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DIETRICH PODLECH & SHAHIN ZARRE

New species of *Astragalus* sect. *Ammodendron (Fabaceae)* with a key for the species of the Flora Iranica area

Abstract:

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During the work on *Astragalus* for Flora Iranica several new species of *A.* sect. *Ammodendron* were discovered. They are described here: *A. akhundzadahensis, A. ammodendroides, A. bazarganii, A. biarjmandicus, A. darrehbidensis, A. nowroozii, A. pseudoarvatensis, A. similissimus, A. strictissimus, A. tenuiramosus* and *A. zurmatensis*. A key for all species of the section occurring in the Flora Iranica area is provided.

During the revision of the critical *Astragalus* sect. *Ammodendron* for Flora Iranica several new species were found among the rich material recently collected. They are described here.

Astragalus akhundzadahensis Podlech & Zarre, **sp. nova**

Holotype: Afghanistan, Prov. Kandahar, 50 km ENE Kandahar an der Straße nach Qalat, bei Akundzadah Saheb Kalay, 31°43'N, 66°12'E, 1170 m, 21.4.1977, *D. Podlech & K. Jarmal 28834* (MSB; isotype: M).

Differt ab *Astragalo squarroso* Bunge stipulis petiolo per 0.5-1 mm adnatis (nec subliberis), bracteis 0.5(-1) mm (nec 1-1.5 mm) longis, calyce pilis ± medifixis (nec partim arcte asymmetrice bifurcatis vel basifixis) obtecto, leguminibus dense pilis basifixis 4-5 mm longis non in tuberculis insidentibus et insuper pilis brevissimis, subappressis, ± medifixis (nec pilis basifixis 2.5-3 mm longis, in tuberculis insidentibus tantum) obtectis; ab *A. similissimo* Podlech & Zarre caulibus pilis 0.5-0.7 mm (nec 0.8-1 mm) longis obtecto, stipulis 2-4 mm (nec 4-6 mm) longis, petiolo breviter (nec per 2-3 mm) adnatis, petiolulis 0.2-0.5 mm (nec 1-1.5 mm) longis, foliolis 5-10(-13) × 1.5-3 mm (nec 12-20(-28) × 2-5(-8) mm), bracteis 0.5(-1) mm (nec 1.5-2 mm) longis, calyce c. *6 mm (nec 7-8 mm) longo, pilis ± medifixis (nec partim arcte asymmetrice bifurcatis) obtecto, dentibus 0.5 mm (nec 1-2 mm) longis.*

Plants 25-40 cm tall, suffruticose. *Stems* of former years up to 30 cm long, ligneous, with grey-yellowish bark, stems of the current year erect, up to 30 cm long, branched, very densely covered with medifixed, appressed hairs 0.5-0.7 mm long. *Stipules* membranous, yellowish, 2-3(-4) mm

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long, adnate to the petiole for 0.5-1 mm, vaginate-connate high up, often for the whole length, partly with short, triangular free tips, rather densely appressed-hairy, glabrescent with age. *Leaves* 1-2.5 cm long; petiole 0.2-0.5 cm long, together with the short rachis hairy like the stem, sometimes indurating and persistent and partly spiny, the petiole of the leaflets 0.2-0.5(-1) mm, sparsely hairy. *Leaflets* in 1 pair, narrowly elliptic to elliptic, 5-10(-13) × 1.5-3 mm, rounded to slightly emarginate at the tip, on both sides ± densely covered with medifixed hairs 0.8-1 mm long. *Peduncles* 2-4 cm long, hairy like the stem. *Racemes* (3-)5-10 cm long, remotely (4-)8-15-flowered; axis hairy like the peduncle. *Bracts* membranous, 0.5(-1) mm long, narrowly ovate, white-hairy. *Pedicels* c. 1 mm long, densely white-hairy. *Calyx* c. 6 mm long, campanulate-tubular, obliquely cut at the mouth, rather densely covered with ± medifixed, subappressed white hairs 0.5-1 mm long; teeth narrowly triangular, c. 0.5 mm long, on inner side with very thin, basifixed, tangled white hairs. *Petals* violet; *standard* 11-13 mm long, limb 6-7 mm wide, obovate, retuse at the tip, at the base gradually narrowed; *wings* 10-12 mm long, limbs narrowly oblong, slightly to sometimes distinctly dilated toward the rounded or slightly retuse tip, 5-5.5 × 2.2-2.5 mm, auricle c. 0.5 mm long, claw 5-6.5 mm long; *keel* 9-10 mm long, limbs obliquely elliptic, with widely curved lower edge and nearly straight upper edge, subacute-tipped, 4 × 2 mm, auricle minute, claw 6-6.5 mm long. *Stamen tube* truncate at the mouth. *Ovary* subsessile, with a stipe up to 0.5 mm long, densely hairy; style glabrous. *Legumes* sessile to subsessile, narrowly ellipsoid, 7 × 3 × 2 mm, rounded ventrally and dorsally, with a curved beak 1 mm long, often with persistent style, bilocular; valves thinly coriaceous, pale brownish, densely covered with thin, tangled, spreading, basifixed white hairs 4-5 mm long and with very short hairs (which can be seen also at the ovary of well developed flowers).

Additional specimens seen. – AFGHANISTAN: FARAH: Bei Surkhab, 85 km NW Delaram an der Hauptstraße nach Herat, 1030 m, 23.4.1977, *Podlech & Jarmal 29008* (M, MSB). — HELMAND: Kermak Dasht, 10 km SE der Blakha-Marja Bewässerungsfläche, 750 m, 31°21'N, 64°10'E, 17.4.1972, *Anders 8488* (MSB, W); inter Kandahar et Girishk, ad rivulum Hilmend, 1000 m, 30.4.1935, *Kerstan 280* (W). — HERAT: S. Hänge des Mir-Alam-Passes 11 km N Adraskan an der Strasse nach Herat, 1450 m, 25.4.1977, *Podlech & Jarmal 29206* (MSB). — KANDAHAR: 50 km ENE Kandahar an der Straße nach Qalat, bei Akundzadah Saheb Kalay, 1170 m, 21.4.1977, *Podlech & Jarmal 28834* (M, MSB); 7 km E der Straßengabelung Girishk - Kandahar - Lashkargah gegen Kandahar, 900 m, 17.4.1978, *Podlech 30743* (G, HUJ, LG, M, MSB); 1.5 km S Haji Sher Kalay, 32 km SE Kandahar, 1035 m, 28.4.1967, *Lalande R801-S2* (MSB). — PAKTIA (PAKTIKA): Zargunshahr, 9.5.1949, *Neubauer 1244* (W).
PAKISTAN: CHAGAI: inter Padag et Nushki, 30.3.1965, *Rechinger 27310* (M, W). — MAKRAN: 60 km S Panjgur, 800-850 m, 19.4.1965, *Rechinger 28089* (M, W).

Astragalus ammodendroides [Bornm. in Repert. Spec. Nov. Regni Veg. 39: 109. 1935, nom. inval., sine descr. latina ex] Podlech & Zarre, **sp. nova**
Holotype: Iran, Gilan, Sefid-rud Tal zwischen Rudbar und Mendschil, 350 m, 9.5.1892, *J.F.N. Bornmüller 6828* (B; isotypes: G, P, W).

Differt ab *Astragalo acutifolio* Bunge foliis 2-5 cm longis saepissime unijugis (nec 1-3 cm longis 1-2-jugis), calyce 7-8 mm (nec 5-6 mm) longo, vexillo 16-18 × 7 mm (nec 12-14 × 4 mm), legumine stipite glabro c. 1 mm longo suffulto (nec sessile).

Plants suffruticose, c. 30 cm tall. *Stems* in older part ligneous, up to 4 mm thick, densely hairy, with yellowish grey bark; parts of the current year 8-18 cm long, very densely covered with medifixed, appressed white hairs 0.5-0.8 mm long. *Stipules* membranous, 2.5-3 mm long, adnate to the petiole for 0.5-1 mm, vaginate-connate high up with triangular free tips, sparsely to rather densely appressed-hairy, at the margins sometimes with few sessile glands. *Leaves* 2-5 cm long; petiole 0.3-0.7 cm long, together with the short rachis hairy like the stem, indurating and persistent, but not spiny. *Leaflets* in 1(-2) pair(s), narrowly elliptic to linear, 15-25 × 2-4 mm, obtuse to subacute at the tip, on both sides loosely to rather densely covered with medifixed, appressed

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hairs 0.5-1 mm long. *Peduncles* 0.5-1 cm long, hairy like the stem. *Racemes* 2-3 cm long, loosely 2-5(-8)-flowered. *Bracts* membranous, 0.5-1 mm long, ovate, white-hairy. *Pedicels* 1-2 mm long, densely white-hairy. *Calyx* 7-8 mm long, campanulate-tubular, 3 mm wide, obliquely cut at the mouth, ± densely covered with symmetrically to asymmetrically bifurcate, subappressed to partly slightly ascending, flexuose, white hairs 0.6-1 mm long; teeth narrowly triangular, 1-2 mm long, densely white-hairy on inner side. *Petals* pale pink(?); *standard* 16-18 mm long, limb c. 7 mm wide, obovate, emarginate at the tip, in the middle subabruptly narrowed and passing into a rather long, cuneate claw; *wings* 14-15 mm long, limbs narrowly oblong, round-tipped, 6-7 × 2-2.5 mm, auricle c. 0.3 mm long, claw c. 8 mm long; *keel* 12-13 mm long, limbs obliquely obovate, with rectangular-curved lower edge and slightly sigmoid upper edge, subacute-tipped, 4.5-2.5 mm, auricle short, claw 8 mm long. *Stamen tube* truncate at the mouth. *Ovary* with a stipe 0.5-1 mm long, white-hairy; style glabrous. *Legumes* with a glabrous stipe c. 1 mm long, ellipsoid, c. 7 × 3.5 × 2 mm, with a curved beak c. 2 mm long; valves densely covered with basifixed, ascending hairs 2-2.5 mm long and with very short, appressed hairs.

Additional specimens seen. – IRAN: GILAN: Sefid-rud Tal zwischen Rudbar und Mendschil, 350 m, 9.5.1892, *Bornmüller 6828b* (B); am Weg nach Manschil, 26.4.1882, *Pichler* (W).

Astragalus bazarganii Podlech & Zarre, **sp. nova**
Holotype: Iran, Khorasan, N of Torbat-e Heydarieh, 1500 m, 3.6.1976, *Rejamand & Bazargan 31983* (W).

Differt ab *Astragalo urgunensi* Podlech foliolis anguste ellipticis, 10-20 × 3-6 mm (nec linearibus, 5-18 × 1-2 mm), calyce c. 6 mm (nec 3.5-4 mm) longo, dentibus 0.8-1.2 mm (nec 0.5-0.7 mm) longis, petalis in sicco flavidis (nec pallide lilacinis), vexillo 10-11 mm (nec 6-7 mm) longo, legumine pilis 2-2.5 mm longis in tuberculis insidentibus obtecto, sine pilis perbrevibus (nec pilis longis 3-4 mm longis et insuper pilis perbrevibus appressis obtecto).

Plants 50-60 cm tall, subshrubby, white-hairy. *Stems* in older parts up to 8 mm thick, ligneous, with grey-brownish bark, parts of the current year up to 40 cm long, branched, very densely covered with medifixed, appressed hairs 0.6-0.8 mm long. *Stipules* hyaline-membranous, 3-5 mm long, adnate to the petiole for c. 1 mm, high up vaginate-connate, subglabrous, at the margins with short, basifixed hairs. *Leaves* 2-4 cm long; petiole 0.5-1.2 cm long, with the rachis hairy like the stem. *Leaflets* in 1-2 pairs, narrowly elliptic, 10-20 × 3-6 mm, obtuse to acuminate, covered on upper side loosely, on underside ± densely with medifixed, appressed hairs 0.8-1 mm long. *Peduncles* 4-7 cm long, the raceme axis hairy like the stem. *Racemes* 8-20 cm long, remotely many-flowered. *Bracts* hyaline-membranous, ovate, 0.5-1 mm long, sparsely hairy. *Pedicels* 0.5-1 mm long, densely hairy. *Calyx* c. 6 mm long, turbinate-campanulate, loosely covered with ± medifixed, appressed to subappressed white hairs 0.5-0.8 mm long; teeth narrowly triangular, 0.8-1.2 mm long, hairy on inner side. *Petals* yellowish when dry, all of nearly the same length; *standard* 10-11 mm long, limb elliptic, c. 3.5 mm wide, with a rather long, wide claw; *wings* c. 10 mm long; *keel* c. 10 mm long, limbs elliptic-triangular, with curved lower edge and slightly concave upper edge, c. 3 × 1.8 mm, claw c. 7 mm long. *Stamen tube* truncate at the mouth. *Legumes* subsessile, narrowly ellipsoid, c. 5 mm long, 2 mm high, densely covered with ± spreading hairs 2-2.5 mm long, sitting on little tubercles, without very short hairs.

Astragalus biarjmandicus Podlech & Zarre, **sp. nova**
Holotype: Iran, Prov. Semnan, Turan protected area, inter Biarjmand et Qaleh Bala, 1100 m, 26.4.1975, *K.H. Rechinger 50339* (M; isotypes: TUH, W).

Differt ab *Astragalo squarroso* Bunge pedunculo ad 2 cm longo, tempore fructificationis non elongato (nec ad 5 cm longo, tempore fructificationis valde elongato, 7-14 cm longo), calyce pilis subbasifixis ad basifixis ascendentibus ad patentibus albis et saepissime nigris immixtis (nec subappressis ad leviter ascendentibus mere albis) obtecto, legumine pilis basifixis paten-

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tibus 2-3 mm longis et insuper pilis medifixis appressis brevibus (nec pilis longis basifixis tantum) obtecto.

Plants at least 25 cm tall, fruticose, strongly branched. *Stems* in older parts long; parts of the current year short, very densely covered with medifixed, appressed white hairs 1-1.5 mm long. *Stipules* membranous, 2-2.5 mm long, shortly adnate to the petiole, vaginate-connate high up, often for nearly the whole length, with triangular free tips, loosely appressed-hairy. *Leaves* 1.5-2 cm long; petiole 0.2-0.5 cm long, like the very short rachis densely covered with hairs up to 1 mm long, indurescent and persistent, subspiny, up to 5 mm long. *Leaflets* in 1 pair, more rarely in 2 pairs, narrowly elliptic, 5-15(-20) × 1.5-5(-7) mm, acute-tipped to obtuse, densely covered on both sides with hairs c. 1 mm long. *Peduncles* 0.5-2 cm long, densely covered with white hairs up to 1 mm long. *Racemes* 2-5 cm long, loosely 5-15-flowered. *Bracts* membranous, c. 2 mm long, narrowly triangular, with partly subbasifixed to basifixed white hairs, sometimes with black hairs mixed in. *Pedicels* 0.5-1 mm long, densely covered with ascending white hairs. *Calyx* c. 8 mm long, campanulate-tubular, densely covered with subbasifixed to basifixed, ascending to partly nearly spreading, soft, flexuose, tousled white hairs c. 1 mm long, mostly with asymmetrically bifurcate to basifixed black hairs mixed in, especially at the base and teeth, more rarely predominantly black-hairy at the dorsal side; teeth subulate, c. 2 mm long. *Petals* pale violet; *standard* c. 16 mm long, limb c. 6 mm wide, obovate, slightly emarginate at the tip, gradually narrowed toward the base; *wings* 14 mm long, limbs narrowly elliptic, round-tipped, 6 × 2.5 mm, auricle 0.5 mm long, claw 8 mm long; *keel* 12 mm long, limbs obliquely narrowly elliptic, with slightly widely curved lower edge and slightly concave upper edge, acute-tipped, 5 × 2 mm, auricle short, claw 7 mm long. *Stamen tube* truncate at the mouth. *Ovary* with a stipe 0.5 mm long, densely covered with basifixed, tousled white hairs c. 1 mm long and with very short, appressed hairs. *Legumes* sessile, ellipsoid, 6-7 × 3 × 2 mm, with a short beak; valves densely covered with basifixed, ascending white hairs 2-3 mm long, sitting on little tubercles, with few to many ± medifixed, appressed short hairs.

Additional specimens seen. – IRAN: ESFAHAN: 6 km E Kashan, near Bagh-abad, 900 m, 1.5.1974, *Babakhanlou, Amin, Dini & Bazargan 17787* (MSB, TARI, W); Kashan, 830 m, 14.5.1973, *Babakhanlu & Amin 15471* (W); 66 km from Qum on the road to Kashan, 870 m, 24.5.1972, *Amin & Moussavi 16053* (W). — KHORASAN: 25 km SE Boshruyeh, 900 m, 11.5.1975, *Rechinger 51659* (M, W) & *Iranshahr 40864-E* (W); 6 km from Saleh-abad toward Doruneh, 1050 m, 2.5.1975, *Iranshahr 41228-E* (W); Haresabad SW Sabzevar, 940 m, 4.5.1976, *Rejamand & Bazargan 31773* (W); 64 km W Sabzevar, 940 m, 17.5.1966, *Pabot 8018* (G); inter Tayyebat et Kisil Islam Qaleh, 700 m, 21.4.1967, *Rechinger 33262, 33267* (M, W). — SEMNAN: Entre Biarjamand et Ghaleh-Bala, 1100 m, 26.4.1975, *Iranshahr 40882-E* (IRAN, TUH, W); Turan protected area, 5-10 km S Ahmadabad versus Zamanabad, 900-950 m, 30.4.1975, *Rechinger 50754* (W); ibid., 28-30 km ESE Delbar versus Ahmadabad, 800 m, 28.4.1975, *Rechinger 50569* (W) & *Iranshahr 40925-E* (IRAN, W); 9 km SW of Chejam, 1150 m, 24.4.1978, *Freitag 14712* (W).
AFGHANISTAN: BALKH: 6-8 m W Naibabad (near road to Mazar-i-Sharif), 500 m, 20.3.1968, *Breckle 925* (MSB); 25-35 km E Mazar-i-Sharif versus Tashkurghan, 400 m, 10.5.1967, *Rechinger 34227*, *34192* (M); 23 km E Mazar-i-Sharif, 4.5.1958, *Pabot 852* (G). — SAMANGAN: 20 km W Tashqurghan an der Straße nach Mazar-i-Sharif, 350 m, 22.4.1971, *Podlech 20524a* (MSB); 25 km E Tashqurghan ab der Straße nach Qunduz, 420 m, 26.4.1969, *Freitag 5060* (MSB).

Astragalus darrehbidensis Podlech & Zarre, **sp. nova**
Holotype: Iran, Prov. Yazd, Darreh Bid, 30 km from Mehriz to Bakh, 31°25'N, 54°20'E, 2000 m, 28.5.1977, *J.R. Edmondson & A.G. Miller 1526* (E).

Differt ab *Astragalo squarroso* Bunge habitu herbaceo nec fruticoso, sine caulibus vetustis lignosis, foliis brevioribus subsessilibus, calyce pilis flexuosis appressis (nec partim ascenden-

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tibus) obtecto; ovario glabro, legumine incomplete (nec complete) biloculari, glabro, laevi (nec dense pilis longis in tuberculis insidentibus obtecto).

Plants c. 30 cm tall, herbaceous. *Caudex* up to 10 mm thick, with a pluricipital root crown. *Stems* several, erect, branched, in some leaf axils with very short, 1-2-leaved brachyblasts, very densely covered with medifixed, appressed hairs 0.5-0.8 mm long. *Stipules* hyaline-membranous, 2-4 mm long, adnate to the petiole for c. 1 mm, vaginate-connate high up, mostly for nearly the whole length, with triangular free tips, loosely to rather densely appressed-hairy or sometimes subglabrous. *Leaves* 0.8-2 cm long, subsessile or with a petiole up to 0.4 cm long; rachis rigid, rather densely covered with symmetrically to strongly asymmetrically bifurcate appressed hairs 0.2-0.5 mm long, indurating and partly persistent, subspiny. *Leaflets* in 1(-2) pair(s), narrowly elliptic, 6-14 × 1.5-3(-4) mm, obtuse to shortly acuminate, on both sides ± densely covered with medifixed, appressed hairs 0.5-1 mm long. *Peduncles* 1.5-3 cm long, hairy like the stem. *Racemes* 5-6 cm long, remotely 10-15-flowered, elongating in fruit up to 12 cm; axis hairy like the peduncle. *Bracts* white-membranous, 1 mm long, ovate-triangular, white-hairy. *Pedicels* 0.5 mm long, white or sometimes also black-hairy. *Calyx* 6-7 mm long, campanulate-tubular, obliquely cut at the mouth, ± densely covered with symmetrically to asymmetrically bifurcate, flexuose, appressed white hairs 0.5-0.8 mm long, sometimes with few black hairs mixed in, especially at the teeth; teeth narrowly triangular, 0.5-1.5 mm long, on inner side covered with very thin, basifixed, tangled white hairs. *Petals* violet; *standard* 13-14 mm long, limb c. 6 mm wide, ovate, round-tipped, at the base subabruptly narrowed into the cuneate, rather long claw; *wings* 12-13 mm long, limbs narrowly oblong, obtuse-tipped, 5-5.5 × 2 mm, auricle c. 0.4 mm long, claw 7 mm long; *keel* 10-11 mm long, limbs obliquely elliptic, with widely curved lower edge and slightly concave upper edge, subacute-tipped, 4.5 × 2 mm, auricle indistinct, claw c. 6 mm long. *Stamen tube* truncate at the mouth. *Ovary* sessile, glabrous. *Legumes* sessile, 6-7 × 4 × 4 mm rounded ventrally and dorsally, with a hooked beak 2 mm long, incompletely bilocular; valves thinly coriaceous, smooth, straw-coloured, glabrous or with scattered hairs along the ventral suture.

Astragalus nowroozii Podlech & Zarre, **sp. nova**
Holotype: Iran, Prov. Yazd, Yazd to Masjed Abolfazl, 1450 m, 25.5.1989, *M. Nowroozi & Feyzi 6014* (TUH).

Differt ab *Astragalo oligophyllo* Boiss. foliolis ellipticis, 4-15 × 2-7 mm (nec anguste ellipticis 8-15 × 1.5-3.5 mm), calyce 7-8 mm longo dentibus 0.5-1 mm longis (nec c. 6 mm longo dentibus 1-2 mm longis), vexillo c. 12 mm (nec 15-17 mm) longo, legumine pilis c. 2 mm longis sine pilis brevibus (nec pilis 3-5 mm longis et insuper brevissimis) obtecto.

Plants suffruticose, at least 40 cm tall (basal parts unknown), branched at the base. *Stems* of the current year 16-20 cm long, very densely covered with medifixed, appressed white hairs 0.8-1 mm long. *Stipules* hyaline-membranous, 3-4 mm long, adnate to the petiole for c. 1 mm, vaginate-connate high up, sometimes nearly to the top, free tips very shortly triangular, loosely white-hairy becoming glabrescent. *Leaves* 1-2.5 cm long; petiole 0.3-0.8 cm long, together with the rachis hairy like the stem, indurating and spiny with age (after losing the leaflets). *Leaflets* in 1 pair plus 1 terminal leaflet, elliptic, 4-15 × 2-7 mm, obtuse to round-tipped, on both sides rather densely hairy like the stem. *Peduncles* 1-2.5 cm long, together with the axis of raceme densely hairy like the stem. *Racemes* 4.5-14 cm long, remotely many-flowered. *Bracts* pale brownish membranous, c. 1 mm long, ovate, sparsely white-hairy. *Pedicels* c. 1 mm long, hairy. *Calyx* 7-8 mm long, shortly tubular, slightly obliquely cut at the mouth, densely covered with medifixed to slightly asymmetrically bifurcate, appressed to subappressed white hairs 0.5-0.8(-1) mm long; teeth narrowly triangular, unequal, 0.5-1 mm long. *Petals* pale lilac; *standard* c. 12 mm long, blade narrowly obovate, obtuse-tipped; *wings* 11-12 mm long, blades narrowly oblong, obtuse-tipped, 3-4 mm long, auricle 0.5 mm long, claw 7-8 mm long; *keel* 10-11 mm

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long. *Legumes* (unripe) sessile, narrowly ellipsoid, c. 6 mm long; valves covered with white hairs c. 2 mm long, without very short hairs.

Astragalus pseudoarvatensis Podlech & Sytin, **sp. nova**
Holotype: Turkmenistan, Prov. Krasnovodsk, Kizil-arvat village, 30.5.1987, *A. Sytin* (MSB; isotype: LE).

Differt ab *Astragalo androssoviano* Gontsch. pilis caulium 0.3-0.5 mm (nec 0.6-0.8 mm) longis, foliis 2-3 cm (nec 3-8 cm) longis, foliolis 6-11 × 1-2 mm (nec 10-25 × 2-5(-10) mm), foliolis supra glabra, subtus pilis 0.5-0.6 mm (nec 0.8-1 mm) longis obtectis, racemis 2-3 cm (nec 4-7 cm) longis, legumine transverse ruguloso-nervato, dense pilis ± medifixis appressis 0.3-0.7 mm longis (nec laevi, pilis ± patentibus basifixis ad 2 mm longis et insuper pilis appressis brevissimis) obtecto.

Plants 14-17 cm tall, suffruticulose, strongly branched at the base. *Stems* of previous years up to 9 cm long, with grey-brownish bark, parts of the current year 4-15 cm long, very densely covered with medifixed, appressed white hairs 0.3-0.5 mm long. *Stipules* hyaline-membranous, 1-3 mm long, nearly free from the petiole, vaginate-connate high up, often without free tips, sparsely white-hairy or subglabrous. *Leaves* 2-3.5 cm long; petiole 0.4-0.8 cm long, together with the rachis densely hairy like the stem. *Leaflets* in (1-)2-3 pairs, narrowly elliptic, 6-11 × 1-2 mm, round-tipped but mostly minutely acuminate, on upper side glabrous, on underside loosely covered with appressed hairs 0.5-0.6 mm long. *Peduncles* 1-2 cm long, angular-sulcate, hairy like the stem. *Racemes* 2-3 cm long, loosely 5-10-flowered. *Bracts* whitish-membranous, ovate-triangular, 1-2 mm long, sparsely black-ciliate. *Pedicels* 1-2 mm long, white- and black-hairy, recurved, flowers spreading to nodding. *Calyx* 6-7 mm long, campanulate-tubular, obliquely cut at the mouth, rather densely covered with symmetrically to asymmetrically bifurcate, flexuose, appressed, white and, predominantly, black hairs 0.3-0.8 mm long; teeth subulate, 1.5-2 mm long, densely covered with thin, basifixed white hairs on inner side. *Petals* pink, yellowish brown when dry; *standard* c. 14 mm long, limb c. 7 mm wide, rhombic-obovate, widely emarginate at the tip, cuneately narrowed at the base with a short claw; *wings* c. 13 mm long, limbs narrowly oblong, obtuse-tipped, 7 × 2.5 mm, auricle c. 0.5 mm long, claw 6-7 mm long; *keel* c. 11 mm long, limbs obliquely elliptic, with widely curved lower edge and slightly curved upper edge, subacute-tipped, 5 × 2.5 mm, auricle indistinct, claw c. 7 mm long. *Stamen tube* truncate at the mouth. *Ovary* subsessile, narrowly ellipsoidal, sparsely appressed-hairy; style glabrous. *Legumes* with a stipe c. 0.5 mm long, nodding, narrowly ellipsoidal, c. 8 × 3 × 2.5 mm, carinate ventrally by the thick, prominent midvein, slightly grooved dorsally, with a curved beak 0.5-1 mm long, bilocular; valves thin but tough, straw-coloured, transversally rugulose-veined, ± densely covered with ± medifixed, appressed white hairs 0.3-0.7 mm long.

Additional specimens seen. – IRAN: GORGAN: Maraveh-Tappeh, Ghazanghieh, eastern part, 300-800 m, 25.5.1994, *Maassoumi, Pakravan & Nasseh 72343* (TARI).

Astragalus similissimus Podlech & Zarre, **sp. nova**
Holotype: Afghanistan, Prov. Orozgan, inter lacum artificiale "Arghandab Reservoir" et Tirin, 1400-1700 m, 23.5.1967, *K. H. Rechinger 35036* (M; isotype: W).

Differt ab *Astragalo squarroso* Bunge stipulis (3-)4-6 mm (nec 1.5-3 mm) longis petiolo per 3 mm adnatis (nec a eo subliberis), subglabris (nec laxe ad densiuscule pilosis), racemis remote 8-20-floris (nec densiusculis in anthesi, elongatis in fructu), calyce pilis subappressis (nec partim ascendentibus) obtecto, legumine pilis longis basifixis 3-4 mm longis et pilis brevissimis (nec pilis basifixis 2.5-3 mm longis in tuberculis insidentibus tantum) obtecto.

Plants 40 cm tall, suffruticose. *Stems* of former years up to 15 cm long, ligneous, with greyish bark, stems of the current year erect, 10-15 cm long, branched at the base, very densely covered

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with medifixed, appressed hairs 0.8-1 mm long. *Stipules* membranous, yellowish, (3-)4-6 mm long, adnate to the petiole for 2-3 mm, vaginate-connate high up, often for the whole length, partly with short, triangular free tips, subglabrous. *Leaves* 1-5 cm long; petiole 0.3-1 cm long, together with the short rachis hairy like the stem, sometimes indurating and persistent, non-spiny, the leaflet petioles 1-1.5 mm long, yellowish brown, sparsely hairy, at the base often with subsessile minute glands. *Leaflets* in 1(-2) pair(s), narrowly elliptic, 12-20(-28) × 2-5(-8) mm, obtuse to shortly acuminate, on upper side loosely to rather densely covered with medifixed hairs 0.8-1 mm long, on underside more densely with shorter hairs 0.5-0.8 mm long. *Peduncles* 2-6 cm long, hairy like the stem. *Racemes* (2-)4-22 cm long, remotely (6-)8-20-flowered; axis hairy like the peduncle. *Bracts* membranous, 1.5-2 mm long, narrowly triangular, subglabrous, at the base mostly with sessile glands. *Pedicels* c. 1 mm long, densely white-hairy. *Calyx* 7-8 mm long, campanulate-tubular, obliquely cut at the mouth, rather densely covered with medifixed to strongly bifurcate, subappressed white hairs 0.4-0.8 mm long; teeth subulate to narrowly triangular, 1-2 mm long, on inner side with very thin, basifixed, tangled, white hairs. *Petals* violet; *standard* 14 mm long, limb 5-7 mm wide, obovate, retuse at the tip, at the base gradually narrowed; *wings* 12-13 mm long, limbs narrowly oblong, sometimes dilated toward the obtuse tip, 6-6.5 × 1.5-2.2 mm, auricle c. 0.4 mm long, claw 6 mm long; *keel* c. 11 mm long, limbs obliquely elliptic, with widely curved lower edge and slightly concave upper edge, acute-tipped, auricle minute, claw c. 6 mm long. *Stamen tube* truncate at the mouth. *Ovary* subsessile or with a stipe c. 1 mm long, densely hairy; style glabrous. *Legumes* sessile to subsessile, narrowly ellipsoid, c. 8 × 3 × 2 mm, obtusely carinate ventrally and dorsally, with a curved beak 2 mm long, often with persistent style, bilocular; valves thinly coriaceous, pale brownish, densely covered with thin, tangled, spreading, basifixed, white hairs 3-4 mm long, and with very short hairs (which can be seen also at the ovary of well developed flowers).

Additional specimens seen. – AFGHANISTAN: HELMAND: Ad marginem deserti Dasht-i Margo SW Qala Bist [Lashkargah], 820 m, 18.5.1967, *Rechinger 34495* (M, W); Shor Ab, an der Strasse Dilaram - Girishk, 980 m, 20.4.1972, *Anders 8620* (MSB, W); Yaktchal near Girishk, 16.4.1958, *Lindberg 364* (W). — KANDAHAR: 43 km N Kandahar versus lacum artificiale "Arghandab reservoir", 1100-1200 m, 22.-23.5.1967, *Rechinger 34904* (M, W); Dahla, c. 65 NE Kandahar, near road to Tirin, 1350 m, 22.5.1967, *Freitag 840* (MSB); Kandahar, c. 1000 m, 5.5.1935, *Kerstan 2249* (W); 40 km E of Kandahar, near Takhta Pul at Dori River, 1100 m, 22.4.1968, *Freitag 2580* (MSB); 50 km SE Kandahar at Dori River, 15.4.1958, *Pabot A.487* (W). — OROZGAN: Inter lacum artificiale "Arghandab Reservoir" et Tirin, 1400-1700 m, 23.5.1967, *Rechinger 34971*, *35036* (M, W). — ZABUL: 81 km SW Mukur versus Kalat-i Ghilzai, 1750 m, 17.5.1967, *Rechinger 34487* (M, W).

Astragalus strictissimus Podlech & Zarre, **sp. nova**
Holotype: Iran, Prov. Azerbaijan, c. 13 km below Mianeh on road to Zanjan, 1050 m, 22.6.1971, *J. Lamond 4242* (E).

Differt ab *Astragalo aiwadzhii* B. Fedtsch. foliolis 2-3-jugis (nec 1-2-jugis), 10-22 × 0.8-2 mm (nec 15-45 × (1.5-)2-4 mm), utrimque sparse ad laxe pilis 1-1.5 mm longis (nec utrimque pilis dense) obtectis, bracteis c. 1 mm (nec 2-4 mm) longis, calyce 4.5-5 mm (nec 5-7 mm) longo, pilis albis nigrisque (nec mere albis) obtecto, dentibus 0.5-0.8 mm (nec 1-1.5 mm) longis, legumine pilis brevibus appressis tantum (nec longis patentibus et brevibus appressis) obtecto.

Plants c. 50 cm tall, subshrubby. *Caudex* strong, up to 15 mm in diameter, branched, with blackish grey bark. *Stems* of older years short, ligneous, branched, parts of the current year up to 40 cm long, erect, branched, with internodes 6-8 cm long, very densely covered with medifixed, appressed white hairs c. 0.3 mm long. *Stipules* hyaline-membranous, 1-2 mm long, free from the petiole, vaginate-connate high up, sparsely white- and black-hairy. *Leaves* 2-4 cm long; petiole 0.5-1.5 cm long, together with the rachis loosely to rather densely hairy like the stem. *Leaflets* in 2-3 pairs, linear, 10-22 × 0.8-2 mm, subobtuse-tipped, often with inrolled margins, on both sides

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sparsely to loosely covered with appressed, medifixed hairs 1-1.5 mm long. *Peduncles* 4.5-11 cm long, hairy like the stem. *Racemes* 6-9 cm long, loosely up to 25-flowered. *Bracts* hyaline-membranous, c. 1 mm long, narrowly triangular, subglabrous. *Pedicels* 1-1.5 mm long. *Calyx* 4.5-5 mm long, turbinate-campanulate, loosely covered with medifixed, appressed white and fewer black hairs c. 0.5 mm long; teeth narrowly triangular, 0.5-0.8 mm long. *Petals* unknown (keel according to the length of stamens 8-9 mm long). *Stamen tube* truncate at the mouth. *Legumes* narrowly ellipsoid, c. 8 × 2 × 2-2.5 mm, with a slightly curved beak, incompletely bilocular; valves pale brownish, loosely covered with medifixed, appressed white hairs 0.3-0.5 mm long. *Seed* one, 3.5 × 1.2 mm, yellowish brown, blackish dotted.

Astragalus tenuiramosus Podlech & Zarre, **sp. nova**
Holotype: Iran, Baluchistan, in declivibus orientalibus vulcani Bazman, 1700-2000 m, 2.-4.5. 1977, *K.H. Rechinger 55071* (M; isotype: W).

Differt ab *Astragalo nigricante* Barneby foliolis angustioribus, 1-2 mm (nec 2-4 mm) latis, calyce 5-6 mm (nec 6-7 mm) longo, vexillo 11 × 4.5 mm, basin versus gradatim angustato sine ungue distincto (nec 12-14 × 6 mm, in medio abrupte constricto et in unguem abeunte), lamina alarum apice rotundata (nec oblique emarginatis), pilis longioribus leguminis 3-4 mm (nec 2-3 mm) longis.

Plants 30-40 cm tall, suffruticose, branched. *Caudex* branched, with grey-yellowish, longitudinally splitting bark. *Stems* of the previous years up to 15 cm long, densely appressed-hairy; stems of the current year 10-15 cm long, slender, very densely covered with medifixed, appressed white hairs 0.5-0.8 mm long. *Stipules* membranous, 1-1.5 mm long, shortly to distinctly adnate to the petiole, vaginate-connate high up, sparsely to loosely appressed-hairy. *Leaves* 1-2.5 cm long; petiole 0.2-0.9 cm long, together with the rachis densely hairy like the stem. *Leaflets* in 1-2 pair(s), narrowly elliptic, 4-12 × 1-2 mm, acute-tipped, on both sides rather densely covered with medifixed, appressed hairs 0.6-1.2 mm long. *Peduncles* 1.5-4 cm long, hairy like the stem. *Racemes* 5-12 cm long, remotely 10-12-flowered. *Bracts* membranous, 1 mm long, narrowly ovate, white-hairy. *Pedicels* c. 1 mm long, white-hairy. *Calyx* 5-6 mm long, tubular, obliquely cut at the mouth, ± densely covered with ± medifixed, appressed white hairs (0.2-)0.3-0.7 mm long; teeth narrowly triangular, 1-1.5 mm long, densely white-hairy on inner side. *Petals* yellowish (?); *standard* c. 11 mm long, limb 4.5 mm wide, obovate with rounded tip, gradually narrowed toward the base without distinct claw; *wings* 11 mm long, limbs narrowly oblong, obtuse-tipped, 5.5 × 1.8 mm, auricle 0.5 mm long, claw 6 mm long; *keel* 10 mm long, limbs obliquely elliptic, with widely curved lower edge and straight upper edge, acute-tipped, 4.5 × 2 mm, auricle minute, claw c. 6 mm long. *Stamen tube* truncate at the mouth. *Ovary* with a stipe c. 0.5 mm long, hairy; style glabrous. *Legumes* with a stipe c. 1-1.2 mm long, narrowly ellipsoid, c. 7 × 2.5 × 2 mm, with straight beak c. 3 mm long; valves straw-coloured, densely covered with basifixed, nearly spreading, white hairs 3-4 mm long and with very short hairs.

Additional specimens seen. – IRAN: HORMOZGAN: Near Bandar-Abbas, 1.4.1976, *Frey & al. 76/345* (MSB). — SISTAN: In declivibus orientalibus vulcani Bazman, 1700-2000 m, 2.-4.5.1977, *Rechinger 55071* (M, W); ibid., 3.5.1977, *Assadi in Rechinger 55146* (M, W); S slopes of Kuh-e-Bazman, c. 1700 m, 11.5.1975, *Parris 75.463* (K); inter Zahedan (Duzdab) et Khash, 1300-1600 m, 15.5.1948, *Rechinger, Aellen & Esfandiari 4230* (M, W); 74-100 km a bifurcatione viae Khash - Iranshahr versus Bazman, 1600 m, 29.4.1977, *Rechinger 54970* (M, W).

Astragalus zurmatensis Podlech & Zarre, **sp. nova**
Holotype: Afghanistan, Prov. Paktia, 50 km NW Urgun versus Zurmat, 2200-2400 m, 10.6.1967, *K. H. Rechinger 35952* (M; isotype: W).

Differt ab *Astragalo urgunensi* Podlech foliolis 15-30 × 2-3 mm (nec 5-18 × 1-2 mm), utrinque pilis 0.3-0.5 mm (nec 1-1.5 mm) longis obtectis, pedunculis 7-15 cm (nec ad 7 cm) longis, bracteis 1-1.5 mm (nec c. 0.5 mm) longis, calyce c. 5 mm (nec 3.5-4 mm) longo, dentibus 1.5-

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2 mm (nec 0.5-0.7 mm) longis, petalis longioribus, vexillo c. 12 mm (nec 6-7 mm) longo, legumine 8-9 mm (nec c. 5 mm) longo, pilis basifixis 2-3 mm longis tantum (nec pilis basifixis 3-4 mm longis et brevibus medifixis subappressis) obtecto.

Plants up to 40 cm tall, only covered with white hairs. *Caudex* 5-8 mm in diameter, branched, with grey-brownish, reticulately fibrous bark. *Stems* branched in the short, older, ligneous parts; stems of the current year 6-12 cm long, slightly angular, very densely covered with ± medifixed, appressed, slightly flattened hairs 0.4-0.8 mm long. *Stipules* membranous,1.5-3 mm long, shortly adnate to the petiole, vaginate-connate up to the middle, with triangular free tips, appressed-hairy to subglabrous. *Leaves* 2.5-4 cm long, subsessile or with a petiole up to 0.5 cm long; rachis densely appressed-hairy like the stem. *Leaflets* in 1-2 pair(s), sometimes in the leaves at the top of stem only 1 terminal leaflet, sessile, linear, 15-30 × 2-3 mm, subobtuse to shortly acuminate at the tip, on both sides ± densely covered with ± medifixed, appressed hairs 0.3-0.5 mm long. *Peduncles* up to 7-12(-15) cm long, slightly angular-sulcate, hairy like the stem. *Racemes* up to 20 cm long, very remotely up to 22-flowered. *Bracts* membranous, narrowly triangular, 1-1.5 mm long, white-hairy. *Pedicels* c. 2 mm long, densely hairy. *Flowers* obliquely erect. *Calyx* c. 5 mm long, campanulate-tubular, obliquely cut a the mouth, rather densely covered with ± medifixed, appressed hairs 0.3-0.7 mm long; teeth subulate, 1.5-2 mm long, sparsely covered with basifixed, fine hairs on inner side. *Petals* pale violet, yellowish-brown when dry; *standard* c. 12 mm long, limb obovate, c. 6 mm wide, slightly to distinctly constricted in the middle, emarginate at the tip, without distinct claw; *wings* c. 11 mm long, limbs narrowly oblong, round-tipped, 5 × 1.5 mm, auricle c. 0.6 mm long, claw 6 mm long; *keel* c. 9 mm long, limbs obliquely obovate, with in upper part rectangular-curved lower edge and nearly straight upper edge, subacute-tipped, 3.5 × 2 mm, auricle indistinct to very short, claw 6 mm long. *Stamen tube* truncate at the mouth. *Ovary* subsessile, white-villous; style glabrous. *Legumes* (unripe) sessile, ellipsoid, 8-9 × 3 × 1.5-2 mm, narrowly rounded ventrally and dorsally, bilocular; valves rather densely covered with ascending to ± spreading, basifixed hairs 2-3 mm long, sitting on minute tubercles, without very short hairs.

Key for the species of *Astragalus* sect. *Ammodendron* of the Flora Iranica area

For a previous contribution to this section in the area see Rechinger & al. (1961). A difficult section. The species look all alike because of the uniform desertic habitat where most of them grow and there are few reliable characters distinguishing them. The plants are often heavily browsed and then sometimes of quite different shape; often their innovations have a different number of leaflets than those of well-developed plants, and their inflorescences have often only short peduncles, the leaflets, and partly also the calyx and petals, are often smaller. Therefore only well grown plants can be named with certainly. The character pair "calyx hairs only white" vs. "black and white" is a reliable criterion in more then 90 % of the cases, but sometimes white-hairy plants have a few black hairs on the calyx teeth, and plants with white and black hairs may have no or very few black hairs in some flowers. So, if there are only very few black hairs on the calyx one should try out both options "calyx hairs white and black" or "calyx hairs white".

1. Leaflets in 4-6 or more pairs 2
– Leaflets in at most 3 pairs 4
2. Leaflets in 8-10 pairs, 4-6 mm long; leaves 2-5 cm long; calyx white-hairy . . . . . *A. ghoratensis* Podlech
– Leaflets in 4-7 pairs, 5-15 mm long; leaves 6-14 cm long; calyx with white and black hairs . 3
3. Leaf rachis indurating and persistent; racemes 4-8-flowered; standard 19-22 mm long; legumes 32-34 × 6 mm . . . . . *A. goreanus* Aitch. & Baker
– Leaf rachis not indurating; racemes 4-15 cm long, loosely many-flowered; legumes 10-15 × 2.5 × 4 mm . . . . . *A. griffithii* Bunge
4. Leaflets glabrous on upper side . . . . . *A. pseudoarvatensis* Podlech & Sytin
– Leaflets hairy on upper side, sometimes only sparsely so 5

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5. Ovary and legumes glabrous (only in *A. darrehbidensis* with scattered hairs at the ventral suture) 6
– Ovary and legumes densely hairy 8
6. Leaflets on both sides densely hairy; rachis rigid, indurating and persistent; legumes 6-7 mm long, with a hooked beak c. 2 mm long, incompletely bilocular . . . . . *A. darrehbidensis* Podlech & Zarre
– Leaflets on upper side very sparsely to loosely hairy; rachis not indurating and persistent; legumes 8-10 mm long, with a straight beak 1-1.5 mm long, completely bilocular . . . 7
7. Stipules covered with strongly asymmetrically bifurcate to basifixed hairs; leaflets in 2 pairs, 8-25 × 3-9 mm, acute-tipped, on upper side covered with partly strongly asymmetrically bifurcate hairs; racemes 20-25 cm long with a densely hairy peduncle; calyx 8-9 mm long, teeth c. 2 mm long . . . . . *A. joarchii* Ghahremani-nejad & al.
– Stipules covered with medifixed hairs; leaflets mostly in 1 pair, 4-14 × 2-4 mm, obtuse-tipped, on upper side covered with medifixed hairs; racemes 1-5 cm long, with a peduncle sparsely hairy to subglabrous; calyx c. 6 mm long, teeth 0.3-1 mm long . . . . . *A. glabellus* Podlech
8. Legumes covered with appressed hairs (can be seen also at the ovary); calyx c. 5 mm long, white- and black-hairy 9
– Legumes always villous with ascending to spreading long hairs (can be seen also at the ovary); calyx longer, if only 5 mm long, than only white-hairy 10
9. Plants c. 15 cm tall; peduncle 0.3-0.8 cm, raceme 1-2 cm long, 2-6-flowered . . . . . *A. arvatensis* Gontsch.
– Plants c. 50 cm tall; peduncle 4.5-11 cm, raceme 6-9 cm long, up to 25-flowered . . . . . *A. strictissimus* Podlech & Zarre
10. Calyx 3.5-4 mm long; standard 6-7 mm long . . . . . *A. urgunensis* Podlech
– Calyx and standard distinctly longer 11
11. Calyx only covered with white hairs 12
– Calyx and mostly also bracts covered with white and black or only black hairs . . . 27
12. Calyx at least partly covered with asymmetrically bifurcate to subbasifixed, appressed and partly ascending hairs up to 0.8 mm long; legumes covered with basifixed hairs 2.5-3 mm long, sitting on little tubercles, without short hairs; leaflets 5-12 × 1.5-3(-4) mm . . . . . *A. squarrosus* Bunge
– Calyx covered with appressed to subappressed hairs only; longer hairs of the legumes mostly not sitting on tubercles (only so in *A. farsicus* and *A. zurmatensis*) 13
13. Plants up to 2 m high with internodes 6-15 cm long; leaflets in 1 pair, the upper leaves only with one terminal leaflet, 25-60 mm long; calyx 6-7.5 mm long . . . *A. kavirensis* Freitag
– Plants distinctly smaller with shorter internodes; leaflets in 1-2 pair(s), distinctly shorter, if upper leaves only with one terminal leaflet (*A. zurmatensis*) then calyx only 5 mm long 14
14. Peduncles 0.1-1 cm long; racemes short, 1.5-4 cm long, 3-7-flowered 15
– Peduncles and racemes distinctly longer, mostly with more flowers 17
15. Calyx 7-8 mm long; standard 16-18 mm long . . . *A. ammodendroides* Podlech & Zarre
– Calyx 5-6 mm long; standard up to 14 mm long 16
16. Leaflets elliptic to narrowly elliptic, 3-10 × 1.7-2 mm, mostly obtuse-tipped; standard 11-13 mm long; legumes with hairs 3-4 mm long, sitting on little tubercles (S Iran) . . . . . *A. biabanensis* Širj. & Rech. f.
– Leaflets narrowly elliptic to linear, 4-25 × 1-2.5 mm, acute-tipped; standard 12-14 mm long; legumes with hairs up to 2.5 mm long, not sitting on tubercles . . . *A. acutifolius* Bunge
17. Leaflets in 1-2 pair(s), (12-)15-30(-38) mm long 18
– Leaflets in 1 pair (only in *A. tenuiramosus* and *A. macrobotrys* lower leaves with 2 pairs but then only up to 15 mm (in *A. macrobotrys* 5-20 mm) long) 20
18. Calyx c. 5 mm long; legumes covered with basifixed hairs 2-3 mm long, sitting on little tubercles . . . . . *A. zurmatensis* Podlech & Zarre

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– Calyx longer; legumes with longer basifixed hairs not sitting on little tubercels . . . 19
19. Plants 50-70 cm tall; leaflets linear, 15-35(-45) × 2-4 mm; bracts (1.5-)2(-3) mm long; calyx 5-7 mm long . . . . . *A. aiwadzhii* B. Fedtsch.
– Plants up to 40 cm tall; leaflets in 1(-2) pair(s), narrowly elliptic, 12-20(-28) × 2-5 mm; bracts 1.5-2 mm long; calyx 7-8 mm long . . . . . *A. similissimus* Podlech & Zarre
20. Leaflets in lower leaves in 2 pairs, in uppermost leaves in 1 pair 21
– Leaflets in 1 pair, rarely in some leaves in 2 pairs 23
21. Legumes c. 5 mm long, covered with spreading hairs 2-2.5 mm long, sitting on little tubercles, without very short hairs; leaflets 10-20 × 3-6 mm . . *A. bazarganii* Podlech & Zarre
– Legumes 6-9 mm long, covered with spreading hairs 3-4 mm long and with very short hairs; leaflets up to 15 × 4 mm wide 22
22. Leaflets 4-12 × 1-2 mm; calyx 5-6 mm long; standard 11 × 4.5 mm, gradually narrowed at the base without distinct claw; wing limbs round-tipped; longer hairs of legumes not sitting on little tubercles . . . . . *A. tenuiramosus* Podlech & Zarre
– Leaflets 7-15 × 2-4 mm; calyx 6-7 mm long; standard 12-14 × 6 mm, in the middle subabruptly narrowed into the rather long, cuneate claw; wing limbs obliquely emarginate at the tip; longer hairs of legumes sometimes sitting on little tubercles (the rare plants with only white calyx hairs) . . . . . *A. nigricans* Barneby
23. Calyx 5-5.5 mm long; legumes with basifixed hairs 2-3 mm long, sitting on little tubercles, without very short hairs . . . . . *A. farsicus* Širj. & Rech.f.
– Calyx 6-7 mm long; legumes with basifixed hairs not sitting on tubercles and also with short, ± medifixed, appressed hairs (only in *A. nowroozii* without short hairs) 24
24. Plants mostly, up to 50(-70) cm tall; leaflets in 1(-2) pair(s), often some leaves at the main stem with 2 pairs, on upper side loosely to very sparsely hairy; legumes covered with basifixed hairs 2-3 mm long . . . . . *A. macrobotrys* Bunge
– Plants up to 40 cm or taller; leaflets always in 1 pair, on both sides ± densely hairy; legumes with basifixed hairs 3-5 mm long and with short, appressed hairs, or with hairs 2 mm long and without very short hairs 25
25. Leaves with petiole indurating and spiny; leaflets elliptic, 4-15 × 2-7 mm; calyx 7-8 mm long; legumes with hairs c. 2 mm long, without very short hairs . . . . . *A. nowroozii* Podlech & Zarre
– Leaves never with indurating and spiny petiole; leaflets narrowly elliptic, 5-15 × 1.5-3 mm; calyx c. 6 mm long; legumes with longer hairs 3-5 mm long and with very short hairs . 26
26. Calyx teeth c. 0.5 mm long; standard 11-13 × 6 mm; leaflets round-tipped to emarginate; legumes c. 7 mm long . . . . . *A. akhundzahadensis* Podlech & Zarre
– Calyx teeth 1-2 mm long; standard 15-17 × 5 mm; leaflets subobtuse at the tip; legumes 8-10 mm long . . . . . *A. oligophyllus* Boiss.
27. Peduncles 1 or 2, one of them appears terminal, the second subterminal; leaflets mostly in 2 pairs; legumes sessile or with a stipe 2-4 mm long 28
– Peduncles mostly more than 2, lateral, sometimes with the exception of the uppermost one; legumes sessile, if stipitate then stipe up to 1 mm long 30
28. Legumes (and ovary) sessile; leaflets in mostly 2 pairs, 8-15 mm (terminal leaflets up to 22 mm) long; standard 18-20(-22) mm long . . . . . *A. tarumensis* Širj. & Rech.f.
– Ovary and legumes with a distinct stipe; standard 13-17(-19) mm long; leaflets mostly distinctly longer 29
29. Legumes (and ovary) with a hairy stipe 2-4 mm long, narrowly ellipsoidal, acuminate at both ends, 8-9 mm long, 3-4 mm high, with longer hairs straight, spreading, up to 3 mm long, often sitting on little tubercles; leaflets mostly narrowly elliptic, 10-25 mm (terminal leaflets up to 40 mm) long . . . . . *A. podolobus* Boiss. & Hohen.
– Legumes with a glabrous stipe up to 3 mm long, ellipsoidal, c. 7 mm long, 4 mm high, with longer hairs flexuose, tousled, 3-4 mm long, never sitting on little tubercles; leaflets linear, 25-35(-40) × 1-2 mm . . . . . *A. erwinii-gaubae* Širj. & Rech.f.
30. Most leaflets in 2 pairs and at least some leaves with 3 pairs . *A. androssovianus* Gontsch.

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– Leaflets in 1 or 1-2 pairs (only in *A. nigricans* most leaves with 2 pairs) 31
31. Calyx covered with strongly asymmetrically bifurcate to subbasifixed, ascending, white hairs and with mostly shorter, subappressed, black hairs; peduncles and racemes short . . . . . *A. biarjmandicus* Podlech & Zarre
– Calyx covered with symmetrically to asymmetrically bifurcate, appressed to subappressed hairs; racemes mostly long 32
32. Dense, compact shrublets up to 25 cm in diameter; standard 14-20 mm long; racemes short, 2-7-flowered, with a peduncle 0.3-2(-3) cm long (Kopet-Dagh) . . . . . *A. turcomanicus* (Bunge) Bunge
– Subshrubs, not densely compact; standard up to 16 mm long; raceme long, many-flowered, with a peduncle up to 4.5 or 9 cm long 33
33. Leaflets always in 1 pair, obovate, 6-12 × 3-6 mm; peduncles 6-9 cm long; standard distinctly constricted below the middle (NW Afghanistan) . . . . . *A. gemellus* Podlech
– Leaflets in 1(-2) or mostly in 2 pair(s), up to 15-20 mm long; peduncles up to 4.5 cm long; standard not constricted; longer hairs of legumes mostly sitting on little tubercles, short hairs sometimes only few 34
34. Leaflets in 1 pair or rarely in 2 pairs; peduncle 1-3.5 cm long; legumes with a straight beak c. 0.5 mm long; desert plants of Iran . . . . . *A. sangonensis* Širj. & Rech.f.
– Leaflets in mostly 2 pairs; peduncle 4-8 cm long; legumes with a curved beak 1-1.5 mm long; plants of NE Iran, Turkmenistan and NW Afghanistan . . . *A. nigricans* Barneby

References

Rechinger, K. H., Dulfer, H. & Patzak, A. 1961: Širjaevii fragmenta astragologica XV. *Astragalus* sect. *Ammodendron*. – Sitzungsber. Österr. Akad. Wiss., Mathem.-Naturw. Kl., Abt. I, **170:** 35-53.

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