Linaria khorasanensis (Scrophulariaceae), a new species from Iran

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Abstract

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Linaria khorasanensis from Khorasan province, NE Iran, is described as a species new to science and illustrated. The species belongs to *L.* sect. *Linaria* and is compared with its presumed closest relatives *L. striatella* and *L. odora*.

The genus *Linaria* Mill. is widely distributed throughout the world except the Americas and comprises annual or perennial herbs growing in a wide variety of habitats including dry and sandy areas and rocky slopes. Sutton (1988) recognized 150 species, of which 22 occur in Iran.

In the course of revising *Linaria* material of different herbaria in Iran (FUMH, IRAN, TARI, TUH, abbreviations according to Holmgren & Holmgren 1998-), specimens of *Linaria* were found that could not be identified with any known species. Closer investigation, including micromorphological studies of seed and capsule surface, revealed that the material represents a hitherto undescribed species of *L.* sect. *Linaria,* which is here described as new to science.

Linaria khorasanensis Hamdi & Assadi, **sp. nov.**
Holotype: Iran, Khorasan province, Mashad, SW of Moghan Mt, 2300 m, 14.2.1991, *Jouharchi* (FUMH 33665) – Fig. 1, 2e, g-h, 3c.

Planta perennis, herbacea, glauca, praeter inflorescentiam glabra, erecta. *Caules* fertiles 30-35 cm longi, supra ramosi. *Folia* caulium fertilium 15-35 × 0.8-1 mm, alterna, linearia, acuta. *Inflorescentia* 8-10 cm longa, laxa, 8-12-floribus; bracteae 4-8 × 1 mm, lanceolatae, acutae, glabrae; pedicelli 3-5 mm longi. *Calycis* lobi aequalae, 3 × 1 mm, acuti, ovati, nec scariosi. *Corolla* 10-12 mm longa, flava, venis violaceis; tubo ore 3-3.5 mm lato; labii abaxialis sinu 1.1 mm profundi; calcarae 5-6 mm longo, 0.8 mm lato ad basem, recto, reliquiam corolla aequanti. *Capsula* 3 × 2 mm, calycem aequantem; *semina* 1.1 × 0.9 mm, alata, alae 0.4-0.7 mm, reniformia, atro-cinerea.

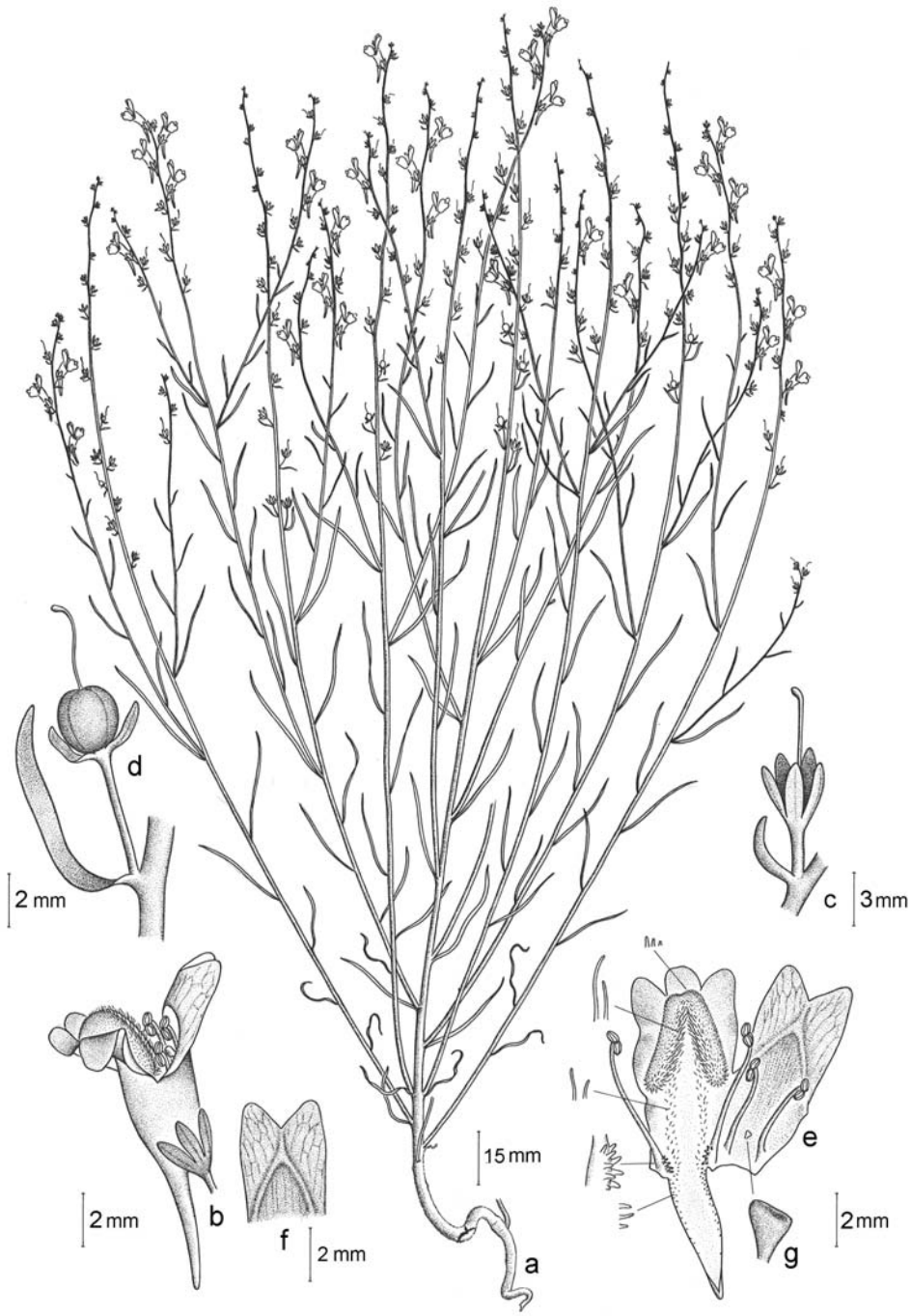

Fig. 1. *Linaria khorasanensis* – a: habit; b: flower; c: calyx; d: capsule; e: opened corolla; f: abaxial lip sinus; g: sterile stamen. – Drawn by M. Mehranfard after the specimen FUMH 24286.

Glaucous perennial herb, glabrous except for the inflorescence, erect; fertile stems 30-35 cm long, branched. *Leaves* of fertile stems 15-35 × 0.8-1 mm, alternate, linear-filiform, acute. *Inflorescence* 8-10 cm long, with 8-12 flowers, lax in flowering and fruiting stages; *bracts* 4-8 × 1 mm, acute, lanceolate, glabrous; *pedicels* 3-5 mm long. *Calyx* with equal lobes, 3 × 1 mm, acute, ovate, not scarious. *Corolla* 10-12 mm long, yellow with violet veins or tinged with violet; tube 3-3.5 mm broad at mouth; abaxial lip sinus 1.1 mm, the distance to lip apex 1.5 mm; spur 5-6 mm long, 0.8 mm broad at base, straight, equalling in length the rest of the corolla. *Capsule* 3 × 2 mm, equalling the calyx; *seeds* 1.1 × 0.9 mm, reniform, wing 0.4-0.7 mm broad, dark grey with finely tubercled seed coat cells.

Etymology. – The new species is named after the Khorasan province in NE Iran

Distribution and habitat. – *Linaria khorasanensis* grows in mountainous habitats of Khorasan province, NE Iran, at an altitude of 1850-2550 m, mainly in open woodland of *Juniperus excelsa,* and is presumably endemic to this region.

Additional specimens studied. – Mashad, Cheshmeh Parishan, 2550 m, 2.6.1994, *Amirabadi & Abassi 3338* (herb. Research Center Forests and Rangelands Mashad); Shirvan to Verk, 1850 m, 25.6.1994, *Zangouii & Hoseinzadeh* (FUMH 24286).

Relationship. – The new species occurs sympatrically with and appears to be related to *Linaria odora* (M. Bieb.) Fisch., distributed from the N Black and Caspian Sea to central Iran, and *L. striatella* Kuprian., distributed from Central Asia to central Iran (Davis 1982, Kuperianova 1950,

Table 1. Morphological comparison of *Linaria khorasanensis, L. striatella* and *L. odora*.

Characters	*L. khorasanensis*	*L. odora*	*L. striatella*
Stem (height) [cm]	30-35	15-30	30-65
Leaves [mm]	15-35 × 0.8-1	20-25 × 1	55-60 × 1
Pedicel [mm]	3-5	1-1.5	0.8-1.5
Bracts [mm]	4-8 × 1	1 × 0.5	2-2.2 × 0.3-0.5
Calyx lobes [mm]	3 × 1	3 × 1	4 × 1-2
Corolla	10-12 × 3-3.5	11-14 × 4	16-22 × 5-6
Spur [mm]	5-6 × 0.8	4-5 × 1	10-11 × 0.8-1
Ratio spur / rest of corolla	equal	smaller	subequal
Abaxial lip sinus of corolla [mm]	1.1	1-1.3	0.4
Sinus to apex of abaxial lip [mm]	1.5-2	1.2	3
Long stamens [mm]	6-6.4	4.5-4.7	6-6.2
Short stamens [mm]	3.5-3.7	3-3.2	4.4-4.6
Staminodes [mm]	2	1	2
Capsule [mm]	3 × 2	3 × 3	5 × 5.5
Seed [mm]	1.1 × 0.9	2.5 × 0.6	2.7 × 3
Seed form	reniform	reniform	reniform to orbicular
Seed wing (diam.) [mm]	0.4-0.7	0.6-1.2	0.5-0.8
Cell shape of seed corpus	polygonal	pentagonal-hexagonal	polygonal
Cell shape of seed wing	pentagonal	pentagonal	polygonal
Surface of seed coat cells	tubercled	± smooth	± smooth
Length of corpus cell [µm]	25-33	20-30	15-20
Width of corpus cell [µm]	20-22	15-18	10-12
Length of wing cell [µm]	65-80	45-70	30-60
Width of wing cell [µm]	35-50	15-30	15

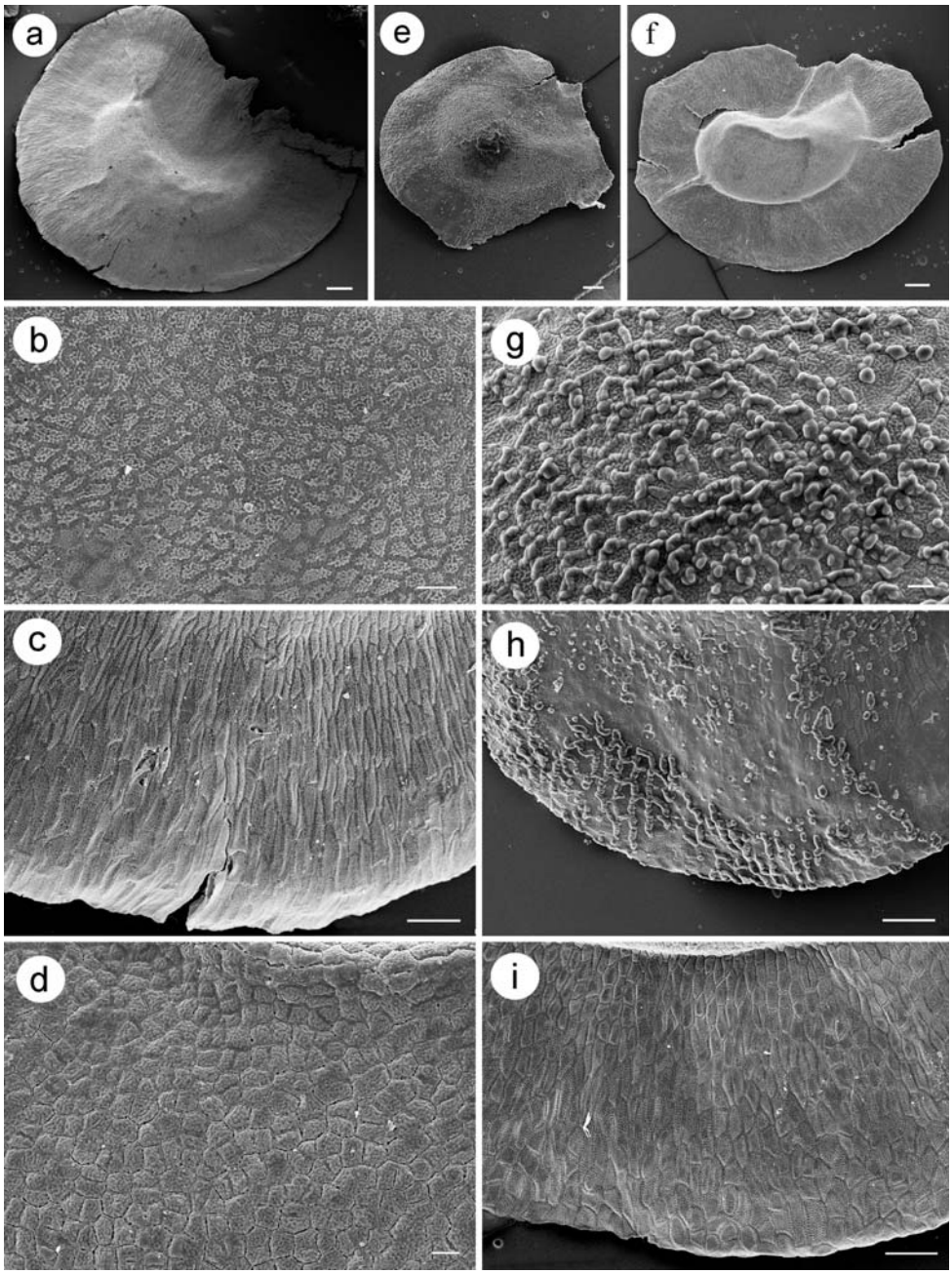

Fig. 2. Scanning electron micrographs of seeds of *Linaria* – a-c: *L. striatella* from TARI 27425 (Tehran to Ghazvin, 84 km N Ghazvin, 1680 m, 1.7.1972, *Hariri & Froughian*), overview (a), testa cells of seed corpus (b) and wing edge (c); – e, g-h: *L. khorasanensis* from FUMH 24286, overview (e), testa cells of seed corpus (g) and wing edge (h); – d, f, i: *L. odora* from TARI 21426 (E Tehran, Ozineh protected area, 12.7.1972, *Arazam & Dini*), overview (f), testa cells of seed corpus (d) and wing edge (i). – Scale bars: a = 200 µm, b = 30 µm, c, h, i = 100 µm, d, g = 20 µm, e = 300 µm.

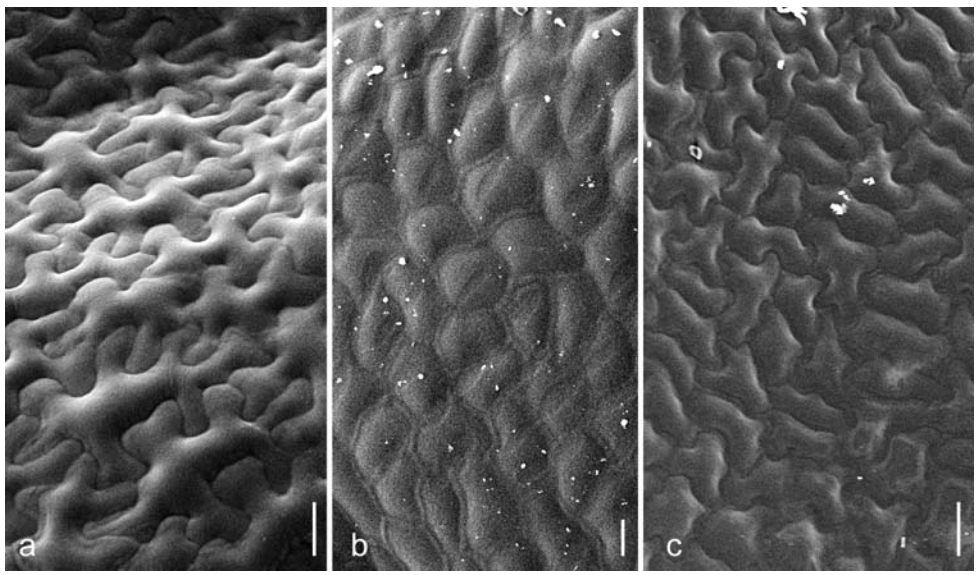

Fig. 3. Surface of inside wall at the base of valve of dehisced capsules of *Linaria* – a: *L. odora;* b: *L. striatella;* c: *L. khorasanensis.* – Scale bars = 100 µm; a from TARI 21426 (see caption Fig. 2), b from TARI 27425 (see caption Fig. 2), c from FUMH 24286.

Sutton 1985). It differs from *L. odora* in the size of the spur, pedicel, bracts and seeds, and from *L. striatella* in the size of the bracts, corolla, spur, pedicel, capsule and seeds (Table 1). Seed coat micromorphology (Elisens 1985) provides further differences: the seed coat cells of *L. khorasanensis* are conspicuously ornamented with tubercles, while they are ± smooth in *L. odora* and *L. striatella;* less conspicuous differences regard the shape and size of the seed coat cells (Fig. 2, Table 1). The inside capsule surface cells of *L. khorasanensis* are distinctly smaller than those in *L. odora* and differ in shape from those in both *L. odora* and *L. striatella* (Fig. 3).

Using the most apparent and reliable feature for distinguishing *Linaria striatella, L. odora* and *L. khorasanensis,* the three species can be keyed out as follows:

1. Corolla more than 15 mm long . . . . . *L. striatella*
– Corolla less than 15 mm long 2
2. Pedicel and bracts at least 3 mm; the spur equalling rest of corolla . . . *L. khorasanensis*
– Pedicel and bracts less than 2 mm; the spur shorter than rest of corolla . . . . *L. odora*

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