

Some new taxa of *Astragalus* L. and comments on Turkish *Caragana* Lam.

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ABSTRACT: Four new taxa of *Astragalus* L. are described from central Anatolia: *Astragalus vuralii* Duman et Aytaç, *A. kochakii* Aytaç et Duman, *A. physodes* L. subsp. *acikirensis* Ekim, *A. densifolius* Lam. subsp. *ayashensis* Aytaç et Ekim. In addition, some comments on Turkish *Caragana* Lam. are given.

KEYWORDS: *Astragalus* - new taxa, *Caragana*, Turkey

Introduction

In the course of floristic investigations carried out within the projects of our Botany Department, we come across some critical and interesting specimens. Not surprisingly, most of them belong to the genus *Astragalus*. It is a generally accepted fact that the genus *Astragalus* is one of the richest genera in Turkey although some groups were split off by Podlech to form other genera (*Astracantha* Podl., PODLECH 1983). In the last volume of the Flora of Turkey (DAVIS et al. 1988), 21 new species of *Astragalus* have been added. On the other hand, during a recent investigation, we have noticed that some species names in *Astragalus* sect. *Dasyphyllium* Bunge should be considered as synonyms (AYTAÇ 1991). Therefore the genus *Astragalus* needs a lot of work on different subjects such as mass collection and revision of critical sections.

In this paper, some of our specimens collected mostly from Central Anatolia are described as new taxa.

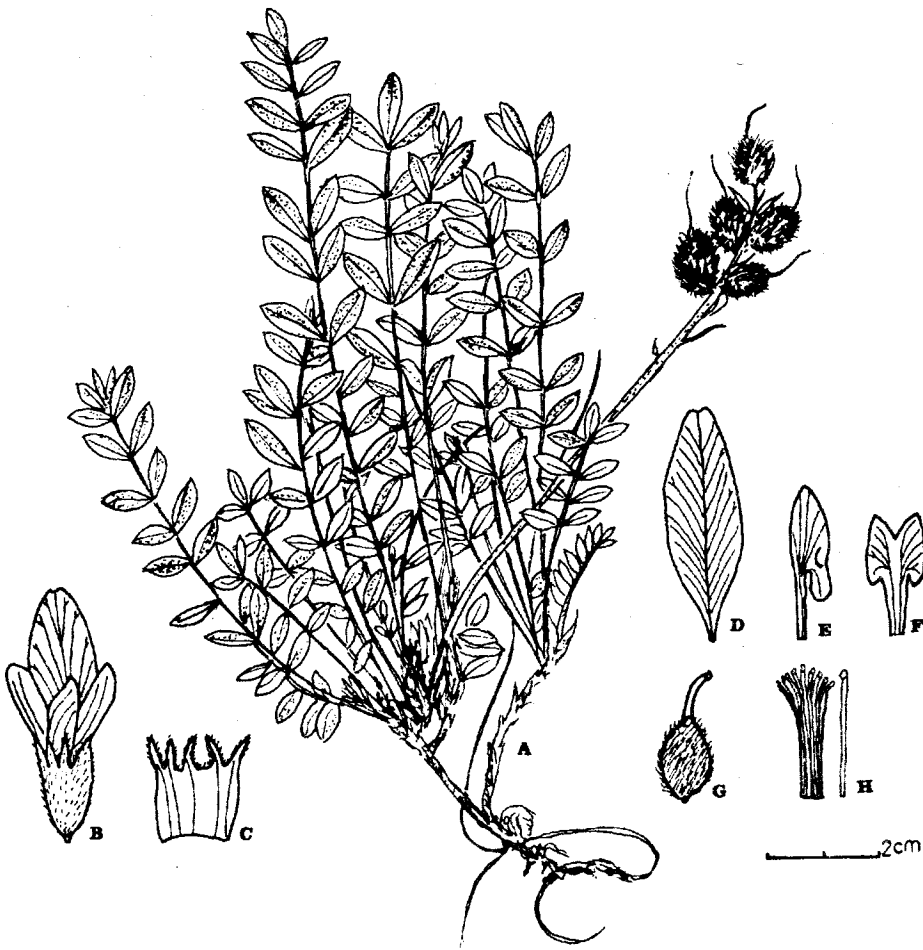


Fig. 1. *Astragalus vuralii* Duman et Aytaç.- A. Habit (x1), B. Flower (x2), C. Dissected calyx (x2), D. Standart (x2), E. Wing (x2), F. Keel (x2), G. Ovary (x2), H. Androecium (x2).

On the other hand, after collecting a specimen of *Caragana* from Polatli (near Ankara), we found great problems with Turkish species of this genus (which, moreover, has recently been described as *Cytisopsis* by HUBER-MORATH and transferred to *Caragana* by him as well, cf. HUBER-MORATH (1983).

New taxa of *Astragalus*:

Astragalus vuralii Duman et Aytac sp. nov. (Sect. *Hololeuce* Bunge) [Fig. 1, Fig. 5.] Typus: Duman et Aytac 3032 (holo-Gazi Universitesi, Fen-Ed. Fak. Herbaryumu, iso-ANK, HUB), Duman et Aytac 3093 (para-Gazi Universitesi Fen-Ed. Fak. Herbaryumu).

A. bicolor Lam. affinis sed foliis 2-8jugis, foliolis 5-20 mm longis, inflorescentiis 4-10floris et bracteis inferioriis 4-6 mm longis differt.

Dwarf, subcaulescent, rhizomatous perennial herb with a woody caudex, 4-15(-18) cm, stem 1-2 cm or almost absent, concealed by the overlapping stipules. Leaves linear-oblong in outline, 2-10(-13) cm, petiole 0.5-4 cm, adpressed bifurcate pilose, leaflets in (2-)3-8 pairs, elliptic to obovate, (3-)5-15(-20) x 2-6 mm, acute, densely white or silvery adpressed to spreading bifurcate pilose on both surfaces, stipules 4-8 mm, practically free from the petiole but considerably fused round the stem to form a loose hyaline sheath, broadly lanceolate-acuminate, predominantly white and sparsely black bifurcate pilose. Peduncles 3-10(13) cm, with black and white adpressed bifurcate hairs. Inflorescence c. 2 cm in diameter, more or less dense ovoid, 4-10flowered spike, elongating in fruit to 5 cm, bracts 2-4(-6) mm, ovate-lanceolate, black and white adpressed bifurcate pilose, bracteoles absent. Flowers subsessile or sessile. Calyx 8-10 mm, tubular-campanulate with long white and short black more or less adpressed bifurcate hairs, teeth 2-3 mm, linear with usually exclusively black subsimple or bifurcate hairs. Corolla cream-white or sometimes suffused lilac. Standard 20-21 mm, lamina oblong 15-16 x 5-6 mm, claw 4-5 mm, apex retuse, wings 13-15 mm, lamina oblong, subequalling the claw, keel 11-12 mm, lamina oblong subequalling the claw, subacute. Ovary bilocular, ovate-elliptic, adpressed pilose, subsessile, c. 10 ovulate, style c. 6 mm, glabrous. Legume 7-10 x 5-6 mm, ovoid, white simple pilose, beak 2-3 mm, curved, seed compressed, c. 2 mm, elliptic, dark brown. Fl. and Fr. May-June.

Specimen examined: Turkey, B 3 Ankara: Polatli, 18 km W. of Polatli, Acikir district, 840-850 m, steppe, 25. V. 1990, Duman et Aytac 3032.



Fig. 2. *Astragalus kochakii* Aytaç et Duman.- A. Habit (x1), B. Flower (x2), C. Dissected calyx (x2), D. Standard (x2), E. Wing (x2), F. Kee (x2), G. Ovary (x2), H. Androecium (x2), I. Fruit (x2).

C. Anatolia. Endemic. Irano-Turanian element. B3 Ankara: Polatli Acikir district, 7. VI. 1983, Akman 13299!. Known only from the type locality. Closely allied to *A. bicolor* Lam., but differing in the features indicated below:

<i>A. bicolor</i> Lam.	<i>A. vuralii</i> Duman et Aytaç
Leaflets 8-15 paired	Leaflets 3-8 paired
Leaflets 5-8 mm	Leaflets 5-20 mm
Inflorescence 15-25 flowered	Inflorescence 4-10 flowered
Lower bracts 7-10 mm	Lower bracts 2-6 mm

The species is named after Doc. Dr. Mecit Vural for his kind help and critical comments to our works.

Astragalus kochakii Aytaç et Duman sp. nov. (Sect. *Onobrychium* Boiss.) [Fig. 2, Fig. 5.] Typus: Aytaç et Duman 3075 (holo-Gazi Universitesi, Fen-Ed. Fak. Herbaryumu, iso-ANK, HUB).

A. xylobasis Freyn et Bornm. affinis sed caulibus 5-15 cm altis, foliis 2-3jugis, dense adpresso bifurcati-pilosis, pedunculis 1.5-5 cm longis differt. Erect, caulescent, perennial herb. (5-)10-20 cm, with a branched woody caudex, stems (3-)5-15 cm, densely covered with spreading to adpressed white bifurcate hairs. Leaves 1.5-4 cm, shortly (0.5-1.5 cm) petiolate, leaflets in (2-)3 pairs, narrowly elliptic-oblong or linear-lanceolate (3-)5-15(-18) x 1-3 mm, obtuse or subacute, densely adpressed bifurcate pilose on both surfaces, stipules ovate-acuminate, membranous, 3-5 mm, joined below, predominantly adpressed bifurcate pilose, sometimes with few black bifurcate hairs. Peduncle 1.5-5 cm, longer than subtending leaf, striate, with white and black spreading bifurcate hairs. Inflorescence c. 2 cm in diameter, a more or less dense, ovate-globose, subsessile, 10-20 flowered spike, elongating in fruit to 5 cm. Bracts linear-lanceolate, membranous, 3-4 mm, with white spreading bifurcate hairs. Calyx tubular-campanulate, 7-8 mm, predominantly with adpressed white, sometimes few black bifurcate hairs, teeth linear, 2-3 mm. Corolla purple, standard 15-18 mm, lamina oblong-lanceolate, 9-10 x 6-7 mm, obtuse or slightly retuse at the apex, claw 6-7 mm, wings 12-14 mm, lamina oblong more or less 1.5 times as long as claw, keel 10-12 mm, lamina oblong or slightly falcate, obtuse, subequalling the claw. Ovary bilocular, linear-lanceolate, with adpressed white bifurcate pilose, 5-6 ovulate, style c. 5-7 mm, glabrous. Legume c. 6-10 mm, ovate-oblong, white bifurcate pilose, beak 2-3 mm, curved, with long persistent style. Fl. and Fr.: June-July.



Fig. 3. Habit of *Astragalus physodes* L. subsp. *acikirensis* Ekim (x1.5)

Specimen examined: Turkey, B3 Ankara: Polatli, 18 km W. of Polatli, Acikir district, 840-850 m, steppe, 6. VI. 1990, Aytaç et Duman 3075.

C. Anatolia. Endemic. Irano-Turanian element. Only known from the type locality. Closely allied to *A. xylobasis* Freyn et Bornm., but differing in the features indicated below:

<i>A. xylobasis</i> Freyn et Bornm.	<i>A. kochakii</i> Aytaç et Duman
Plant 20-35 cm	Plant (5-)10-20 cm
Stem 15-30 cm	Stem (3-)5-15 cm
Leaflets sparsely bifurcate pilose	Leaflets densely bifurcate pilose
Leaflets 4-5 paired	Leaflets (2-)3 paired
Peduncles 5-8 cm	Peduncles 3-4 cm
Bracts c. 2 mm	Bracts 3-4 mm

The species is named after Prof. Dr. Ahmet Ö. Koçak (Lepidopterologist) who interested in fodder plants of Lepidoptera as well.

Astragalus physodes L. subsp. *acikirensis* Ekim subsp. nov. (Sect. *Proselius* Bunge) [Fig. 3, Fig. 5.] Typus: Duman et Aytaç 3031 (Holo-Gazi Universitesi Fen-Ed. Fakültesi Herbariumu, iso-ANK, HUB), Akman 13736! (para-ANK).

Affinis subsp. *physodes* sed fructibus adpresse bifurcate pilosis differt.

Perennial, nearly acaulescent (stem not more than 1 cm long), 10-17 cm tall, stipules 5-7 mm long, ovate-lanceolate, scarious, glabrous, the lower covered with adpressed stiff white hairs, leaves 7-15 cm long, the rachis 1.5-3 times longer than the petiole, both petiole and rachis covered with scattered adpressed white hairs, leaflets in 5-10 pairs, elliptic to oblong-elliptic, acute, rarely subobtuse, 6-12 mm long, hairy on both surfaces, peduncles shorter than the leaves, covered with scattered white adpressed hairs or sometimes few black adpressed hairs above, the inflorescence with black and white adpressed hairs, racemes rather compact ovoid, 3-5 cm long, mostly many flowered, bracts lanceolate, 2-3 mm, long, covered with black hairs, calyx cylindric, 7-8 mm long, villose with short ascending black hairs, teeth c. 1 mm long, corolla pale violet, standard 16-18(-20) mm long, the limb rhomboid-oblong, abruptly narrowed in lower third, oblong-ovate upward, retuse, 5-6 times longer than the claw, wing 15-16 mm long, the limb linear-oblong, slightly retuse, somewhat shorter than to as long as claw, keel

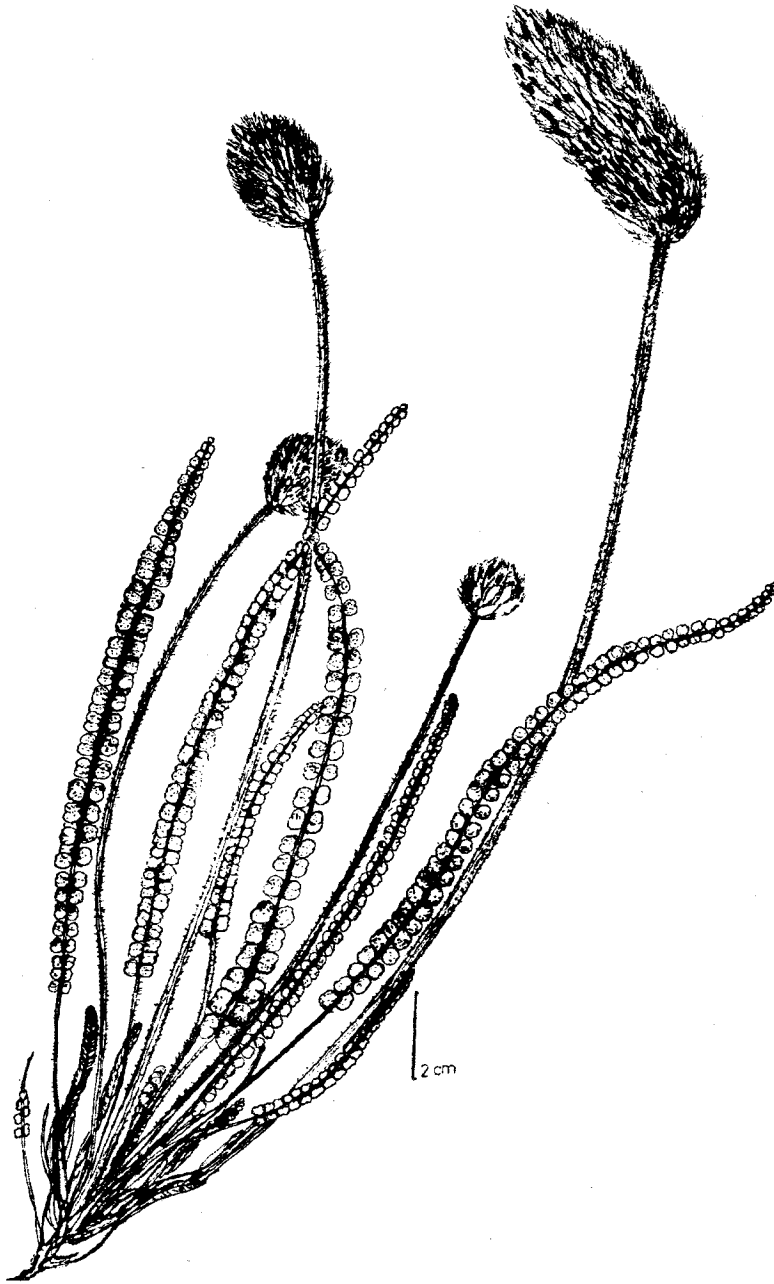


Fig. 4. Habit of *Astragalus densifolius* Lam. subsp. *ayashensis* Aytaç et Ekim (x1).

13-14 mm long, obtuse, ovary on stipe 1.5-2 mm long, densely adpressed pilose, legume sessile, spherical, 15-30 mm long, grooved ventrally and dorsally with adpressed white bifurcate hairs, bilocular. Fl. and Fr. April to May.

Specimens examined: Turkey, B3, Ankara: Polatli, 18 km W. of Polatli, Acikir distric, 840-850 m, steppe, 25. V. 1990, Duman et Aytaç 3031, *ibid.*, 7. VI. 1983, Akman 13736!, B4, Kirikkale: Delice, 4 km S. of Delice, 650 m, 18. V. 1990, Ali Dönmez 1822!.

C. Anatolia. Endemic. Confined to Central Anatolia, Irano-Turanian element. Type locality of this plant very well preserved as it is a military area.

The differences between the subspecies of the species:

subsp. <i>physodes</i>	subsp. <i>acikirensis</i>
Leaflets glabrous above	Leaflets hairy on both surfaces
Calyx 10 mm long	Calyx 7-8 mm long
Legume glabrous	Legume adpressed bifurcate-pilose

Astragalus densifolius Lam subsp. *ayashensis* Aytaç et Ekim subsp. nov. (Sect. *Dasyphyllium* Bunge) [Fig. 4, Fig. 5.] Typus: Aytaç 2428 (holo-Gazi Universitesi Fen-Ed. Fak. Herbariyumu, iso-ANK, HUB), Aytaç 2326, 2426, 2427, 2429, 2430, 2567, 2569; Vural 4182 (para-Gazi Universitesi, Fen-Ed. Fak. Herbariyumu).

Affinis subsp. *densifolius* sed inflorescentia floribus 50-100 suffulta et rostro erecto differt.

Specimens examined: Turkey, A4, Ankara: Ankara-Ayas Karayolu 50. km, Ayasbeli Akyatak district, 1200-1350 m, 18. VI. 1988, Aytaç 2428. *ibid.* 21. VI. 1988, Aytaç 2326, 14. VII. 1988, Aytaç 2426, 2427, 2429, 2430, 18. VIII. 1988, Aytaç 2567, 16. III. 1989, Aytaç 2569, 27. VI. 1986 Vural 4182!.

C. Anatolia. Endemic. Irano-Turanian element. Known only type locality. The differences between the subspecies of *A. densifolius*:

subsp. <i>densifolius</i>	subsp. <i>ayashensis</i>
Inflorescence to 50 flowered	Inflorescence 50-100 flowered
Beak recurved	Beak erect

Caragana Lam.

After collecting a very interesting and extremely rare plant from Polatli (90 km W. of Ankara), we supposed it to belong to *Caragana*. It eas quite similar to *C. leiocalycina* Hub.-Mor., but having some

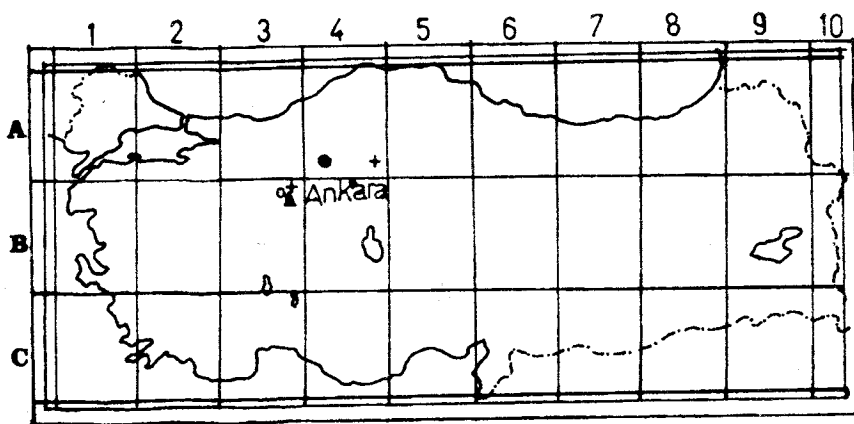


Fig. 5. ▲ *Astragalus vuralii*, ◐ *A. kochakii*, + *A. physodes* subsp. *acikirensis*, ● *A. densifolius* subsp. *ayashensis*

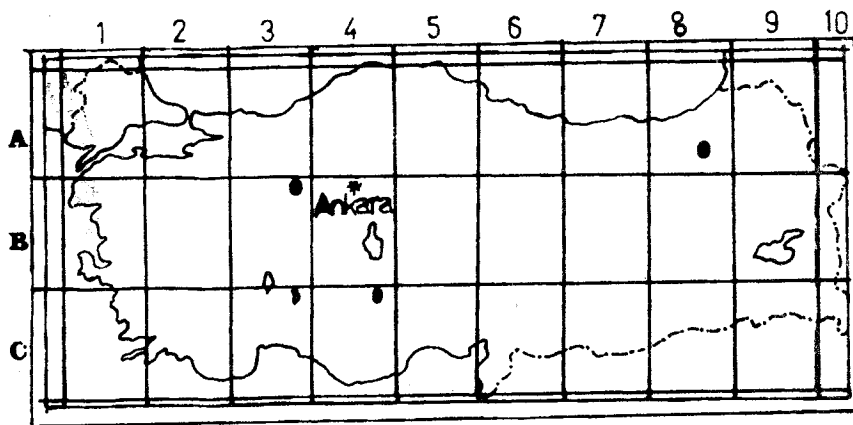


Fig. 6. ● *Caragana grandiflora*

differencens from the latter species we thought it might be a new species. In order to be sure, we decided to collect the *C. leiocalycina* from the type locality indicated in the Flora, not far from Ankara, to the east of Konya. According to our observations in the field, the description of *C. leiocalycina* is completely wrong as the species has been described according to a fragmentary specimen collected by Prof. Dr. Akman. After collecting the Karapinar (Konya) specimens, we thought that the specimens from Polatli and Karapinar might be slightly different from the other species, *C. grandiflora*, which was cited in the Flora from Erzurum. So we decided to collect the *C. grandiflora* as well. On the way to Erzurum in 1990 we went to Tortum and collected the plant in the area also visited by Prof. Dr. P. H. Davis (specimen no. 47561). After a careful study of all three specimens we have found only one main difference which was on the indumentum of fruits. While Tortum specimen has glabrous legumes, the others were hairy. Thus it appeared as a justified conclusion to separate them as infraspecific taxa. However, just after these studies, one of the authors, Ekim, was given an opportunity to visit some main European herbaria, such as W, B, G and K after attending 3. South West Asia Plant Life Symposium, held in Berlin and another meeting on the Bern Convention in Cambridge, September 1990. He examined many specimens collected in Caucasus and Transcaspia in the herbaria indicated above. He realised that there were both features (hairy or glabrous legume) present in the specimens collected by various botanist from the same area or even on the same sheet. There was a sheet in the herbarium K (without collector's name; the only indication was "Herb. W. Besser" and "Turkomania", "Armenia"). Both types of fruits occurred on the same sheet.

As a result of our investigations both in the field and in various herbaria we finally decided that there was only one species in the genus in Turkey, *C. grandiflora* (Bieb.) DC.

We have seen an isotype of *C. leiocalycina* in ANK herbarium. Huber-Morath description was based on the specimen collected by Prof. Dr. Akman (4079), Ankara University. Collection was made quite early in the middle of April. Therefore immature legume length is indicated as 20 x 2-3 mm. The other interesting difference was the length of plant which was c. 25 cm in the Flora (DAVIS 1988, p. 114). Our collections from the middle of June 1990 show that both measurements are not correct. The differences are given in the table (below) between the original description of the species and our specimens. The species

was described as a *Cytisopsis* by the same author (in 1981) and later transferred to *Caragana* (1983).

The description of *C. leiocalycina*

in the Flora	According to our collection
Plant 25 cm	Plant 50-150 cm
Plant few branched	Plant as a shrub with many branched
Fruit 20 x 2-3 mm	Fruit 40-55 x 2-4 mm
Corolla 15-18 mm	Corolla 15-20 mm

New collections of *Caragana grandiflora* in Turkey: B3 Ankara: Polatli-Sivrihisar road 18. km, Acikir district, on marly soil; c. 840 m, 6. VI. 1990, Aytac et Duman (3067). C4 Konya: Karapinar, Erosion control area, stony and sandy places, 1000-1100 m, 13. VI. 1990, Aytac et Duman (3101). Type locality of *C. leiocalycina* A8 Erzurum: Tortum, after 7 km to Oltu, N of Tortum, stony and sandy places, 1600-1700 m, 17. VII. 1990, Ekim, Aytac et Duman (3122).

Acknowledgements

We should like to express our thanks to Doç. Dr. M. Vural (Gazi Univ.) and Doc. Dr. A. Güner (Hacettepe Univ.) for reading the paper critically and correcting the Latin descriptions. Thanks are also due to the staff of our colleges in ANK and HUB.

Özet

Orta Anadolu'dan *Astragalus* L. cinsine ait dört yeni takson betimlendi: *Astragalus vuralii* Duman et Aytac, *A. kochakii* Aytac et Duman, *A. physodes* L. subsp. *acikirensis* Ekim, *A. densifolius* Lam. subsp. *ayashensis* Aytac et Ekim. Buna ilave olarak ülkemizdeki *Caragana* Lam. türlerinin yorumu da yapıldı.

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