

A NEW SPECIES OF *ASTRAGALUS* (FABACEAE) FROM ZHOB DISTRICT OF NORTHERN BALOCHISTAN, PAKISTAN

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Abstract

Astragalus qamardinianus (sect. *Pendulina* Gontscharov), is described as a new species from northern Balochistan, Pakistan. *Astragalus qamardinianus* N. Khan, A. Sultan & T. Khan sp. nov. is closely related to *A. dieterlei* Podlech but differs in morphological characters. *Astragalus qamardinianus* is a small perennial stemless glabrous herb with white membranous stipules, elliptic, acuminate leaflets, 3-5 flowered pedunculate raceme, minute white membranous linear bracts, slightly gibbous calyx, creamy white flowers with purple nerves, oblong to elliptic fruits and reniform, rugose seeds. *Astragalus qamardinianus* is compared with *A. dieterlei* and *A. mirabilis* Lipsky (the only other species of section *Pendulina* known from Pakistan). A distribution map, illustrations, ecology and ethnobotany of the new species are provided.

Key words: *Astragalus qamardinianus*, Section *Pendulina*, Zhob.

Introduction

Astragalus L. (Galegeae: Fabaceae) is one of the largest genera of flowering plants, comprising 3156 species in 255 sections (Maassoumi, 2020; Podlech & Zarre, 2013). The genus is widely distributed in the Old and New World and contains 746 taxa (294 varieties) in the New World and about 2748 taxa (144 subspecies) in the Old World (Maassoumi, 2020). *Astragalus* species vary from ephemeral annual herbs (ca. 80 spp.) to perennial rhizomatous or hemicryptophyte herbs (ca. 2500 spp.) and to cushion forming spiny shrubs (ca. 300 species) (Zarre & Azani, 2013). *Astragalus* species mostly inhabit semi-arid to arid habitats, while some species prefer humid habitats and a few species are found as field weeds (Zarre & Azani, 2013; Maassoumi, 2005). Many species of the genus *Astragalus* are extensively used as medicine, food, fodder, fuel and as ornamental plants around the world (Amiri *et al.*, 2020) and a few species are economically important as a source of gum tragacanth, as indicators for selenium and uranium, for erosion control, while others are poisonous to livestock (Allen & Allen, 1981). Roots of *A. infestus* locally called 'Miswaak' (tooth brush twig) are extensively collected and sold in national and international market from Kakar Khurasan area of Zhob district (Nazar Khan pers. obs.)

The genus is a significant example of adaptive radiation on a global scale distribution (Osaloo *et al.*, 2003). From a biogeographic point of view, *Astragalus* is attributed Irano-Turanian element and many species of it show a narrow geographic range (narrow endemics), which makes them particularly vulnerable to extinction (Jalili & Jamzad, 1999; Memariani *et al.*, 2016). *Astragalus* is represented by c. 148 species in Pakistan representing 45 sections (Amjad Khan and Amir Sultan, unpublished data).

Section *Pendulina* was established by Gontscharov (1946). Section *Pendulina* comprises 17 species and is characterized by herbaceous plants, often stemless, glabrous or with an indumentum of white hairs (inflorescence indumentum black). Stipules greenish or whitish-

membranous, shortly adnate to the petiole or free. Leaves imparipinnate or rarely trifoliolate. Racemes long pedunculate or subsessile. Persistent bracts. Calyx tubular, often oblique and gibbous. Corolla glabrous, petals unequal, the limb of the wings distinctly expanded towards the apex. Legume long-stalked, ventrally carinate, dorsally flattened or broadly furrowed, semibilocular or bilocular, valves thinly subcoriaceous (Podlech, 1999). Section *Pendulina* has a distribution in Central Asia, Afghanistan and Pakistan (Podlech, 1999) and is represented by *Astragalus mirabilis* in Pakistan (Podlech, 1999) which has a local distribution in Chitral (*A. gahiratensis* Ali was considered endemic to Chitral (Ali, 1977) but it was placed in synonymy under *A. mirabilis* by Podlech (1999)).

Materials and Methods

This study is based on material collected during field work in western Pakistan bordering with Afghanistan. The plant specimen for this study was collected from Qamardin Karez area of Zhob district of Balochistan province. It could not be identified when compared with the species described in the Flora of Pakistan (Ali, 1977) and Flora Iranica (Podlech, 1999). Plants were studied in further detail and type material of new species has been deposited in National Herbarium of Pakistan, National Agricultural Research Centre (NARC), Islamabad. Habitat and edaphic data were gathered during field work to determine the ecology of new species.

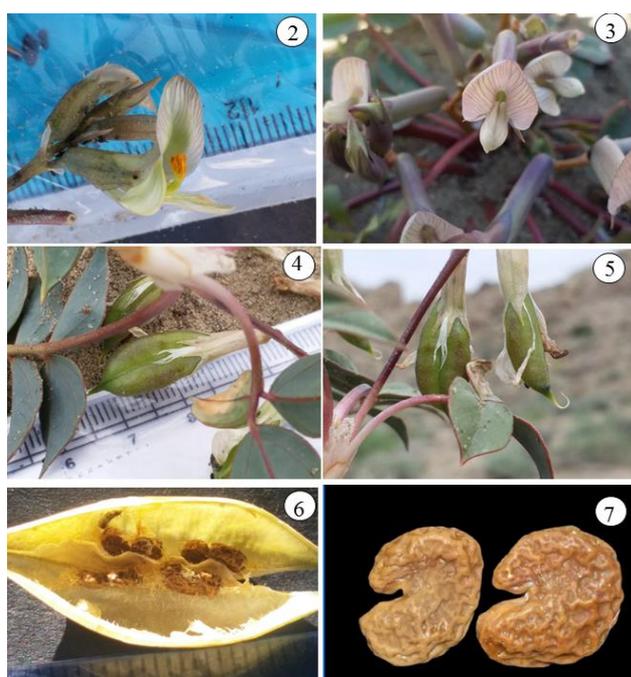
Results

Astragalus qamardinianus N. Khan, A. Sultan & T. Khan sp. nov.
Figs: 1-10.

Type: Balochistan, Zhob district, Qamardin Karez, around Qamardin city, 31°39'37"N, 68°24'20"E, Nazar Khan Mandokhel, 22 April, 2020 (RAW 101351).



Fig. 1. *Astragalus qamardinianus* plant habit (photo by Nazar Khan).



Figs. 2-7. *Astragalus qamardinianus* Figs. 2, 3 flower, Figs. 4, 5 fruit, Fig. 6 fruit opened to show partial septum, Fig. 7 seeds (Photos By Nazar Khan).

Diagnosis

The glabrous and stemless nature, slightly gibbous calyx, size of flower, semi-bilocular nature of fruits is similar to *Astragalus dieterlei* but the whole plants is markedly different from *A. dieterlei*. It differs from *A. dieterlei* in having larger stipules 10-12 mm (vs. 5-8 mm long stipules in *A. dieterlei*), leaves 3-5(-7) foliolate (vs. leaves trifoliate), ovate to elliptical, acuminate leaflets (vs. broadly elliptic or rhomboid-orbicular leaflets) 10-25 x 6-14 mm (vs. 15-33 x 12-24 mm), raceme pedunculate, peduncle 4-5.5 cm long (vs. raceme subsessile), bracts, 2.5-3-5 mm long (vs. to 6-7 long bracts), pedicel 1-1.5 mm (vs. 4-6 mm), calyx 10-16 mm (vs. 14-17 mm), calyx teeth 2-5 mm (vs. 7-8 mm), corolla greenish white to creamy white, purplish tinged (vs. to yellow, suffused with red), keel 19-21 mm long (vs. 14-16 mm long) and legume 20-25 mm (vs. 20-30 mm). It differs

from *A. mirabilis* the other species known from Pakistan, in having smaller white membranous, lanceolate to oblong stipules, 10-12 mm (vs. greenish, linear-acuminate, 13-18 mm long stipules in *A. mirabilis*), leaves 3-5(-7) foliolate (vs. leaflets 3-20), ovate to elliptical, acuminate leaflets (vs. filiform to narrowly elliptic or rarely elliptic to ovate leaflets) 10-25 x 6-14 mm (vs. 10-60 x 0.5-15 mm), glabrous (vs. often glabrous on upper surface and sparsely to densely appressed white pilose on the undersurface), peduncle 4-5.5 cm long (vs. peduncle 5-20 cm long), raceme 4-5 flowered (vs. 3-20 flowered), bracts glabrous, 2.5-3-5 mm long (vs. black and white pilose, 4-9 mm long bracts), pedicel 1-1.5 mm (vs. 1.5-2 mm), calyx 10-16 mm, glabrous (vs. 8-15 mm, sparsely black pilose), calyx teeth 2-5 mm (vs. 1.5-6 mm), corolla greenish white to creamy white, with purple nerves (vs. yellow or white suffused with green), vexillum 20-24 mm, obovate (vs. 18-25 mm, pandurate-oblong), wings 18-21 mm (vs. 16-24 mm), keel 19-21 mm long (vs. 13-22 mm long) and legume glabrous, partially bilocular (vs. shortly white-pilose, bilocular).



Fig. 8. Stipules.

Description

Small perennial herb, 5-10 cm high, entire plant is glabrous, stem absent, stipules white membranous, lanceolate to oblong, 10-16 x 2-3 mm, basally fused with petiole for about 3 mm, leaf imparipinnately compound, 3-5(-7) foliolate, 4-10 cm long, glabrous, petiole 2-5 cm, rachis c. 0.8-2.6 cm, leaflets 10-25 x 6-14 mm, opposite, subsessile with petiolule less than 1 mm, ovate to elliptical, acuminate, entire, base rounded, inflorescence axillary raceme, 3-5 flowered, peduncle 4-5.5 cm, bract minute, 2.5-3-5 mm, linear, white, membranous, pedicel 1-1.5 mm, median to obliquely placed. Calyx greenish purple, slightly gibbous at

base, tube 8-11 mm, teeth unequal, 2-5 mm, linear to triangular, acuminate, glabrous. Corolla greenish white to creamy white, with green to purple nerves, vexillum obovate, obtuse to emarginate, 20-24 x 8-10 mm, wings obovate, 18-21 x 3-4 mm, limb 8 mm, auriculate, auricle 1mm, claw 13 mm, keel, 19-21 x 4-5 mm, limb 6 mm, auriculate, auricle 1mm, claw 13 mm, stamens 9+1, filaments 13-21 mm, fused part 11-18 mm, free part 2-3 mm, anther c. 1 mm, dorsifixed, orange, ovary linear, glabrous, 5-8 mm, with a 9 mm gynophore, ovules 4-6, style 5-8 mm, stigma linear. Pod oblong to elliptic, olive green to purplish, glabrous, 20-25 x 5 mm, partially bilocular with 4-6 seeds, pendent, sulcate, stipe 8-12 mm. Seeds 5-9 mm, reniform, rugose.

Vernacular Name: Da matar botai

Phenology: April to May

Etymology: The species is named after type locality Qamardin Karez, a tehsil of Zhob district.

Distribution: Khutkandai (31°31'31"N, 68°14'38"E; 31°31'42"N, 68°16'02"E), Ghami Cheena (31°40'55"N, 68°33'27"E), Batailawai (31°38'26"N, 68°25'20"E), Qamardin city graveyard (31°38'54"N, 68°25'05"E), around Qamardin city (31°39'37"N, 68°24'20"E), near Girls High School Qamardin (31°39'46"N, 68°25'11"E).

Ecology: Found in sandy loam soils.

Ethnobotany: The plant is eaten by sheep and goats.

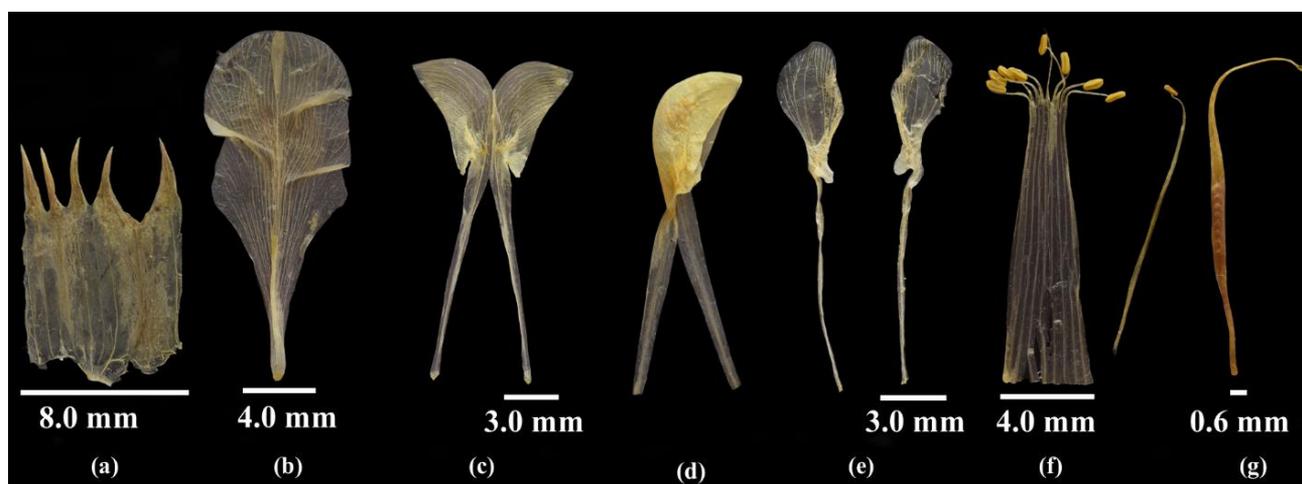


Fig. 9a. Calyx, b. vexillum, c-d. keel, e. wings, f. stamens, g. carpel.

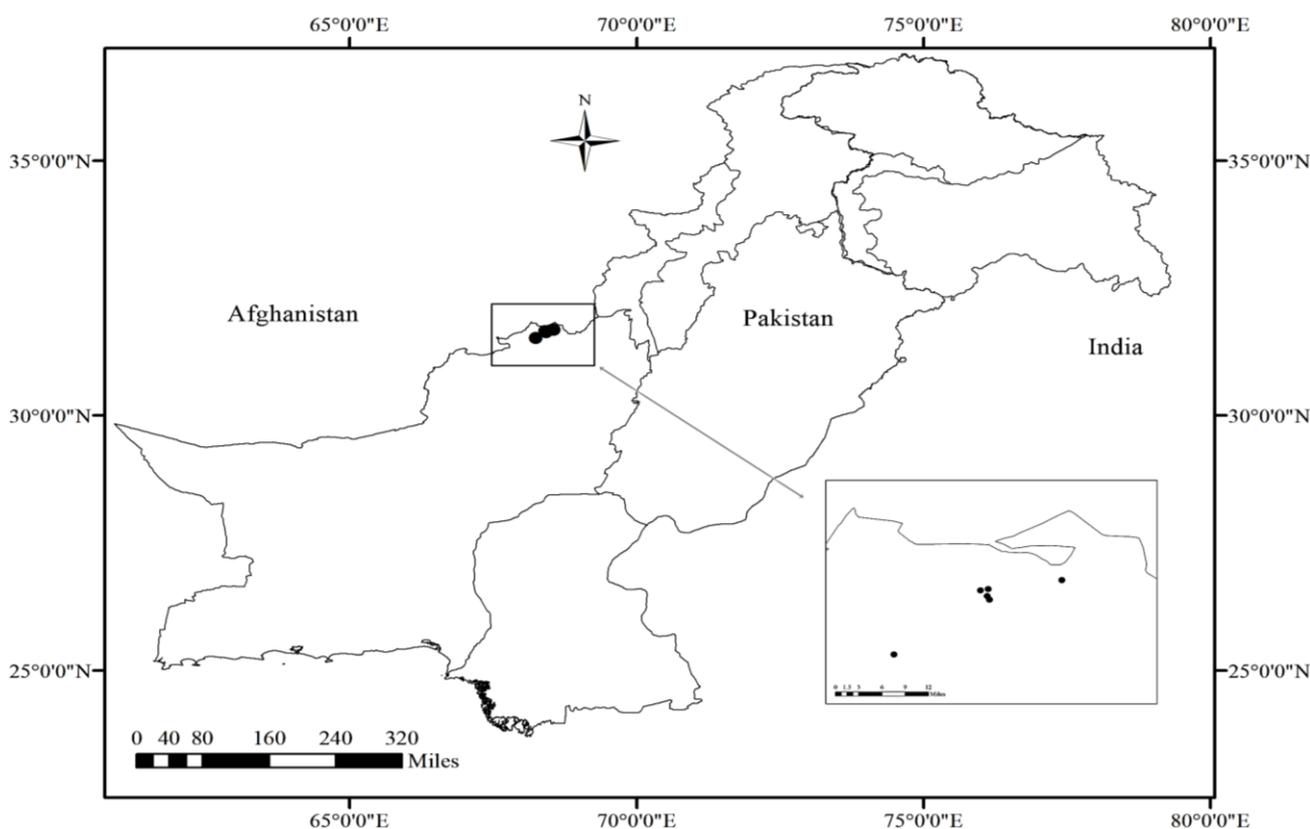


Fig. 10. Distribution of *Astragalus qamardinianus*.

Key to species of *Astragalus* section *Pendulina* occurring in Pakistan

- + Plants glabrous, leaves 3-5-(7) foliolate, 4-10 cm long, leaflets ovate to elliptical, acuminate, 10-25 x 6-14 mm, raceme 4-5 flowered, peduncle 4-5.5 cm long, corolla greenish white to creamy white, purplish tinged, vexillum obovate, legume glabrous, partially bilocular (Qamardin Karez, Zhob, Balochistan) *A. qamardinianus* sp. Nov.
- Plants not glabrous, leaves 3-20 foliolate, 6-35 cm long, leaflets filiform to narrowly elliptic rarely elliptic to ovate, 10-60 x 0.5-15 mm, raceme 3-20 flowered, peduncle 5-20 cm long, corolla yellow or white suffused with green, vexillum pandurate-oblong, legume shortly white-pilose, bilocular (Chitral) *A. mirabilis*

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