

New species of *Astragalus* L. (Leguminosae) sect. *Hololeuce*, *Onobrychoidei*, *Ornithopodium* and *Synochreati* and a new section *Baldaccia*

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Abstract:

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During our work on *Astragalus* sect. *Onobrychoidei* and neighbouring sections several new taxa were found, which are described here. Sect. *Hololeuce*: *A. khokhrjakovii*, *A. kizilirmakii*, *A. xerophiloides*; Sect. *Onobrychoidei*: *A. bijarensis*, *A. maxtedii*, *A. parvarensis*; Sect. *Ornithopodium*: *A. circumlacustris*; Sect. *Synochreati*: *A. rubicundus*; *Astragalus* sect. *Baldaccia*. The following taxa are renamed or raised in rank: *A. bithynicus*, *A. chamonobrychis*, *A. hololeucoides*.

Zusammenfassung:

Während der Arbeiten an *Astragalus* sect. *Onobrychoidei* und verwandten Sektionen konnten mehrere neue Sippen gefunden werden, die hier beschrieben sind: Sect. *Hololeuce*: *A. khokhrjakovii*, *A. kizilirmakii*, *A. xerophiloides*; Sect. *Onobrychoidei*: *A. bijarensis*, *A. maxtedii*, *A. parvarensis*; Sect. *Ornithopodium*: *A. circumlacustris*; Sect. *Synochreati*: *A. rubicundus*; *Astragalus* sect. *Baldaccia*. Die folgenden Sippen werden umbenannt oder im Rang erhöht: *A. bithynicus*, *A. chamonobrychis*, *A. hololeucoides*.

Several new species of the following sections are newly described: *Hololeuce*, *Onobrychoidei*, *Ornithopodium* & *Synochreati*. For the general characters of the sections see Flora of Turkey vol. 3 (section *Synochreati* as *Acmothrix*).

***Astragalus hololeucoides* Podlech & Sytin, nom. et status nov. (Sect. *Hololeuce*)**

Based on *A. mesogitanus* f. *glabriflorus* Hub.-Mor., Repert. Spec. Nov. Regni Veg. 48: 282. 1940. Syntypes: Vilajet Burdur, Dirmil-Tefenni, 1250 m, 9.6.1938, H. Reese, J. Renz & A. Huber-Morath 5531; 3 km nach Dirmil, 1200 m, 9.6.1938, A. Huber-Morath 5532 (G). Lectotype (PODLECH 1998): [Turkey] Vilajet Burdur, Dirmil-Tefenni, 1250 m, 9.6.1938, H. Reese, J. Renz & A. Huber-Morath 5531 (G!; iso: G!) ≡ *A. lycius* Boiss. f. *acutiflorus* Hub.-Mor., Repert. Spec. Nov. Regni Veg. 48: 284. 1940.

This species is clearly distinct from *A. mesogitanus* Boiss. and *A. lycius* Boiss., both of sect. *Onobrychoidei*. In our opinion it is a member of sect. *Hololeuce*.

We give a complete description of this species because the original diagnosis is very short:

Plants 10–15 cm tall, caespitose, densely covered with ascending to spreading, bifurcate hairs. Caudex strongly divided with short branches. Stems several to many, mostly sterile, 2–5 cm long, branched in lower part, very densely covered with symmetrically to asymmetrically bifurcate, tangled, subappressed to ascending white, below the nodes also with black hairs 0.3–0.7 mm long. Stipules whitish- to yellowish-membranous, c. 3 mm long, free from the petiole, connate behind the stem at least to the middle or higher up, the tips narrowly triangular, sparsely to loosely appressed white and black hairy. Leaves 2–3 cm long; petiole 0.5–1 cm long, like the rachis rather densely hairy like the stem, but sometimes also with some hairs nearly spreading. Leaflets in 6–10 pairs, in short, sterile side-branches often in 3–4 pairs only, narrowly elliptic to narrowly obovate, 3–6 × 1–2 mm, mostly folded, obtuse to shallowly retuse at the apex, on both sides rather densely to densely covered with mostly asymmetrically bifurcate, tangled, subappressed to partly ascending white hairs 0.5–0.6 mm long. Peduncles 4–7 cm long, rather densely covered with symmetrically to asymmetrically bifurcate, subappressed white hairs 0.2–0.3 mm long and with ascending to spreading hairs 0.6–1 mm long, in upper part also with some black hairs mixed in. Racemes ovoid to oblong, 5–12-flowered. Bracts membranous, narrowly triangular, 4–5 mm long, white and black hairy, at the margins with basifixed hairs sometimes sitting on little tubercles. Pedicels very short, hairy. Calyx 9–10 mm long, tubular, obliquely cut at the mouth, covered with subbasifixed, ascending to partly spreading white hairs 0.8–1.2 mm long, often sitting on little tubercles, and with symmetrically to asymmetrically bifurcate, often flexuose, appressed black hairs 0.2–0.4 mm long; teeth linear-acute, c. 3 mm long, white hairy on inner side. Petals violet or purplish. Standard c. 17 mm long; blade c. 5 mm wide, rhombic-ovate, gradually and tongue-like narrowed toward the truncate to retuse apex, cuneately narrowed at the base. Wings c. 12 mm long; blades narrowly oblong, obtuse at the apex, 6 × 1.5 mm; auricle 0.8 mm long, claw 6 mm long. Keel c. 10 mm long; blades obliquely obovate, with in upper part widely curved lower edge and ± straight upper edge, subacute at the apex, 4.5 × 2 mm; auricle acute, 0.5 mm long, claw 6 mm long. Stamen-tube obliquely cut at the mouth. Stamens 10 mm long, the free ends 1–2 mm long. Ovary narrowly ellipsoidal, white hairy; style glabrous. Legumes sessile, erect, obliquely ellipsoidal, 6–7 mm long, 3–3.5 mm high, 3 mm wide, carinate ventrally, grooved dorsally, with a curved beak 1.5–2 mm long but often with the persistent long style, bilocular; valves thin, rather densely covered with subbasifixed to basifixed, ± spreading white hairs 1–2 mm long, sitting on distinct tubercles. Seeds two in each locule, 1.5 × 1.2 mm long, brown.

Astragalus khokhrjakovii Sytin & Podlech, spec. nov. (Sect. *Hololeuce*).

Holotypus: Turkey, Prov. Artvin, valley of the river Coruh Nehri, right bank against Artvin, 6.7.1994, A.P. Khokhrjakov, M.G. Pimenov, E.V. Kljukov & M.T. Mazurenko (MW).

Differt ab *A. eliasianus* Kit Tan & Sorger stipulis a petiolo liberis sed ante petiolum saepissime distincte vaginati-connatis (nec post caulem tantum vaginati-connatis), foliolis pilis arcte asymmetricice bifurcatis (nec ± medifixis) obtectis, pedunculo 6–9 cm (nec 13–28 cm) longo, calyce pilis albis longis patentibus (nec omnibus appressis) oblecto, leguminibus pilis albis 1–1.5 mm longis et paucis nigris brevissimis obtectis (nec pilis albis et nigris 1.5–2 mm longis obtectis).

Differs from *A. eliasianus* Kit Tan & Sorger by stipules free from the petiole but before the petiole distinctly vaginate-connate (not vaginate-connate behind the stem only), by leaflets

covered with strongly asymmetrically bifurcate (not medifixed) hairs, by peduncles 6–9 cm (not 13–28 cm) long, by the calyx covered with long, spreading hairs (not only with appressed hairs) and by legumes covered with white hairs 1–1.5 mm long and few very short black hairs (not with white and black hairs 1.5–2 mm long).

Plants densely caespitose, mat-forming. Caudex long, ligneous, up to 5 mm thick, strongly divided. Stems numerous, prostrate to slightly ascending, 1.5–6 cm long, densely covered with asymmetrically to \pm symmetrically bifurcate, appressed to partly ascending (mostly the longer ones) white hairs 0.5–1.2 mm long. Stipules hyaline-membranous, c. 5 mm long, free from the petiole, but not only highly vaginate-connate behind the stem, but also mostly distinctly connate before the petiole, at the margins with subbasifixed to basifixed hairs, otherwise nearly glabrous. Leaves 4–6 cm long; petiole 1.5–2.5 cm long, slender, like the rachis grooved on upper side, loosely to densely hairy like the stem. Leaflets in 7–9 pairs, narrowly elliptic, $5\text{--}12 \times 0.8\text{--}2.5$ mm, slightly retuse and mostly cucullate at the apex, on upper side loosely, on underside rather densely covered with mostly strongly asymmetrically bifurcate, subappressed hairs 0.8–1 mm long. Peduncles 6–9 cm long, slightly ascending-curved, hairy like the stem but below the raceme also with black hairs. Racemes densely 8–10-flowered. Bracts hyaline-membranous, narrowly ovate-acuminate, 4–5 mm long, sparsely white and black hairy. Pedicels c. 0.5 mm long, hairy. Calyx 9–10 mm long, tubular, slightly inflated, rather densely covered with subbasifixed, nearly spreading white hairs c. 1 mm long and with asymmetrically bifurcate, often somewhat flexuose, subappressed, mostly shorter black hairs; teeth linear-acute, 2–2.5 mm long, white hairy on inner side. Petals possibly pale bluish. Standard c. 25 mm long; blade 8.5–9 mm wide, ovate, in upper part slightly tongue-like narrowed toward the emarginate apex, at the base cuneately narrowed. Wings c. 19 mm long; blades narrowly obovate, laterally slightly emarginate at the apex, c. 9×3.5 mm; auricle c. 1.5 mm long, claw 10 mm long. Keel c. 16 mm long; blades oblique-obovate, with widely rectangular-curved lower edge and nearly straight upper edge, obtuse at the apex, 7×3.5 mm; auricle acute, c. 0.5 mm long, claw c. 9 mm long. Stamen-tube truncate at the mouth. Ovary with a stipe c. 0.5 mm long, densely white hairy; style glabrous. Legumes sessile, ellipsoidal, c. 10 mm long, 4 mm high and 2 mm wide, obtuse-carinate ventrally, narrowly grooved dorsally, with an oblique beak c. 2 mm long, bilocular; valves densely covered with extremely asymmetrically bifurcate, mostly flexuose-tangled, ascending white hairs 1–1.5 mm long, sitting on little tubercles and with some very short black hairs.

Astragalus kizilirmakii Podlech & Sytin, spec. nov. (Sect. *Hololeuce*).

Holotypus: Turcia, Nevsehir, in valle fluvii Kizil Irmak inter Gulshehir et Haciбекtas, 950 m, 3.7.1975, K.H. Rechinger 53946 (M).

Differt ab *A. alyssoides* Lam. stipulis 2–3,5 (nec 3–7) mm longis, foliis 4–6-jugis (nec 5–9-jugis), foliolis ellipticis, $2\text{--}6 \times 1\text{--}3$ mm (nec anguste ellipticis, $4\text{--}7 \times 1\text{--}2$ mm), calyce 8–10 (nec 5–7) mm longo.

Differs from *A. alyssoides* Lam. by stipules 2–3.5 mm (not 3–7 mm) long, by leaflets in 4–6 pairs, elliptic, $2\text{--}6 \times 1\text{--}3$ mm (not in 5–9 pairs, narrowly elliptic, $4\text{--}7 \times 1\text{--}2$ mm), by the calyx 8–10 mm (not 5–7 mm) long.

Plants 6–10 cm tall, acaulescent to shortly caulescent, caespitose, densely covered with equally to unequally bifurcate hairs. Caudex strongly and repeatedly divided, with short to elongated subterranean branches. Stems mostly absent or up to 3 cm long, ascending to erect,

densely covered with ascending to partly \pm spreading, tangled, asymmetrically bifurcate white hairs c. 1 mm long, rarely at the nodes with some black hairs mixed in. Stipules whitish-hyaline, 2–3.5 mm long, nearly free from the petiole, connate behind the stem to the middle or higher up, the free tips triangular to narrowly triangular, sparsely to loosely \pm appressed white hairy, sometimes with few black hairs mixed in, at the margins also with basifixed hairs. Leaves 1.5–3 cm long; petiole 0.4–0.7 cm long, like the rachis densely covered with subappressed to slightly ascending, asymmetrically bifurcate hairs c. 0.8 mm long. Leaflets in (3–)4–6(–7) pairs, flat to folded, elliptic, obtuse to subacute at the apex, 2–6 \times 1–3 mm, on both sides densely silvery hairy with subappressed to slightly ascending, asymmetrically bifurcate, tangled hairs up to 1 mm long. Peduncle 1–4 cm long, angular, rather densely covered with subappressed, symmetrically to asymmetrically bifurcate, partly flexuose, white hairs 0.5–0.8 mm long, partly slightly glabrescent with age. Racemes globose to ovoid, 8–18-flowered, elongating in fruit and up to 4 cm long. Bracts whitish-membranous, narrowly triangular, 2–3 mm long, sparsely black and white or only white hairy, at the margins also with basifixed hairs. Bracteoles absent. Pedicels 0.5–1 mm long, hairy. Calyx 8–10 mm long, shortly tubular, slightly obliquely cut at the mouth, densely covered with strongly asymmetrically bifurcate white hairs c. 1 mm long, at the teeth and sometimes elsewhere also with \pm symmetrically medifixed, slightly flexuose, subappressed black hairs 0.3–0.5 mm long; teeth narrowly triangular to linear-acute, greenish, \pm equal, 2–3.5 mm long, white and black hairy, on inner side merely white hairy. Petals violet. Standard 9–12 mm long; blade 4–6 mm wide, ovate to rhombic-ovate, toward the emarginate apex shortly ligulate-attenuate, gradually narrowed at the base without clearly differentiated claw. Wings 7–9 mm long; blades narrowly obovate, slightly retuse to rounded at the apex, 4–5 \times 2–2.5 mm; auricle 0.5–0.7 mm, claw 3–4 mm long. Keel 5–7 mm long; blades with widely curved lower edge and \pm straight upper edge, obtuse at the apex, 3–4 \times 1–2 mm; auricle 0.3–0.4 mm long, claw 3–4 mm long. Stamen-tube truncate at the mouth. Ovary subsessile, densely white hairy; style hairy in the lower part. Legumes ovoid, 6–8 mm long, 3–4 mm high, laterally compressed; valves sparsely to densely covered with appressed, short black and white hairs and with spreading, long, subbifurcate white hairs. Seeds seen only immature.

Other specimen seen:

Turkey. **Nevsşehir:** mittleres Flussgebiet des Halys [Kizilirmak] bei Nesvsşehir, c. 1000 m, 1896, *Oberhammer & Zimmerer* (M).

Astragalus xerophiloides Podlech & Ekici, spec. nov. (sect. *Hololeuce*).

Holotypus: Turkey, Prov. Erzurum: Palandöken Dağları, Geçidi (pass) N Aziziye, 19.7. 1996, *P. Rasmont* 104 (MSB; iso: LG).

A. xerophilus Ledeb. similis sed ab eo differt stipulis 3–4 mm (nec 4–6 mm) longis, bracteis 3–4 mm (nec 2–2.5 mm) longis, calyce 7–8 mm (nec 5–6 mm) longo dentibus 1.5–2 mm (nec 0.3–0.8 mm) longis, vexillo 15–19 mm (nec 11–16 mm) longo, alis 13–17 mm (nec 8–12 mm) longis, carina 11–15 mm (nec 7–10 mm) longa.

Similar to *A. xerophilus* Ledeb. but differs from this species by stipules 3–4 mm (not 4–6 mm) long, by bracts 3–4 mm (not 2–2.5 mm) long, by calyces 7–8 mm long with teeth 1.5–2 mm long (not 5–6 mm long with teeth 0.3–0.8 mm long) and by petals distinctly longer (standard 15–19 not 11–16 mm long).

Plants 7–12 cm tall, shortly caulescent. Caudex with short to elongated subterranean or aerial stolons. Stems of the current year 1–2 cm long, several, ascending to erect, mostly

covered by the stipules. Stipules hyaline-membranous, 3–4 mm long, adnate to the petiole for 1–2 mm or free but connate before the petiole for 1–2 mm, behind the stem distinctly to high up vaginate-connate, free tips narrowly triangular, subglabrous to loosely furnished with medifixed white hairs, at the margins with basifixed hairs up to 0.5 mm long. Leaves 1.5–3 cm long; petiole 0.5–1.5 cm long, like the rachis slender, rather densely covered with subappressed, unequally bifurcate hairs 0.5–1 mm long. Leaflets in 6–8 pairs, narrowly elliptic, 3–7 × 0.8–2 mm, at the apex subobtusate to obtuse, on both sides loosely to densely covered with mostly medifixed, appressed white hairs 0.8–1.5 mm long. Peduncles 2–7 cm long, slender, densely covered with subappressed, symmetrically to strongly asymmetrically bifurcate white hairs 0.5–1.2 mm long and toward the raceme also with black hairs. Racemes capitate, densely 7–12-flowered, slightly elongating in fruit. Bracts whitish-membranous, 3–4 mm long, narrowly triangular, sparsely white and black hairy, at the margins with basifixed hairs. Pedicels 0.5–1 mm long, white and black hairy. Calyx 7–8 mm long, tubular, obliquely cut at the mouth, rather densely covered with strongly asymmetrically bifurcate, subappressed, straight, white hairs 0.5–1.2 mm long and with mostly distinctly shorter, ± medifixed, somewhat flexuous, appressed black hairs; teeth subulate to narrowly triangular, 1.5–2 mm long, white hairy on inner side. Petals lilac, fading to yellowish-brown. Standard 15–19 mm long; blade rhombic-elliptic, c. 7 mm wide, in upper third subabruptly ligulate-attenuate, c. 4 mm wide, emarginate at the apex, at the base passing into a narrow claw. Wings 13–17 mm long; blades narrowly oblong, rounded at the apex, 7 × 2 mm; auricle c. 1 mm long, claw 6–10 mm long. Keel 11–15 mm long; blades obliquely obovate, with in upper part curved lower edge and nearly straight upper edge, subacute at the apex, 5 × 2.5 mm; auricle 0.5 mm long, claw 6–10 mm long. Stamen-tube truncate at the mouth. Ovary sessile, narrowly ellipsoidal, white hairy; style glabrous. Legumes (immature) densely covered with nearly spreading, strongly asymmetrically bifurcate to subbasifixed white hairs up to 1 mm long and with mostly shorter and more medifixed, subappressed black hairs.

Astragalus autrani Bald. is a very rare species, known only from one single plant in the Barbey-Herbarium at Genève. A second plant collected by Markgraf at the locus classicus (MARKGRAF 1931) was destroyed during the Second World War in the herbarium at Berlin. In Flora Europaea vol. 2 (TUTIN & al. 1968) this species is inserted between *A. idaeus* Bunge and *A. agraniotii* Orph. ex Boiss. in the enumeration, both belonging to sect. *Chlorosphaerus*, which was united with sect. *Hololeuce* by CHAMBERLAIN & MATTHEWS (1972) in Flora of Turkey vol. 3, but which is considered by us to be a section of its own.

The careful examination of *A. autrani* has confirmed its relationship to these species but otherwise it is so unique, that we describe a new section.

***Astragalus* sect. *Baldaccia* Sytin & Podlech, sect. nov.**

Type and only species: *A. autrani* Bald.

Differt ab *A. sect. Chlorosphaerus* Bunge et sect. *Hololeuce* Bunge caudice densissime stipulis vetustis oblecto, stipulis petiolo breviter adnatis et post caulem breviter vaginato-connatis, substellatim oblique erectis, foliis brevissimis, 0.5–1 cm tantum longis, foliolis minutis, leguminibus 4 mm tantum longis.

Differs from *A. sect. Chlorosphaerus* Bunge and *Hololeuce* Bunge by the caudex very densely covered by old stipules, by the stipules shortly adnate to the petiole and behind the stem shortly vaginate-connate (so intermediate between sections *Chlorosphaerus* and *Hololeuce*), substellately spreading, by very short leaves 0.5–1 cm only long, by minute leaflets and short legumes c. 4 mm only long.

Astragalus autrani Bald., Bull. Herb. Boiss. 3: 196. 1895. Holotype: [Albania] mt. Temor Abbas Ali supra "stani" Kurlaj, 12.8.1892, *E. Baldacci* 307 (G!).

Plants small, low, caespitose, acaulescent, in vegetative parts with white hairs only. Caudex strongly divided, branches c. 3 mm thick, up to 2–3 cm long, densely and completely covered with remnants of old stipules. Stipules membranous, nearly stellately arranged, ovate-acute, 5–6 mm long, 1.5–2.5 mm wide, shortly adnate to the petiole and shortly vaginate-connate behind the stem, ciliate at the margins with basifixed hairs 0.4–0.8 mm long, otherwise glabrous. Leaves 0.5–1 cm long; rachis densely covered with medifixed, subappressed hairs c. 0.5 mm long. Leaflets in 4–6 pairs, obovate, 2–3 × 1.5 mm, on both sides densely covered with ± medifixed, subappressed hairs up to 0.8 mm long. Peduncle c. 3 cm long, densely covered with ± medifixed, appressed to subappressed short hairs and with fewer basifixed, ascending hairs up to 1 mm long. Raceme ovoid, c. 3 cm long, densely many-flowered. Bracts whitish-membranous, c. 5 mm long and 1 mm wide, narrowly triangular, loosely covered with white hairs up to 1 mm long, with few black hairs mixed in. Pedicels c. 0.3 mm long. Calyx 7–8 mm long, campanulate, obliquely cut at the mouth, tube whitish-membranous, sparsely hairy with medifixed to basifixed white hairs 0.3–0.5 mm long and few black hairs mixed in; teeth subulate, c. 5 mm long, with basifixed white hairs c. 1 mm long and with medifixed, short black hairs. Petals mostly destroyed. Stamens c. 5 mm long. Legumes ellipsoidal, c. 4 mm long, 2 mm high, with shortly acuminate apex and persistent glabrous style, obtusely carinate ventrally, grooved dorsally, bilocular; valves densely covered with strongly asymmetrically bifurcate, subappressed to ascending white hairs up to 0.8 mm long.

Astragalus bijarensis, Podlech & Sytin, spec. nov. (Sect. *Onobrychoidei*).

Holotypus: Iran, Prov. Kurdistan: ad radices montis Hamzeh Arab SE Bijar, 2000 m, 1.7.1971, *K.H. Rechinger* 42483 (W).

Differt ab *A. cancellato* Bunge foliolis ad insertionem glandulis minutis sessilibus provis, pedunculo 1,5–2,5 cm (nec 4–8 cm) cm longo, racemis 3–6-floris (nec 10–16-floris) in fructu non elongatis, bracteis hyalini-membranceis, triangularibus, 1,5–2 mm longis (nec viridiusculis, lineari-acutis, 3–4 mm longis), margine glandulis minutis sessilibus provis, calyce 4,5–6 mm (nec 8–10 mm) longo, leguminibus pilis arcte asymmetricice bifurcatis ad basifixis, saepe in tuberculis minutis insertis obtectis (nec pilis leviter ad distincte asymmetricice bifurcatis, non in tuberculis insidentibus obtectis).

Differs from *A. cancellatus* Bunge by leaflet petioles provided at the base with minute sessile glands, by peduncles 1.5–2.5 cm (not 4–8 cm) long, by racemes 3–6-flowered (not 10–16-flowered), by bracts hyaline-membranous, triangular, 1.5–2 mm long (not greenish, linear-acute, 3–4 mm long) provided at the margins with sessile glands, by calyces 4.5–6 mm (not 8–10 mm) long and by legumes covered with strongly asymmetrically bifurcate to basifixed hairs often inserted in little tubercles (not slightly to distinctly asymmetrically bifurcate hairs without tubercles).

Plants c. 20 cm tall. Caudex with a pluricipital root-crown, subterranean branches short to elongated. Stems several, ascending to erect, angular-sulcate, branched near the base, densely covered with medifixed, appressed white and throughout with scattered black hairs 0.4–0.8 mm long. Stipules 2.5–3 mm long, the lower ones hyaline-membranous, behind the stem vaginate-connate high up sometimes for the whole length, black or black and white hairy at

the base, otherwise glabrous, the upper ones greenish or reddish-suffused, reflexed, narrowly triangular, connate shortly or up to the middle, sparsely white and black hairy, all free from the petiole. Leaves 2–3 cm long, subsessile or with a petiole up to 0.7 cm long; rachis slender, grooved on upper side, densely white hairy like the stem, near the insertion of leaflets with minute, ovoid, sessile glands. Leaflets in 7–8 pairs, narrowly elliptic, 5–7 × 2–3 mm, at the apex emarginate, on both sides densely covered with medifixed, appressed white hairs (0.6–) 0.8–1 mm long. Peduncles 1.5–2.5 cm long, rather densely covered with symmetrically to asymmetrically bifurcate, appressed to subappressed white and scattered black hairs 0.3–0.8 mm long. Racemes capitate, densely 3–6-flowered, not elongating in fruit. Bracts hyaline-membranous, 1.5–2 mm long, triangular, predominantly white hairy, at the margins also with basifixed hairs, near the base with minute, ovoid, sessile glands. Pedicels c. 1 mm long, white hairy. Calyx 4.5–6 mm long, campanulate, whitish, loosely covered with strongly asymmetrically bifurcate to subbasifixed, ± spreading white hairs c. 1 mm long, mostly sitting on distinct tubercles, and toward the teeth with much shorter, more symmetrically medifixed, appressed to subappressed black hairs up to 0.5 mm long; teeth narrowly triangular, 2–2.5 mm long, on inner side white hairy. Petals violet. Standard c. 15 mm long; blade 6–7 mm wide, ovate, in upper part indistinctly ligulate-attenuate and 4–5 mm wide, retuse at the apex, at the base subabruptly narrowed into the short claw. Wings 11 mm long; blades obovate, rounded at the apex, 6 × 2.5 mm; auricle c. 1 mm long, claw 5 mm long. Keel unknown. Stamen-tube truncate at the mouth. Legumes sessile, narrowly ellipsoidal, 6–8 mm long, c. 3 mm high and 2–2.5 mm wide, carinate ventrally, shallowly grooved dorsally, attenuate into a slightly recurved, hairy beak c. 3 mm long, with long glabrous, persistent style, nearly completely bilocular; valves rather densely covered with strongly asymmetrically bifurcate to basifixed, subappressed to ascending white hairs 1–1.5 mm long, often sitting on minute tubercles.

Astragalus bithynicus Podlech & Sytin, nom. et stat. nov. (Sect. *Onobrychoidei*).

Based on *A. xylobasis* var. *angustissimus* Bornm., Repert. Spec. Nov. Regni Veg., Beih. 89: 185. 1940. Holotype: [Turkey] Bithynia, ad Bilecik, in declivitatibus vallis fluvii Karasu, 300–400 m, 20.5.1929, J.F.N. Bornmüller 14107 (B!; iso: BP!, BM, G!, W!).

Astragalus xylobasis var. *angustissimus* with its extremely narrow leaflets does not fit within the variability of *A. xylobasis* Freyn & Sint., which is now considered to be a synonym of *A. aduncus* Willd. Its area in the western part of Turkey is distinctly separated from the area of *A. aduncus*.

We give a complete description of this species because the original diagnosis is very short:

Plants 30–35 cm tall, covered with appressed hairs. Caudex divided with short branches. Stems several, erect, branched near the base, slightly angular, densely covered with appressed white hairs 0.25–0.4 mm long. Stipules 3–6 mm long, from wide hyaline-membranous base subabruptly subulate-acuminate, very shortly adnate to the petiole, behind the stem high up vaginate-connate, at the base mostly with some black and white hairs, at the margins sparsely ciliate and with few minute, subsessile glands. Leaves (2–)4–6 cm long; petiole 1–1.5 cm long, like the rachis slender, densely hairy like the stem. Leaflets in 3–4 pairs, in uppermost leaves sometimes only in 1–2 pairs, linear, 12–27 × 1–2 mm, subobtusate at the apex, on upper side sparsely, on underside loosely covered with medifixed hairs 0.5–0.8 mm long, always folded. Peduncles 5–10 cm long, slender, rather densely to densely hairy like the stem, in upper part with some black hairs mixed in. Racemes short, rather densely 10–12-flowered. Bracts membranous, 2–3 mm long, narrowly triangular, sparsely covered with predominantly

white hairs, at the margins also with subbasifixed hairs. Pedicels c. 0.5 mm long, white hairy. Calyx campanulate-tubular, 5–6 mm long, slightly obliquely cut at the mouth, densely covered with asymmetrically bifurcate, appressed to subappressed white hairs 0.6–1 mm long, sometimes also with shorter and more symmetric black hairs mixed in; teeth unequal, the upper two narrowly triangular, c. 1 mm long, the lower three subulate, c. 1.5 mm long, all white hairy on inner side. Petals violet. Standard 13–14 mm long; blade elliptic, c. 4 mm wide, in upper third tongue-like narrowed and c. 2 mm wide, apex truncate to very slightly emarginate, gradually narrowed at the base. Wings c. 10 mm long; blades narrowly oblong, rounded at the apex, c. 5 × 1 mm; auricle c. 0.5 mm long, claw 5 mm long. Keel c. 8 mm long; blades obovate-triangular, obtuse at the apex, with in upper part rectangular-curved lower edge and straight upper edge, 3.5–1 mm; auricle indistinct, claw c. 4.5 mm long. Stamen-tube truncate at the mouth. Legumes (immature) covered with medifixed, appressed white hairs c. 0.8 mm long.

Other specimens seen:

Turkey. Bolu: 35 km N Nalléhan, 800 m, 14.6.1973, *Sorger* 73-44-9 (W). – Eskisehir: 17 km from Gökçekaya to Hamadiye, 5.5 km N Basören köyü on road to Gökçekaya barajı, 1000 m, 11.6.1969, *Buttler* 13420 (M).

Astragalus chamonobrychis Podlech, nom. nov. (Sect. *Onobrychoidei*).

Based on *A. potaninii* N.Ulziykh., Bjull. Moskovsk. Obshch. Isp. Prir. Otd. Biol. 95: 77. 1990, nom. illeg. [non Kom.]. Holotype: [Mongolia] Altai Mongolicus, in parte australi ad trajetum inter Tatal et Saxa, 8.7.1877, *G.N.Potanin* (LE!).

Astragalus maxtedii Podlech & Sytin, spec. nov. (Sect. *Onobrychoidei*).

Holotypus: Turkey, Prov. Ankara, SW of Kalecik, 1260 m, 40°04' N, 33°20' E, summer 1995, *N. Maxted* 16/156 (MSB).

Differt ab *A. asciocalyx* Bunge foliis 1,5–3 cm (nec 2–7 cm) longis, calyce tubuloso non demum inflato, in fructu rupto (nec post anthesin ovoidei-inflato, in fructu legumen includendo), pilis partim ascendentibus saepissime et praesertim in dentibus in tuberculis minutis insidentibus obecto (nec pilis appressis sine tuberculis obecto), dentibus 4–5 mm (nec 1,5–4 mm) longis, vexillo ca. 15 mm (nec 17–23 mm) longo, leguminibus pilis symmetrice ad asymmetricum (nec subbasifixis) obectis.

Differs from *A. asciocalyx* by leaves 1.5–3 cm (not 2–7 cm) long, by the calyx not inflated in age, ruptured by the fruit (not ovoid-inflated after anthesis, enclosing the fruit), covered partly with ascending hairs mostly sitting on little tubercles (not with appressed hairs without tubercles), by calyx teeth 4–5 mm (not 1.5–4 mm) long, by standard c. 15 mm (not 17–23 mm) long and by legumes covered with symmetrically to asymmetrically bifurcate hairs (not with subbasifixed hairs).

Plants 8–25 cm tall. Stems erect, angular-sulcate, 4–20 cm long, branched, rather densely to densely covered with symmetrically to slightly asymmetrically bifurcate, subappressed to ascending white hairs 0.8–1.2 mm long with some shorter black hairs mixed in. Stipules membranous, 4–7 mm long, adnate to the petiole for c. 1 mm, vaginate-connate behind the stem often high up, the free tips often greenish, narrowly triangular, loosely covered with subappressed white, at the base also black hairs, at the margins also with basifixed hairs. Leaves 1.5–3 cm long; petiole c. 0.5 cm long, like the rachis slender, loosely to densely hairy

like the stem. Leaflets in 7–8 pairs, narrowly elliptic, $3\text{--}10 \times 1\text{--}3$ mm, at the apex acuminate, on both sides loosely to densely covered with asymmetrically to symmetrically bifurcate, subappressed to ascending hairs up to 1.2 mm long. Peduncles 4–6 cm long, angular-sulcate, hairy like the stem. Racemes, densely 8–12-flowered. Bracts membranous, 3–5 mm long, narrowly triangular, white hairy, at the margins also with basifixed hairs. Pedicels c. 1 mm long, white hairy. Calyx c. 8 mm long, loosely covered with \pm symmetrically to asymmetrically bifurcate, subappressed to ascending white hairs 0.7–1.2 mm long, mostly sitting on little tubercles, especially at the teeth; teeth subulate, 4–5 mm long, white hairy on inner side. Petals color unknown, glabrous. Standard c. 15 mm long; blade ovate, in lower third c. 5 mm wide, slightly tongue-like narrowed and c. 4 mm wide in upper part, deeply and widely emarginate at the apex, at the base subabruptly or sometimes gradually narrowed into the short, cuneate claw. Wings c. 11 mm long; blades narrowly oblong, slightly obliquely retuse at the apex, $6\text{--}7 \times 2$ mm; auricle c. 1 mm long, claw c. 5 mm long. Keel c. 10 mm long; blades oblong-curved, with widely, slightly curved lower edge and \pm concave upper edge, rounded at the apex, 4.5×2 mm; auricle acute, 0.5 mm long, claw c. 5 mm long. Stamen-tube truncate at the mouth. Ovary sessile, densely white hairy; style hairy in lower half. Legumes sessile, obliquely erect, narrowly oblong, 9–10 mm long, 2.5 mm high and 2 mm wide, carinate ventrally, narrowly grooved dorsally, with a slightly recurved beak 2–3 mm long, bilocular; valves thin but tough, rather densely covered with symmetrically to asymmetrically bifurcate, subappressed to ascending white hairs 0.8–1 mm long.

Other specimen seen:

Turkey. Ankara: SE of Polatli, 1040 m, $39^{\circ}04'$ N, $32^{\circ}14'$ E, summer 1995, *Maxted 7/128* (MSB).

Astragalus parvarensis Podlech & Sytin, spec. nov. (Sect. *Onobrychoidei*).

Holotypus: Persia, Damghan-Semnan, Parvar Protected Region, in montibus inter Shah-mirzad et Fulad Mahalla, 53 km NE Semnan, 2000 m, 30.5.1975, *Rechinger 52233* (M).

Differt ab omnibus speciebus sectionis indumento e pilis subbasifixis tantum consistente.

Differs from all species of sect. *Onobrychidei* by the indument of subbasifixed hairs only.

Plants 18–30 cm tall, covered with subbasifixed hairs only. Caudex repeatedly divided, with short branches. Stems several, \pm erect, up to 18 cm long, slightly angular-sulcate, loosely to rather densely covered with appressed white hairs 0.2–0.5 mm long and with few ascending hairs up to 0.7 mm long, partly glabrescent. Stipules 3–3.5 mm long, membranous, sometimes with greenish tips, free from the petiole, behind the stem distinctly vaginate-connate, appressed white hairy. Leaves 2–3 cm long; petiole 0.5–1 cm long, like the rachis hairy like the stem. Leaflets in 7–9 pairs, narrowly elliptic to obovate, $2\text{--}6 \times 1\text{--}2$ mm, rounded at the apex, on both sides loosely to rather densely covered with subappressed to ascending white hairs 0.4–1 mm long. Peduncles 6–20 cm long, hairy like the stem but toward the raceme with increasing black hairs. Racemes ovoid, 1.5–3 cm long, rather densely 8–15-flowered. Bracts membranous, 2–2.5 mm long, narrowly triangular to ovate, white and black hairy. Pedicels 0.3–0.5 mm long, hairy. Calyx 8–9 mm long, shortly tubular, slightly obliquely cut at the mouth, rather densely covered with tangled, ascending to spreading white hairs 0.8–1 mm long and especially at the dorsal (lower) side with shorter black hairs 0.2–0.5 mm long; teeth c. 3 mm long, narrowly triangular-linear, white hairy on inner side. Petals pale violet, fading to yellowish. Standard c. 15 mm long; blade rhombic-elliptic, in the middle c. 5 mm wide, gradually narrowed toward the slightly retuse apex, at the base slightly angularly

passing into the cuneate claw. Wings c. 12 mm long; blades narrowly oblong, slightly widened at the rounded apex, 6×2 mm; auricle c. 0.6 mm long, claw c. 6 mm long. Keel 10 mm long; blades obliquely obovate, with in upper part rectangular-curved lower edge and straight upper edge, subacute at the apex, 4×2 mm; auricle 0.5 mm long, claw 6 mm long. Stamen-tube truncate at the mouth. Ovary narrowly oblong, sessile, densely white hairy; style glabrous. Legumes unknown.

Astragalus circumlacustris Podlech & Sytin, spec. nov. (Sect. *Ornithopodium*).

Holotypus: Persia, Prov. Azerbaijan orient., ad ripas lacus Shebil, 2000 m, 1.6.1971, K.H. Rechinger 40757 (W; iso: MSB).

Differt ab *A. jodostachys* Boiss. & Buhse stipulis 2–4 mm (nec 3–6 mm) longis, petiolo breviter adnatis (nec ab eo liberis), superiores inter se liberis (nec omnibus distincte vaginato-connatis), foliis sessilibus (nec petiolo 1–2,5 cm longo suffultis), rachide pilis 0,2–0,4 mm (nec 0,3–1 mm) longe instructo, foliolis ad 5 mm (nec ad 3 mm) latis, supra glabris (nec sparse pilosis), calyce 9–10 mm (nec 7–8 mm) longo, dentibus inaequalibus, longioribus 3–4 mm (nec 1,5–2 mm) longis, brevioribus 2–2,5 mm (nec ca. 1 mm) longis, vexillo apicem versus subabruptly ligulato-angustato (nec ovato apicem versus gradatim angustato).

Differs from *A. jodostachys* Boiss. & Buhse by stipules 2–4 mm long, shortly adnate to the petiole (not 3–6 mm long, free from the petiole), by leaves sessile, the rachis covered with hairs 0.2–0.4 mm long (not with a petiole 1–2.5 cm long, rachis with hairs 0.3–1 mm long), by leaflets up to 5 mm wide, glabrous on upper side (not up to 3 mm only, hairy on upper side), by calyxes 9–10 mm (not 7–8 mm) long, with unequal teeth, the longer ones 3–4 mm (not 1.5–2 mm), the shorter ones 2–2.5 mm (not c. 1 mm) long, by the standard blade subabruptly narrowed toward the apex (not ovate, gradually narrowed toward the apex).

Plants up to 50 cm tall. Caudex branched. Stems several, ascending to erect, c. 3 mm thick, slightly angular-sulcate, rather densely covered with \pm medifixed, appressed white hairs 0.4–0.6 mm long, at the nodes with some black hairs mixed in, often glabrescent at the angles, sometimes branched with short, non-flowering brachyblasts. Stipules membranous with greenish tips, 2–4 mm long, narrowly triangular, shortly adnate to the petiole, the lower ones distinctly vaginate-connate behind the stem, the upper ones free from each other, all sparsely hairy to subglabrous, at the margins also with basifixed hairs and near the base with minute, sessile glands. Leaves 5–9 cm long, sessile; rachis loosely covered with appressed white hairs 0.2–0.4. Leaflets in 11–12 pairs (in brachyblasts mostly in c. 8 pairs), narrowly elliptic, $8\text{--}22 \times 2\text{--}5$ mm, obtuse to subacute or slightly emarginate at the apex, on upper side glabrous, on underside loosely covered with medifixed, appressed white hairs 0.5–1 mm long. Peduncles 9–12 cm long, slightly angular-sulcate, in basal part loosely to densely, in upper part sparsely hairy like the stem, toward the raceme mostly also with black hairs. Racemes oblong, 2.5–5 cm long, rather densely many-flowered, elongating in fruit and up to 12 cm long. Bracts white-membranous, narrowly triangular, 2–3 mm long, sparsely white and black hairy, at the margins with basifixed hairs and at the base with minute, sessile glands. Pedicels c. 1 mm long, hairy. Calyx campanulate-tubular, 9–10 mm long, obliquely cut at the mouth, loosely covered with appressed, medifixed, predominantly black hairs 0.2–0.5 mm long; teeth unequal, the three lower ones subulate 3–4 mm long, the two upper ones narrowly triangular, 2–2.5 mm long, subglabrous on inner side. Petals lilac to pale violet when dry. Standard c. 20 mm long; blade c. 10 mm wide, rhombic-elliptic, in upper third subabruptly ligulately narrowed and c. 4 mm wide, apex rounded to retuse, at the base gradually cuneately

narrowed. Wings 14 mm long; blades narrowly oblong to narrowly obovate, rounded at the apex, 8×3 mm; auricle c. 1 mm long, claw 6 mm long. Keel c. 10 mm long; blades obliquely obovate, with in upper third widely curved lower edge and nearly straight upper edge, obtuse to subacute at the apex, 5×2.8 mm; auricle short, claw 5 mm long. Stamen-tube truncate at the mouth. Ovary sessile, linear, sparsely hairy. Legumes sessile, linear, pendulous but semicircularly upcurved, slightly torulose, 35–40 mm long, c. 2 mm high and 1.5 mm wide, carinate ventrally, grooved dorsally, densely covered with appressed, \pm medifixed white hairs 0.5–0.8 mm long, with few black hairs mixed in.

Specimens seen:

Iran. *Azerbaidjan Sharqi*: Ghaflan-Kouh, 20 km from Mianeh, 1300–1700 m, 3.–5.6.1986, *Termeh & Daneshpajuh 41368-E* (W); ad ripas lacus Shebil, 2000 m, 1.6.1971, *Rechinger 40757* (MSB, W).

Astragalus rubicundus Podlech & Sytin, spec. nov. (Sect. *Synochreati*).

Holotypus: Turkey: Kara-dagh inter Amasia et Samsun, 700–800 m, 3.6.1890, *Bornmüller 87* (B).

Differt ab *A. acmonotrichus* Fenzl et *A. fragrans* Willd. tota planta fere rubro-brunnei-suffusa, bracteis 2.5–3.5 mm longis (nec 3–6 mm longis), ab *A. acmonotrichus* insuper leguminibus ellipsoideis, ca. 7 mm longis (nec linearibus, 17–30 mm longis), ab *A. fragrans* insuper petalis roseis vel purpureis (nec flavis), leguminibus c. 7 mm (nec 10–20 mm) longis.

Differs from *A. acmonotrichus* Fenzl and *A. fragrans* Willd. by nearly the whole plant being red-brown coloured, by bracts 2.5–3.5 mm (not 3–6 mm) long, from *A. acmonotrichus* in addition by legumes ellipsoidal, c. 7 mm long (not linear, 17–30 mm long) and from *A. fragrans* by petals pink to purple (not yellow) and by legumes c. 7 mm (not 10–20 mm) long.

Plants 10–22 cm tall, covered with mostly asymmetrically bifurcate, predominantly appressed but also partly spreading hairs 0.2–1 mm long. Caudex up to 10 mm in diameter, short, with a pluricipital root-crown, strongly short-branched. Stems several, branched at the base, up to 5 cm long, older parts densely covered with remnants of old leaves, parts of the current year up to 2 cm long, angular-sulcate, mostly red-brown, at first densely covered with short white hairs and some black hairs mixed in, often glabrescent with age. Stipules dark brown, membranous, 2–3 mm long, free from petiole, behind the stem high up vaginate-connate, the free tips triangular, sparsely white and black hairy, at the margins also with subbasifixed to basifixed hairs and minute sessile glands. Leaves 3–7(–10) cm long; petiole 1–1.5 cm long, like the rachis mostly reddish-brown, slender, loosely to densely covered with strongly asymmetrically, appressed to subappressed or partly spreading hairs 0.4–0.7 mm long. Leaflets in 11–13 pairs, mostly reddish-brown, narrowly elliptic, $5-8 \times 1.5-3$ mm, obtuse to rounded at the apex, rather densely covered on both sides with subappressed white hairs up to 1 mm long, sometimes on upper side sparsely hairy to subglabrous. Peduncle 2.5–5 cm long, sulcate, loosely to rather densely covered with mostly strongly asymmetrically bifurcate, subappressed white hairs 0.3–1 mm long. Raceme globular to ovoid, rather densely 10–20-flowered. Bracts brown-membranous, narrowly triangular, 2.5–3.5 mm long, white hairy. Pedicels c. 1 mm long, white hairy. Calyx 7–8 mm long, shortly tubular, reddish-brown, loosely covered with mostly strongly asymmetrically bifurcate, often flexuose, subappressed white hairs 0.5–1 mm long; teeth subulate, 2–3 mm long, hairy on inner side. Petals pink to purplish, glabrous. Standard c. 14 mm long; blade 6 mm wide, elliptic, at the apex truncate to slightly emarginate, at the base gradually narrowed into the cuneate claw. Wings c.

11 mm long; blades narrowly oblong, obtuse at the apex, 6×2 mm; auricle wide, 1 mm long, claw 5 mm long. Keel 9 mm long; blades obliquely obovate, with widely curved lower edge and sigmoid-convex upper edge, minutely acuminate at the apex, 4×2.5 mm; auricle short, claw 5 mm long. Stamen-tube truncate at the mouth. Ovary sessile, narrowly oblong, sparsely appressed hairy; style glabrous. Legumes sessile, spreading, ellipsoidal, c. 7 mm long, c. 3.2 mm high and 4 mm wide, obtuse-carinate ventrally, widely grooved dorsally, abruptly contracted into a slender, straight beak 1–1.5 mm long, incompletely bilocular; valves thin, brownish, densely covered with \pm medifixed, fine, flexuous, subappressed to slightly ascending white hairs 0.5–1 mm long. Seeds two in each locule, 3.5×2.5 mm, dark brown, shiny.

Other specimens seen:

Turkey. Amasia: In lapidosis montanis „Logman“, 800–900 m, 2.7.1889, *Bornmüller 1409* (B). – Samsun: Kara-dagh inter Amasia et Samsun, 700–800 m, 3.6.1890, *Bornmüller 87b* (B).

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