Ann. Bot. Fennici 49: 117–122 ISSN 0003-3847 (print) ISSN 1797-2442 (online)
Helsinki 26 April 2012 © Finnish Zoological and Botanical Publishing Board 2012

Two new species of *Astragalus* sect. *Caprini* (Fabaceae) from Iran

Massoud Ranjbar[1,*], Mohammad-Reza Rahiminejad[2], Roya Karamian[1] & Simin Raufi[1]

[1)] *Department of Biology, Herbarium Division, Bu-Ali Sina University, P.O. Box 65175/4161, Hamedan, Iran (*corresponding author's e-mail: ranjbar@ basu.ac.ir)*
[2)] *Mohammad-Reza Rahiminejad, Department of Biology, Faculty of Sciences, Isfahan University, Isfahan, Iran*

Received 10 Nov. 2010, final version received 5 Mar. 2011, accepted 7 Mar. 2011

Ranjbar, M., Rahiminejad, M.-R., Karamian, R. & Raufi, S. 2012: Two new species of *Astragalus* sect. *Caprini* (Fabaceae) from Iran. — *Ann. Bot. Fennici* 49: 117–122.

Astragalus khosrowabadensis Ranjbar & Karamian *sp. nova* and *A. margonensis* Ranjbar, Rahiminejad & Raufi *sp. nova* (Fabaceae) are described from the Zagros mountain in western Iran. They belong to *Astragalus* sect. *Caprini,* which contains species that are often stemless and with white, basifixed hairs and yellow flowers. The former resembles *A. fabaceus* and the latter is compared with *A. managettae* and *A. pseudopellitus*.

Astragalus (Fabaceae) is the most diverse angiosperm genus in southwest Asia, with ca. 1000 species. With more than 840 species, it is the largest genus in the flora of Iran and the most problematic group in the legume systematics in general (Lock & Simpson 1991, Yakovlev *et al*. 1996, Maassoumi 1998, Karamian & Ranjbar 2005, Ranjbar & Karamian 2002, 2005).

Astragalus sect. *Caprini*, with about 300 species, is the largest section within the genus. It was introduced for the first time by de Candolle (1825). Von Steven (1856) recognized it as a genus, *Myobroma*, but Bunge (1868, 1869) did not accept that. The taxon was returned to its original level by Podlech (1990, 1999a, 1999b). *Astragalus* sect. *Caprini* is the largest section within *A*. subgen. *Astragalus*, belonging to the group of yellow-flowered *Astragali*. The term "yellow-flowered *Astragali*" is used in this paper for the group of species with simple basifixed hairs, which were treated by Bunge (1868, 1869) in the subgenera *Phaca* and *Calycophysa*. This group consists of *A*. sect. *Astragalus*, *A*. sect. *Chronopus*, *A*. sect. *Alopecuroidei*, *A*. sect. *Laxiflori*, *A*. sect. *Caprini* and *A*. sect. *Eremophysa* (Ranjbar & Karamian 2002, 2005).

Astragalus sect. *Caprini* comprises about 120 species in Iran. The plants are commonly found along dry foothills and lower to higher mountain slopes and they are often situated above *Quercus-Juniper* woodlands. The canopy is often formed by *Quercus brantii* in the Zagros mountain in western Iran. In south Iran, they are found at warm, dry sites on mountain slopes and dry foothills, plateaus, and ridges. The greatest diversity is centered in areas with a pronounced dry period, which brings about a rest period for the plants. The plants display very marked features of adaptation of the mesophytic constitution to a specific climatic regime: secondary acaulescence,

Fig. 1. Holotype of *Astragalus khosrowabadensis* in fruiting phase.

a shortened growth period, etc. The distribution area of the section embraces the Mediterranean region, Asia Minor, Armenia, Kurdistan, Iran, Afghanistan, Arabia, NW India and central Asia, reaching in the east as far as Altai. In the west, the plants are distributed to southern Europe, and in the north to central Europe and the steppe and forest-steppe regions of the former USSR.

Studies focusing on *A.* sect. *Caprini* in Iran have been carried out by us since 2001 and some new species have recently been described in the section (Podlech & Maassoumi 1987, Maassoumi 2002). This study is mainly based on herbarium material and field observations during several excursions in Iran. The examined specimens were in vegetative or fruiting phase and they are deposited at BASU. Additionally several sheets have been examined for each species from the following herbaria: W, WU, TARI, FUMH, BASU, Herbarium of Isfahan University, Herbarium of Research Centers of Natural Resources and Animal Affairs of Mashhad, Isfahan, Shiraz, Kerman and Zahedan.

Astragalus khosrowabadensis Ranjbar & Karamian, *sp. nova* (Fig. 1)

Haec species ab Astragalo fabaceo foliis 8.5–10 (nec 12–23) cm longis, foliolis ca. 4- (nec 7- ad 9-) jugis, pedunculo ca. 0.5 (nec 2–8) mm longo glabro (nec trichomatibus albis obtecto), calyce ca. 20 (nec 15–18) mm longo, vexillo ca. 34 (nec 25–28) mm longo, carina ca. 29 (nec 20–24) mm longa, alis 32–33 (nec 22–25) mm longis atque legumine stipiti ca. 6 mm longo insidente (nec sessili) differt.

Holotype: Iran. Kurdestan: Bijar, 60 km before Bijar, around Khosrowabad, 1750 m, 26.V.2007 *Ranjbar 12778* (holotype BASU; isotype MO, TARI, W).

Etymology: The epithet is derived from the village Khosrowabad, near Bijar in the Kurdestan Province, Iran.

Plants acaulescent, ca. 11 cm tall, vegetative parts with loosely spreading 2–3 mm long villous hairs. Stemless or stem 1–2 cm long, erect, at base 1–2 cm in diameter. Stipules yellowish to brown, 8–12 mm long, narrowly triangular to lanceolate, with sparse 0.5–1 mm long villous hairs. Leaves 8.5–9.2 cm long; petiole 2–3 cm long; rachis with sparse to loose 1–3 mm long villous hairs, leaflets in 4 pairs, obcordate to obovate, emarginate, 18–22 × 13–21 mm, glabrous on upper side, underside with appressed white hairs up to 1.5 mm long, sometimes only at margins and midvein. Peduncle mostly ca. 0.5 cm long, glabrous. Racemes loosely branched, ca. 2 cm in diameter, 3-flowered; axis glabrous.

Fig. 2. *Astragalus fabaceus* in fruiting phase.

Bracts yellowish-membranous, 6–7 mm long, ca. 1.5 mm wide, at margins with sparse, spreading, ca. 1 mm long hairs. Flowers pedicellate, pedicels 2.5–4 mm long. Calyx ca. 20 mm long, tubular to slightly campanulate, tube straw-colored, with sparse erect to ascending, ca. 1 mm long hairs; teeth linear to subulate, equal, ca. 4 mm long, with sparse, spreading, 0.5–1 mm long hairs. Corolla yellow, glabrous. Standard ca. 34 mm long; limb ca. 7 mm wide, obovate, slightly emarginate, subabruptly contracted into a claw ca. 15 mm long. Wings 32–33 mm long; limb narrowly oblong, rounded, ca. 10 × 2.5 mm; auricle round, 2–3 mm long, claw ca. 23 mm long. Keel ca. 29 mm long; limb obovate to triangular, subacute, ca. 9 × ca. 4 mm; auricle indistinct, claw ca. 20 mm long. Stamen tube truncate at mouth. Ovary stipitate, stipe ca. 6 mm long, ellipsoid, glabrous; style glabrous. Pods stipitate, stipe ca. 6 mm long, oblong to ovaloid, 30–40 mm long, acute at both ends, rigidly coriaceous, glabrous, bilocular, many-seeded, the beak 2–3 mm long; seeds asymmetrically reniform, 4–5 mm long. Flowering in April and fruit ripening in May and June.

Astragalus khosrowabadensis is a rare endemic in NW Iran and known only from the dry-steppe zone of the submountainous regions around Khosrowabad, near Bijar in the Kurdestan Province. The moderate to heavy grazing pressure in the area may be responsible for the fact that it produces few flowers and fruits. On the other hand, at least in the short term, the occurrences apparently persist in the presence of livestock. This is likely to be because annual reproduction and recruitment are probably not paramount to the survival of this perennial species. However, source-sink paths can vary over a growing season, and the timing as well as the amount of herbivory may influence growth, not only in the current year but also over to subsequent reproductive seasons. *Astragalus khosrowabadensis* resembles *A. fabaceus* especially because of the similar shape of pods and leaflets (Fig. 2). However, it differs from the latter by having clear differences in the size of standard, keel and wing, stipe of pod, and in the number of leaflet pairs (Table 1).

Astragalus margonensis Ranjbar, Rahiminejad & Raufi, *sp. nova* (Fig. 3)

Haec species ab Astragalo managettae foliis 19.5–22.5 (nec 3–4) cm longis, stipulis ca. 13 (nec 20–25) mm longis, foliolis ca. 3- (nec 8- ad 13-) jugis 25–32 × 14–19 (nec 20–48 × 18–43) mm, pedunculo ca. 6 (nec 30–50) mm longo, calyce ca. 21 (nec 16–20) mm longo trichomatibus albis 4–5 (nec 1–3) mm longis obtecto dentibus ca. 11 (nec ca. 2) mm longis atque racemo ca. 4- (nec 10- ad 12-) floro, ab A. pseudopellito

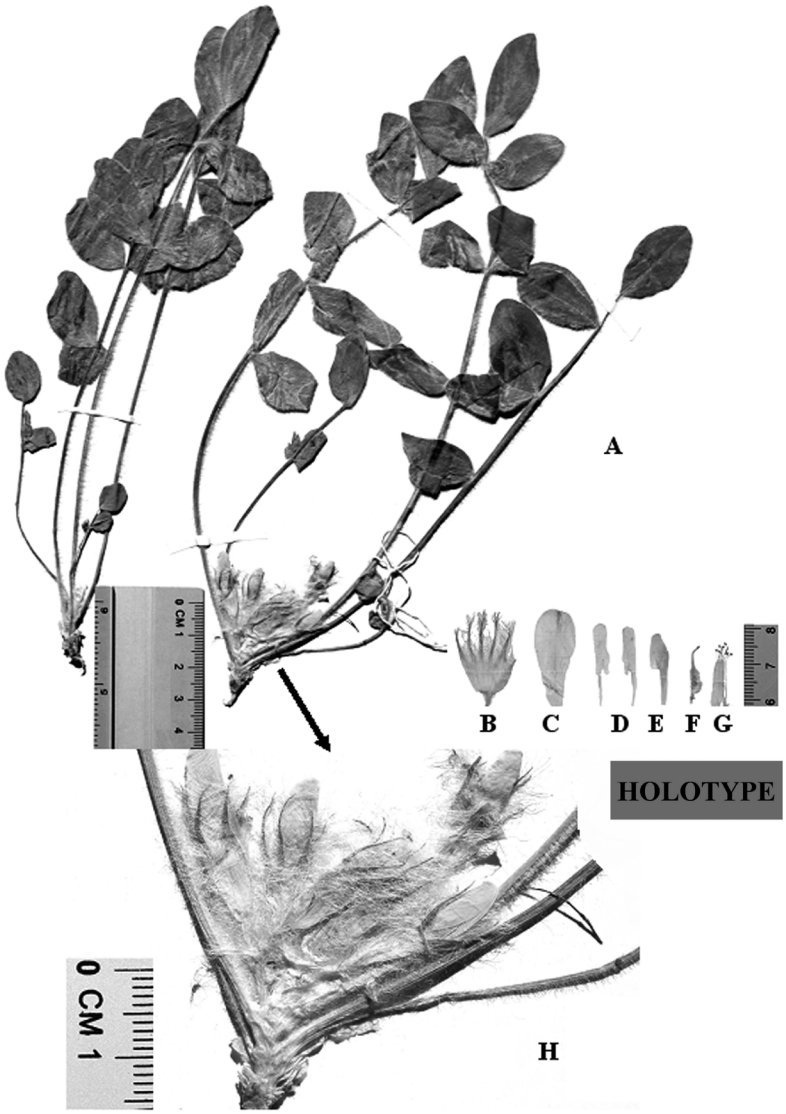

Fig. 3. Holotype of *Astragalus margonensis*. — **A**: Habit. — **B**: Calyx. — **C**: Standard. — **D**: Wings. — **E**: Keel. — **F**: Pistil. — **G**: Androecium. Scale bars: **A** = 3 cm; **B**–**H** = 1.5 cm.

Table 1. Diagnostic morphological characters of *Astragalus fabaceus* and *A. khosrowabadensis*.

Species	*A. khosrowabadensis*	*A. fabaceus*
Stem length	ca. 30 mm	stemmed or stemless
Leaf length	8.5–10 cm	12–23 cm
Petiole length	2–3 cm	3–7 cm
Leaflet pair number	4 pairs	7–9 pairs
Peduncle length	0.5 mm	2–8 mm
Peduncle indumentum	glabrous	hairy
Flower number	ca. 3	7–12
Standard length	ca. 34 mm	25–28 mm
Keel length	ca. 29 mm	20–24 mm
Wing length	32–33 mm	22–25 mm
Calyx length	ca. 20 mm	15–18 mm
Pod stipe length	stipitate, ca. 6 mm	sessile

Table 2. Diagnostic morphological characters of *Astragalus managettae*, *A. pseudopellitus* and *A. margonensis*.

Species	*A. margonensis*	*A. pseudopellitus*	*A. managettae*
Stem length	stemless	ca. 30 mm	stemmed or stemless
Leaf length	19.5–22.5 cm	7–15 cm	3–4 cm
Petiole length	90–105 mm	15–30 mm	60–130 mm
Stipule length	ca. 13 mm	7–12 mm	20–25 mm
Leaflet pair number	ca. 3 pairs	8–15 pairs	8–13 pairs
Leaflet length	25–32 mm	5–10 mm	20–48 mm
Leaflet width	14–19 mm	3–6 mm	18–43 mm
Peduncle length	ca. 6 mm	5–10 mm	30–50 mm
Flower number	ca. 4	2–4	10–12
Standard length	ca. 28 mm	24–25 mm	26–32 mm
Keel length	ca. 20.5 mm	20–21 mm	22–27 mm
Calyx length	ca. 21 mm	15–20 mm	16–20 mm
Calyx teeth length	ca. 11	7–9	ca. 2
Calyx hair length	4–5 mm	0.5–3 mm	1–3 mm

foliis 19.5–22.5 (nec 3–4) cm longis, stipulis ca. 13 (nec 20–25) mm longis, foliolis ca. 3- (nec 8- ad 15-) jugis 25–32 × 14–19 (nec 5–10 × 3–6) mm, pedunculo ca. 6 (nec 5–10) mm longo atque calyce ca. 21 (nec 15–20) mm longo trichomatibus albis 4–5 (nec 0.5–3) mm longis obtecto dentibus ca. 11 (nec 7–9) mm longis differt.

HOLOTYPE: Iran. Kohgilouyeh and Boirahmad: Yasuj, 25 km from Yasuj to Margon, 2000 m, 25.IV.2002 *Aryavand & Dehghan 12497* (holotype BASU).

ETYMOLOGY: The epithet is derived from the village Margon in the Kohgilouyeh and Boirahmad Province, Iran.

Plants ca. 22.5 cm tall, in vegetative parts with dense 1.5–2.5 mm long villous hairs. Stemless or stem ca. 10 mm long, erect, at base 2–4 mm in diameter, very finely striate. Stipules yellowish to brown, 12–13 mm long, narrowly triangular to lanceolate, with dense 0.6–1.2 mm long villous hairs. Leaves 19.5–22.5 cm long; petiole 9–10.5 cm long, rachis with loose to dense 1–2.5 mm long villous hairs, leaflets in 3 pairs, ovate to elliptic to obovate, 25–32 × 14–19 mm, with dense, spreading villous hairs. Peduncle mostly ca. 0.6 cm long, with loose, spreading hairs, up to 3.5 mm long. Racemes dense, ovate, ca. 3 cm in diameter, 7-flowered; axis with rather loose long hairs. Bracts yellowish-membranous, 6–8 mm long, ca. 1 mm wide, at margins with loose, spreading 3–3.5 mm long hairs. Flowers subsessile. Bracteoles ca. 6 mm long, ca. 0.4 mm wide, with loose, spreading, 1.5–2 mm long villous hairs. Calyx ca. 21 mm long, turbinate-campanulate, tube straw-coloured, teeth green, with loose, erect to ascending, 4–5 mm long hairs; teeth linear to subulate, unequal, 10–11 mm long, with loose, erect to ascending, 4–5 mm long hairs. Corolla yellow, glabrous. Standard ca. 28 mm long; limb 11–14 mm wide, widely obovate to suborbicular, slightly emarginate, slightly subabruptly contracted into a claw ca. 12 mm long. Wings ca. 24 mm long; limb narrowly oblong, slightly retuse, ca. 13 × 4 mm; auricle round to triangular, 2–2.5 mm long, claw ca. 9 mm long. Keel 20–21 mm long; limb obovate to triangular, rounded, 10–11 × 5–6 mm; auricle subtriangular, claw ca. 10 mm long. Stamen tube truncate at mouth. Ovary subsessile, ellipsoid, with dense white hairs; style glabrous. Pods unknown. Flowering in March and April.

Astragalus margonensis is known only from the type locality in the northwestern part of the Yasuj mountain in the northwest Kohgilouyeh and Boirahmad Province in Iran. Just above this area, a small population grows in the steppe and stony clay zone around the village Margon. *Astragalus margonensis* resembles *A. managettae* and *A. pseudopellitus*, but there are several differences among the three species (Table 2).

Acknowledgements

The help of Ernst Vitek, Bruno Wallnöfer and Walter Till during the first author's visit to W and WU in Vienna is much appreciated. We are grateful to Roye Gereau (MO) for revising the Latin description. We thank the Director of

the Herbarium Research Institute of Forests and Rangelands (TARI), Herbarium of Ferdowsi University of Mashhad (FUMH), Herbarium Research Centers of Natural Resources and Animal Affairs of Tabriz, Mashhad, Isfahan, Shiraz, Kerman and Zahedan for making the herbarium facilities available for our study.

References

Bunge, A. 1868: Generis Astragali species Gerontogeae. Pars prior, Claves Diagnosticae. — *Mém. Acad. Imp. Sci. St. Pétersbourg* ser. 7, 11: 1–140.

Bunge, A. 1869: Generis Astragali species Gerontogeae. Pars altera, Specierum enumeratio. — *Mém. Acad. Imp. Sci. St. Pétersbourg* ser. 7, 15: 1–245.

de Candolle, A. P. 1825: *Prodromus systematis naturalis regni vegetabilis*, vol. 2. — Treuttel & Würtz, Paris.

Karamian, R. & Ranjbar, M. 2005: *Astragalus* sect. *Astragalus* (Fabaceae) in Iran. — *Bot. J. Linn. Soc.* 147: 363–368.

Lock, J. M. & Simpson, K. 1991: *Legumes of West Asia, a check-list*. — Royal Bot. Gardens, Kew.

Maassoumi, A. A. 1998: *Astragalus in the Old World, a check-list*. — Islamic Republic of Iran Ministry of Jahad-e Sazandegi Research Institute of Forests and Rangelands 1998–194, Tehran.

Maassoumi, A. A. 2002: Noteworthy species of the genus *Astragalus* sect. *Caprini* DC. from Iran. — *Iran. J. Bot.* 9: 121–125.

Maassoumi, A. A. & Ranjbar, M. 1994: Two new species of the genus *Astragalus* (Papilionaceae) from Iran. — *Iran. J. Bot.* 6: 251–253.

Podlech, D. 1986: Taxonomic and phytogeographical problems in *Astragalus* of the Old World and South-West Asia. — *Proc. Roy. Soc. Edinburgh* 89B: 37–43.

Podlech, D. 1988: Revision von *Astragalus* L. sect. *Caprini* DC. Bunge. — *Mitt. Bot. Staatssamml. München* 25: 1–924.

Podlech, D. 1990: Die Typifizierung der altweltlichen Sektionender Gattung *Astragalus* L. (Leguminosae). — *Mitt. Bot. Staatsamml. München* 29: 461–494.

Podlech, D. 1999a: *Astragalus* sect. *Astragalus*. — In: Rechinger, K. H. (ed.) *Flora Iranica* 174: 98–129. Akad. Druck- u. Verlagsanst., Salzburg.

Podlech, D. 1999b: Papilionaceae III: *Astragalus*. — In: Rechinger, K. H. (ed.), *Flora Iranica* 174: 1–350. Akad. Druck- u. Verlagsanst., Graz.

Podlech, D. & Maassoumi, A. A. 1987: Nine new taxa of the genus *Astragalus* sect. *Caprini* (Leguminosae) from Iran. — *Iran. J. Bot.* 3: 95–110.

Ranjbar, M. & Karamian, R. 2002: *Astragalus* sect. *Astragalus* (Fabaceae) in Iran, complementary notes with a key to the species. — *Nordic J. Bot.* 22: 177–181.

Ranjbar, M. & Karamian, R. 2005: The first record of *Astragalus* sect. *Aegacantha* (Fabaceae) in Iran. — *Nordic J. Bot.* 23: 541–544.

von Steven, C. 1856: Verzeichnis der auf der Taurischen Halbinsel wildwachsenden pflanzen. — *Bull. Soc. Imp. Naturalistes, Moscou* 29: 142–155.

Yakovlev, G. P., Sytin, A. K. & Roskov, Yu. R. 1996: *Legumes of northern Eurasia, a check-list*. — Royal Bot. Gardens, Kew.