaman 2797; *ibid.*, 03.09.2011, S. Karaman 2799; Yusufeli, Öğden, from Kapreşet to Ziyaret Mountain, 2500 m, 05.08.1984, N. Demirkuş 2418 (HUB). A9 Erzurum: Olur, Kekikli village plateaus, Şiriş, 1750–2300 m, 01.08.1984, N. Demirkuş 2298 (HUB); Gürpınar, 2 km to Koçgüden village, steppe, 2645 m, 21.06.2011, S. Karaman & F. Taeb 2605. B9 Van: Gürpınar, above Koçgüden village, steppe, 2950 m, 31.07.2002, M. Ünal 7810 (VANF); Gürpınar, south slopes of Başet Mountain, steppe, 2600 m, 14.06.2001, M. Ünal 5165 (VANF); Muradiye, Pirreşit Mountain, steppe, 2734 m, 18.06.2011, S. Karaman 2582; Muradiye, above Babacan village, steppe, 2062 m, 18.06.2011, S. Karaman 2577;

Güzeldere pass, steppe, 2650 m, 22.06.2013, S. Karaman 2755; Hoşap, Çuh pass, steppe, 2700 m, 22.06.2013, S. Karaman 2749; Özalp, Sugeçer village, steppe, 2800 m, 28.06.1997, F. Özgökçe 4138 (VANF). B10 Van: Özalp, between A.Koçkırın and Damlacık villages, Boncuklutepe, steppe, 2363 m, 05.07.1997, F. Özgökçe 4745 (VANF). C10 Hakkâri: Cilo Mountains, rocky ground near glacier stream, 2700 m, 15.07.1965, R. Fedden & P.McColl 63 (K).

Astragalus velenovskyi Nábělek

Turkey. A9 Ağrı: Ağrı to Horasan, W Eleşkirt, Weg nach Hayrangöl, 2650 m, 17.08.1987, Engel 140 (MSB); B9 Van: Zap deresi, Başkale, steppe, 02.08.1954, P.H. Davis & O. Polunin 23796 (ANK, K); between Başkale and Hakkari, 1894 m, 07.07.2014, S. Karaman 2884 & Z. Aytaç; Erciş, between Deliçay and Pay villages, steppe, 2000 m, 12.07.2011, S. Karaman 2633; *ibid.*, 23.06.2013, S. Karaman 2759.

Astragalus zohrabi Bunge

Turkey. A8 Bayburt: in collibus aridis prope Bayburt, 2070 m, 19.06., J.C. Archibald (K); Baibout, 19.06.1862, Bourgeau 68 (G, K, MSB); *dto.*, Zohrab (K); 2 km N Bayburt toward Of, 1350 m, 12.06.1988, Nydegger 43317 (G, MSB); Bayburt toward Aşkale, near Bayburt, 1650 m, 21.08.1987, Engel 156 (MSB). B9 Bitlis: outcrop by Lake Van, 24 km W of Erciş, dry stony limestone hillside above initial scree, 2000 m, 31.05.1960, Cheese & Watson 1388 (E); Van: 6 km from Timar (Canik) to Van, steppe, 1850 m, 03.06.1966, P.H. Davis 44188 (E); Çatak, Kavuşşahap Mountain, rocky slopes, 2743 m, 24.07.1954, P.H. Davis & O. Polunin 23049 (E); Güzeldere pass (Çuh pass), between Başkale and Hoşap, screes and open gravelly slopes, 2700 m, 05.07.1986, J.C. Archibald s.n. (E); 34 km from Başkale to Hoşap, Güzeldere pass, rocky slopes in sandy soil (mountain steppe), 2800 m, 03.07.1966, P.H. Davis 45973 (E); Özalp, steppe, 2010 m, 23.06.2013, S. Karaman 2764; Van–Erçek road, 7–8 km, steppe, 1907 m, 20.06.2011, S. Karaman 2589; between Bahçesaray and Yukarınarlı, steppe, 2550 m, 11.07.2011, S. Karaman 2626; Güzeldere pass, steppe, 2650 m, 22.06.2013, S. Karaman 2751; Gürpınar–Kırkgeçit road, after Bölmeçalı road, steppe, 2130 m, 22.06.2011, S. Karaman 2608; Gürpınar, 2 km to Koçgüden village, 2645 m, 22.06.2011, S. Karaman 2606; Erçek, roadsides, 1894 m, 20.06.2011, S. Karaman 2590; Gürpınar, north slopes of Zerneş dam, steppe, 1900–2600 m, 28.05.2008, İ. Demir 330 (VANF); between Van and Hakkari, 2 km to Güzeldere pass, steppe, 2700 m, 23.08.1983, N. Adıgüzel 1988 (ANK, VANF); Kurubaş pass, Dilan çeşmesi, steppe, 2000 m, 12.06.1993, Y. Altan 4880 (VANF); between Güzelsu and Başkale, Güzeldere pass, steppe, 2700 m, 30.06.2001, M. Armağan 1560 (VANF); Gevaş, Artos Mountain, 2591 m, 14.07.1954, P.H. Davis & O. Polunin 22733 (ANK, K); Çatak, Kavuşşahap Mountain, 2743 m, 24.07.1954, P.H. Davis & O. Polunin 23049 (K); 20

km S of Hoşap, dry stony slopes, 2743 m, 07.1965, *E.M. Rix* 289 (K); Gürpınar, above Koçgüden village, steppe, 2200 m, 27.06.2001, *M. Ünal* 5320 (VANF); Erciş, northeast of Aksakal village, steppe, 2484 m, 29.07.2007, *O. Karabacak* 7312 (VANF); 6 km from Timar (Canik) to Van, steppe, 1850 m, 03.06.1966, *P.H. Davis* 44188 (K); Güzeldere pass, 34 km from Başkale to Hoşap, S side of caleoneous pass, 2800 m, 12.07.1966, *P.H. Davis* 45973 (K); Gürpınar, between Zerne dam and Üçgen village, steppe, 1700–1900 m, 10.06.2007, *İ. Demir* 456 (VANF); Gürpınar, 2 km to Bölmeçalı village, steppe, 2250 m, 27.06.2002, *M. Ünal* 7142 (VANF). B10 Van: Özalp, between Aşağı Koçkiran and Yukarı Koçkiran villages, Beyzade Çayı, steppe, 2300 m, 04.07.1997, *F. Özgökçe* 4637 (VANF); Gevaş, Artos Mountain, 2590 m, 14.07.1954, *P.H. Davis & O. Polunin* 22733 (MSB); N side of Artos Mountain, S of Gevaş, 2000–2200 m, 22.07.1978, *Ehrendorfer, Sorger et al.* 787 93–11 (MSB); Pelli Mountain, between Van and Tatvan, 2000–2500 m, 29.06.1968, *Rix et al.* 728 (M); slopes above Ercek lake, 1800 m, 10.06.1985, *Archibald* 6627 (M); Gürpınar to Başkale, Güzeldere pass, 2900 m, 12.08.1987, *Engel* 118 (MSB); Van to Kurubaş pass, 2000 m, 12.06.1993, *Altan* 4880 (GAZI). Ağrı: east of Doğubeyazıt İshak Paşa Sarayı, steppe, 1900–2100 m, 27.06.1988, *Z. Aytaç* 2383 (ANK); Doğubeyazıt, 1900–2100 m, 27.06.1988, *Z. Aytaç* 2383 (GAZI); C10 Hakkari: 21 km from Bajirge to Yüksekova, shaley hill sides, 2230 m, 18.06.1966, *P.H. Davis* 45232 (K); Mor Dag, Near Bajirge Yüksekova pass, limestone slopes, 3100 m, 16.08.1967, *A, C&W* 3633 (K).

Sect. *Macrophyllum*

Astragalus cephalotes Banks & Sol.

Turkey. A4 Kastamonu: Taşköprü, Bölükyazı village, 04.06.1967, *T. Baytop* 11338 (E); Kırıkkale: Delice, Bayakavazar, c. 1150 m, 26.06.1991, *Yaman* 1015 (GAZI). A5 Çorum: before Osmancik, rocky scrub, 600 m, 31.05.1969, *Tobey* 2655 (E). A8 Artvin: Şavşat, Yavuzlar village, naked slopes, 1490 m, 16.07.2011, *S. Karaman* 2669; Şavşat, between 2 km from Köprülü to Ciritdüzü, naked slopes, 1400 m, 16.07.2011, *S. Karaman* 2670; Şavşat, Yalnızçam pass, naked slopes, 2630 m, 22.07.2013, *S. Karaman* 2793; from Yusufeli to Öğdem, forest openings, 1700 m, 22.07.2013, *S. Karaman* 2795; Çoruh Gorge, between Artvin and Ardanuç, rocky igneous slopes in open oak scrub, 26.06.1957, *P.H. Davis & Hedge* 30054 (E); 6 km W Altıparmak NW Yusufeli, 18.06.1988, 1780 m, *Nydegger* 43390 (MSB). A9 Erzurum: Oltu, Dutlu Mountain, Eski Dutlu village, 2200–2500 m, 15.07.2011, *S. Karaman* 2665. B5 Kayseri: Sarız, Yolak (Yesilkent) Dayoluk village, Koca Mountain hill, 1750 m, 05.08.1988, *Aytaç* 2513 (GAZI). B6 Malatya: 50 km na poludnie od Malatya, droga do Pazarcik, 17.05.1975, *K. Browicz & J. Zielinski* 250 (E); Kozluk, in the upper course of the river above İsmet Paşa, rocky hillsides, 08.06.1968, *R. Alava* 7074

(E); Aghateh (Akça Mountain) to Arga, 16.07.1906, Post 134 (G); 50 km N Malatya, Pazarcik, 17.05.1975, *Browicz & Zielinski* 250 (E); near vill. Kozluk, river above Izmet Pasa, 08.06.1968, *Alava* 7074 (E). B7 Elazığ: Elazığ–Kale, 22 miles E of Elazığ, marly vineyards, 1300 m, 04.06.1957, *Davis & Hedge* 28940A (E); Elazığ–Pertek, banks, 1300 m, 06.06.1957, *Davis & Hedge* 29197 (E); Tunceli to Elazığ, zw. Munzur Suyu und Peri Suyu, 1050 m, 25.08.1987, *Engel* 170 (MSB); Elazığ to Pertek, 1300 m, 06.06.1957, *Davis & Hedge* 29197 (E, M); Diyarbakir: Ergani, 10 km from Diyarbakir, 750 m, 01.06.1957, *Davis & Hedge* 28798 (E). C4 Konya: S Hadim Taşkent, 1450 m, 19.10.2002, *Ulrich* A26 (MSB); Sultandagh, supra Jasian ditionis Akscheher, 100 m, 01.07.1899, *Bornmüller* 4415(K). C5 Adana: Karınca Mountain, 2 miles NE of Alpu, 3 miles N of Pozanti, pinewood floor, 1100 ft., 18.06.1971, *Fz.* 428 (E); Adana: Feke, 10.06.1976, *Y. Akman* 6102 (E); N. Pozanti, E slopes of Toros Mountain, 1000 m, 13.07.1971, *Abb. Uni. Aman. Exp. B170* (E); Karinka Da., 2 miles NE Alpu, 3 miles N Pozanti, 18.07.1971, *F2* 428 (E); Pozanti to Tekir Yayla, *M. Vural* 6866 (GAZI); Osmaniye, Yarpuz vill., Soku area, 1500 m, 20.07.1988, *Z. Aytaç* 2439 (GAZI); Mersin: S foot of Bolkar Mountain, between Yavca and Arslan villages, NE of Mersin, 01.06.1991, *Boratynski et al.* 6856 (MSB); Delikkaya–Cambarlı, 810 m, 26.06.1972, *Uslu* 1550 (E); Gülek Bogazi, 1300 m, 20.06.1987, *Nydegger* 42877 (MSB); Zaurus occid. pr. Gülek, 1836, *Kotschy* 132 (G–BOIS, K); Taurus, pres du défilé des Portes Ciliciennes, 23.06.1855, *Balansa* 485 (G, MSB); Gülek Bogazi, 1300 m, 20.06.1987, *Nydegger* 42877 (MSB). C6 Kahramanmaraş: 2 km from Çağlayançerit to Bozlar, 1000 m, 22.07.2011, *S. Karaman* 2673; Ahir Mountain above Maraş, 1100 m, 02.05.1957, *P.H. Davis & Hedge* 27472 (E); Valley of Tekir river near Sucati, NE Alikayası, stony places, 06.06.1991, *Boratynski et al.* 6887 (MSB); Öksüz Mountain, Tarla kenarı, 1400–1500 m, 14.06.1987, *H. Duman* 3277 (GAZI); *ibid.*, 26.07.1987, *H. Duman* 3766 (GAZI); Engizek Mountain, Aksu, 1000–1100 m, 24.05.1987, *H. Duman* 2907 (GAZI); above Maraş, Balls 954 (E); [montis Kara Kirtdag] supra Seytun, 04.08.1865, *Hausknecht* 2 (G–BOIS). Gaziantep: Campus of Gaziantep University, steppe, 1050 m, 04.06.2013, *S. Karaman* 2733; W of Gaziantep, 19.05.1972, *D & U. Ruckbrodt s.n.* (E); Aintab [Gaziantep], 20.05.1937, *Frère Louis* 94 (MSB); circa Aintab, 610 m, 20.06.1865, *Hausknecht s.n.* (G–BOIS); S of Kilis, 16.05.2005, *Rabaute s.n.* (MSB); Hatay: Amanus, env. of Belen, 24.07.1862, *Kotschy* 76 (E, G–BOIS, MSB). C7 Urfa: 15 km from Urfa to Hilvan, 18.05.1957, *Davis & Hedge* 28255 (E); circa Orfa [Urfa], 15.05.1865, *Hausknecht* 45 (G–BOIS). C8 Diyarbakir: Diyarbakir–Ergani, 10 km from Diyarbakir, bazalt field, 750 m, 01.06.1957, *Davis & Hedge* 28798 (E). Mardin: Mardin, eroded banks, 1100 m, 24.05.1957, *Davis & Hedge* 28531 (E); Bakakri, 02.07., *P. Sintenis* 1283 (E).

***Astragalus dipodurus* Bunge**

Turkey. B9 Ağrı: Patnos, Erkeli village, steppe, 2300 m, 04.10.2000, *L. Behçet* 6349 (VANF); Bitlis: Süphan Mountain, Erkeçili village, stony and rocky slopes, kayalık, 2300–2500 m, 02.07.2000, *L. Behçet* 6319 (VANF); Van: Muradiye, Babacan village, Derviş plateau, steppe, 2400 m, 24.06.2002, *O. Karabacak* 3256 (VANF). C4 Konya: Karasınır, steppe, field margins, 1100 m, 15.07.1965, *Ledingham* et al. 4351 (E); *ibid.*, 07.07.2011, *S. Karaman* 2625; *ibid.*, 25.08.2011, *S. Karaman* 2693; 24 km S. Seydişehir toward Bozkir, 1050 m, 30.07.1992, *Nydegger* 46898 (MSB); Karaman: Ermenek, Göktepe, Dumlugöze village, Gavur alanı, 1300 m, 16.07.1984, *H. Sümbül* 3176 (HUB). C6 Kahramanmaraş: between Bozlar and Çağlayancerit, moving slopes, 1000 m, 22.07.2011, *S. Karaman* 2673; Gaziantep: Arat Mountain, steppe, 910 m, 04.06.2013, *S. Karaman* 2736; Gaziantep: circa Aintab, 20.06.1865, *Hausknecht* 47 (G–BOIS); Urfa: 8 km S Halfeti to Birecik, 600 m, 27.05.1987, *Nydegger* 42523 (MSB); Kahramanmaraş: Çağlayancerit–Bozlar, moving slopes, 1000 m, 02.06.1987, *H. Duman* 3103 (GAZI); Çağlayancerit, Öksüz Mountain, Ziyaret hill, north slopes, 1300–1600 m, 06.07.1991, *Z. Aytaç & H. Duman* 4065 (GAZI); 3 km from Çağlayancerit to Pazarcık, north of Bozlar village, moving slopes, 1580–1600 m, 14.08.1997, *Z. Aytaç, N. Adıgüzel, S. Zarre & H. Duman* 6605 (GAZI); Berit Mountain, 1865 m, *Hausknecht s.n.* (G–BOIS); 15 km from Pazarcık to Çağlayancerit, 580 m, 14.08.1997, *Zarre* 157 (E, MSB); Çağlayancerit to Bozlar, 1000 m, 14.08.1997, *Zarre* 173 (MSB). C10 Hakkari: Zap stream, 30 miles south of Başkale, *Davis & O. Polunin* 23820 (ANK, K).

***Astragalus isauricus* Hub.-Mor. & V.A. Matthews**

Turkey. C4 Konya: between Hadim and Taşkent, 3–5 km from Hadim, steppe, 1580 m, 11.06.2011, *S. Karaman* 2549; *ibid.*, 24.08.2011, *S. Karaman* 2690; Karaman: Ermenek, Damlaçalı, *Cedrus libani* A.Rich forest, 1750 m, 07.07.1978, *H. Peşmen* 960 (E).

***Astragalus longifolius* Lam.**

Turkey. A8 Erzurum: between Köprü village and Narman, steppe, 1950 m, 15.07.2011, *S. Karaman* 2658. B7 Elazığ: between Elazığ and Bingöl, Hoşmat Karayolları Park, protected area, 1200 m, 21.06.1983, *Ekim* 7310 (GAZI); c. 25 km N Erzurum toward Tortum, 1750 m, 18.08.1987, *Engel* 145 (MSB); Erzurum to İspir, vor İspir, 2150 m, 19.08.1987, *Engel* 151 (MSB). B9 Van: Erciş, between Hasanabdal and İşbaşı villages, moving slopes, 1855 m, 19.06.2011, *S. Karaman* 2587; *ibid.*, 12.07.2011, *S. Karaman* 2647; *ibid.*, 10.08.2011, *S. Karaman* 2678; *ibid.* 1950 m, 26.06.2005, *O. Karabacak* 3647 (VANF); Muradiye, above Şeytan bridge, southern slopes, steppe, 2000 m, *O. Karabacak & L. Behçet* 2553 (VANF); Bitlis: Tütün Bakımevi, steppe, 1500–1600 m, 23.06.1983, *N.*

Adıgüzel 1988 (GAZI); Nemrut Mountain, 1800 m, *P.H. Davis* 23546 (ANK); Tatvan, Nemrut Mountain, volcanic rocky slopes, 2900 m, 18.06.1972, *H. Peşmen* 2896 (HUB); E flank of Nemrut Dag, 1829 m, 03.07.1954, *P.H. Davis & O. Polunin* 23546 (E, K); Nemrud Mountain, im Krater am Nemrud Gölü, 2300 m, 09.08.1987, *Engel* 102 (MSB); E. flank of Nemrut Mountain 1830 m, 03.07.1954, *P.H. Davis & O. Polunin* 23546 (E). C9 Hakkari: Çukurca, 2 km from Üzümlü to Ceylanlı, rocky slopes, 1450 m, 21.06.2011, *S. Karaman & İ. Kaval* 2598; *ibid.*, 11.08.2011, *S. Karaman* 2683; Çukurca, Marinos Dere above Marunis, 20 km from bridge across Zap, rocky limestone slopes, 1900 m, 21.06.1966, *P.H. Davis* 45780 (E).

***Astragalus oleaefolius* DC.**

Turkey. A8 Gümüşhane: Szandschak Gümüşhane, Nuvena stream, Bajjana Kale, 19.07.1984, *Sintenis* 7142 (E). Erzurum: between Köprüköy and Narman, steppe, 1950 m, 25.08.2011, *S. Karaman* 2692; Horasan, Hacı Ahmet village, road side, 1730 m, 15.07.2011, *S. Karaman* 2657; 50 km from Erzurum to İspir, north of Eğerti village, steppe, 2200 m, 19.07.1990, *H. Duman & Z. Aytaç* 2949 (GAZI); Tortum, 1600 m, 25.07.1984, *N. Demirkuş* 2096 (HUB). B2 Afyon: 20 km from Afyon to Kütahya, road side, 1000 m, 03.08.1993, *Z. Aytaç et al.* 6478 (GAZI). B3 Afyon: Sandıklı, 10–15 km from Sandıklı to Dinar, field margins, 1000 m, 21.08.1993, *H. Duman, Z. Aytaç & A. Dönmez* 5253 (GAZI). B4 Ankara: Haymana, Karacaören, K. Demirhavan hill, stony slopes, steppe, 1040 m, 26.09.1992, *N. Adıgüzel, F. Karavelioğulları & M. Vural* 6212 (GAZI, HUB); Hacıkadın stream, 23.06.1954, *R. Çetlik* 570 (ANK, KNYA); Hacıkadın Mountain, 950 m, 14.06.1944, *B. Kasaphgil* 272 (ANK); Balgat–Orman Çiftliği, field margin, 30.05.1958, *R. Çetlik* 20840 (ANK); Beynam forest, 1300 m, 18.06.1960, *Y. Akman* 8365 (ANK). Çubuk dam, 13.07.1955, *Walter* 1331 (B); 10 km N Ankara, 13.07.1962, *M. & D. Zohary* 337 (MSB). B5 Nevşehir: Göreme, around Elnazar church, field margin, 1140 m, 17.06.1989, *M. Vural, Ü. Kol & N. Adıgüzel* 5150 (GAZI); Aksaray: Taptuk Emre village, garden margins, 1406 m, 07.06.2011, *S. Karaman* 2542; Ylandagh ad Caesaream, 1400 m, 12.8.1856, *Balansa* 942 (G–BOIS). B6 Sivas: Şarkışla–Ortavillage, road side, 1250 m, 27.08.1994, *M. Ekici & A. Dönmez & Z. Aytaç* 6718 (GAZI); Şarkışla, between Orta village and Ortatopaç, road side, 1293 m, 14.06.2011, *S. Karaman* 2557; Şarkışla, 32 km from Şarkışla to Gemerek, road side, 1260 m, 06.06.2013, *S. Karaman* 2738; Malatya: Doğanşehir, Dedeyazı village, Keşiş Mountain, 1800–2000 m, steppe, 28.07.1971, *H. Peşmen* 2614 (HUB). B7 Elazığ: between Elazığ and Bingöl, Hoşmar Karayolları Parkı, protected area, 1200 m, 21.06.1983, *N. Adıgüzel & T. Ekim* 7310 (ANK). B8 Erzurum: between Erzurum and İspir, Eğerti village, Kelkaya hill, limestone slopes, 11.08.1988, *Z. Aytaç* 2561 (GAZI); Erzincan: Egin, Kıl Maghala dagh,

05.06.1890, *Sintenis* 2878(G). B9 Muş: Malazgirt, southeast of Karıncalı village, slopes around Lake Kaz, steppe, 1760 m, 23.07.2006, *L. Behçet, F. Özgökçe & M. Ünal* 1246 (VANF); Ağrı: Patnos, north of Süphan Mountain, rocky slopes, 2500 m, 02.07.2000, *L. Behçet* 6319 (VANF); Erçiş to Ağrı, 20 km vor Patnos bei Karabasan (7–8 km von der Hauptstraße), 2200 m, 15.08.1987, *Engel* 133(MSB); Patnos, between Top Mountain and Karakaya village, steppe, 1553 m, 16.06.2007, *H. Emlik* 814 (VANF); Muş: Malazgirt, Karıncalı village, steppe, 1592 m, 14.07.2007, *L. Behçet, F. Özgökçe & M. Ünal* 3293 (VANF); Van: Erçiş, between Taşkapı village and Ganissipi plateau, steppe, 2144 m, 17.07.2006, *O. Karabacak* 5118. (VANF); Bitlis: Nemrut Mountain, E slopes, mountain steppe, 1950 m, 13.07.1956, *Hub.-Mor., H. Birand & K. Karamanoğlu* 295 (ANK). B10 Van: Başkale, Çaldıran village, stony and rocky places, 2008 m, 01.07.2007, *L. Behçet & D. Avlamaz* 1611 (VANF); Zap Gorge, 30 miles S Başkale, 2.08.1954,

P.H. Davis 23820 (E); Van to Edremit, Doğanlı village, 1750 m, 24.08.1993, *Altan* 5613 (GAZI). C4 İçel: Abanoz–Kazancı, 1300 m, 19.08.1994, *N. Adıgüzel, A. Dönmez & M. Vural* 7154 (GAZI); Konya: 20 km E Seydişehir, 1050 m, 11.10.2001, *Ulrich s.n.*(MSB). C6 Gaziantep: Nizip, 22 km from Nizip to Gaziantep, steppe, 850 m, 04.06.2013, *S. Karaman* 2732; campus of Gaziantep University, steppe, 1050–1100 m, 04.06.2013, *S. Karaman* 2735; Gaziantep, 2000 m, 16.06.1865, *Hausknecht s.n.* (E). C9 Şırnak: Uludere, Hakkari, 1680 m, 20.06.2003, *A. Dönmez* 11299 (HUB). JORDAN: The University Campus, Al-Jubaiha, near Amman, 15.05.1973. Al-Eisawi 1491 (MSB); Transjordan, Ajlun, Wadi Ierkan, 05.07.1941, *P.H. Davis* 3780 (E).

***Astragalus yukselii* Karaman & Aytaç**

C4 Konya: Hadim, 3 km from Hadim to Taşkent, steppe, 1580 m, 11.06.2011, *S. Karaman* 2620 & *Y. Karaman*; ibid., 24.08.2011, *S. Karaman* 2691.