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Linaria turcica (Scrophulariaceae), a new species from Turkey

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Linaria turcica S. Makbul & Hamzaoğlu *sp. nova* from Artvin (Yusufeli) province, NE Turkey, is described. It is compared with its morphologically closest match *L. genistifolia*, from which it differs in several macro- and micromorphological characters.

The genus *Linaria* is mainly distributed in the northern hemisphere (Sutton 1988) and its distribution centre is in the Mediterranean basin. The majority of its species are found in Europe, SW Asia and North Africa (Hong 1983). The genus comprises annual and perennial herbs growing in a wide variety of habitats including dry and sandy places and rocky slopes (Rocio *et al*. 1999, Segarra *et al*. 2001). Seçmen *et al*. (2000) recognized a total of ca. 200 species in the genus. In Turkey there are 30 *Linaria* taxa representing 20 species. The endemism rate of the genus for Turkey is 34.4% (Davis 1978, Seçmen *et al*. 2000).

This study was based on the materials in BOZOK and RUB herbaria in Turkey and also on field observations. In addition macro- and micromorphological characters of seeds (cf. Elisens 1985) and fruits were examined under SEM. Studying the specific descriptions of *Linaria* in Davis (1978), Pignatti (1982) and Sutton (1988), as well as comparing specimens in HUB, GAZI and ANK showed that the specimens reported here represent a species new to science. Around 50 specimens of *Linaria turcica* were examined for this study and compared with specimens of *L. genistifolia*, which is the closest morphological match to *L. turcica*.

Linaria turcica S. Makbul & Hamzaoğlu, *sp. nova* (Figs. 1, 2a–d, 3a–c)

Affinis Linariae genistifoliae, sed foliis infernis 1–18 × 5–40 mm (nec 0.3–2 × 15–60 mm), bracteis 1–12 × 4–25 mm (nec 0.5–1 × 2–3 mm), pedicellis infernis 3–70 mm longis (nec 1.5–4 mm), corollis rubellis vel purpureis (nec luteis), capsulis ca. 5 mm longis (nec 3–4 mm) differt.

Type: Turkey. A8 Artvin: Yusufeli, between Çeltikdüzü and Dokumacılar, 750 m, 1.V.2009. *Makbul 123* (holotype RUB; isotypes RUB, GAZI, ANK). — Paratype: Turkey. A8 Artvin: Yusufeli, between Çeltikdüzü and Dokumacılar, 750 m, 4.VI.2008 *Hamzaoğlu 5092* (BOZOK, RUB).

Etymology: The species is named after the country of Turkey.

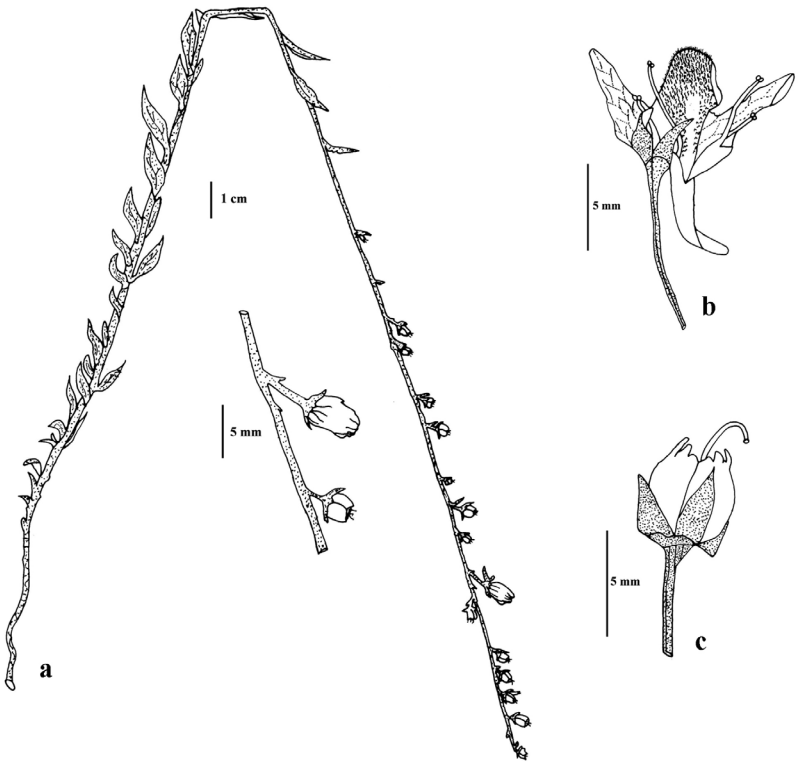

Fig. 1. *Linaria turcica* (from the holotype). — **a**: Habit. — **b**: Flower. — **c**: Fruit.

Perennial herb, glabrous, erect or ascending. Stem 25–90 cm long, simple or branched. Leaves alternate, dense, upper leaves lanceolate or slightly ovate-lanceolate, lower leaves lanceolate or linear to lanceolate, 1–18 × 5–40 mm, lower leaves shorter than upper, subcordate at base, apex acute to subacute, glabrous and sessile. Inflorescence 15–65 cm long, dense raceme. Bracts 1–12 × 4–25 mm, ovate-lanceolate, glabrous, acute at apex, seldom reaching top of calyx. Some of lower pedicels up to 70 mm long, upper pedicels 3–8(10) mm long. Calyx lobes equal or subequal, 2–5(6) mm, lanceolate, rounded at base, acute and glabrous. Corolla 6–8(10) mm long, reddish and purple with yellowish cream parts, tube 2.5–3 mm wide at mouth; stamens didynamous, long stamens ca. 7 mm, short stamens ca. 5 mm; spur 5–7 mm long, conical subulate, deflexed, ca. 1 mm wide at base, equalling rest of corolla. Capsules ca. 5 mm long, oblong-cylindrical, longer than calyx, seldom equaling with calyx, stigma undivided. Seeds compressed, 0.3–0.6 × 1–1.03 mm long, wing ca. 70–75 μm wide, trihedral and black.

Linaria turcica is endemic in the area Artvin, NE Anatolia (Turkey), and belongs to the Irano-Turanian element. The species is restricted to rocky areas and dry streambeds with several small and very isolated populations which, especially during the fruiting season, are affected by extreme temperatures, drought, erosion and grazing. It flowers in May and June and fruits in June.

Linaria turcica has some morphological similarities with *L. genistifolia* (Figs. 2e–h, 3d–f), which is widely distributed almost all over the Anatolia (Davis 1978). For a detailed account of the similarities and differences between the two taxa, *see* Table 1.

Sutton (1988) distinguished several sections in *Linaria* based on their characteristic features observed in fruiting material. The sections *Diffusae* and *Versicolores* are characterized by non-discoid seeds. In addition, the section *Diffusae* has an undivided style, while in the section *Versicolores* the style is usually divided into two or three stigmatic areas. The section *Supinae* is

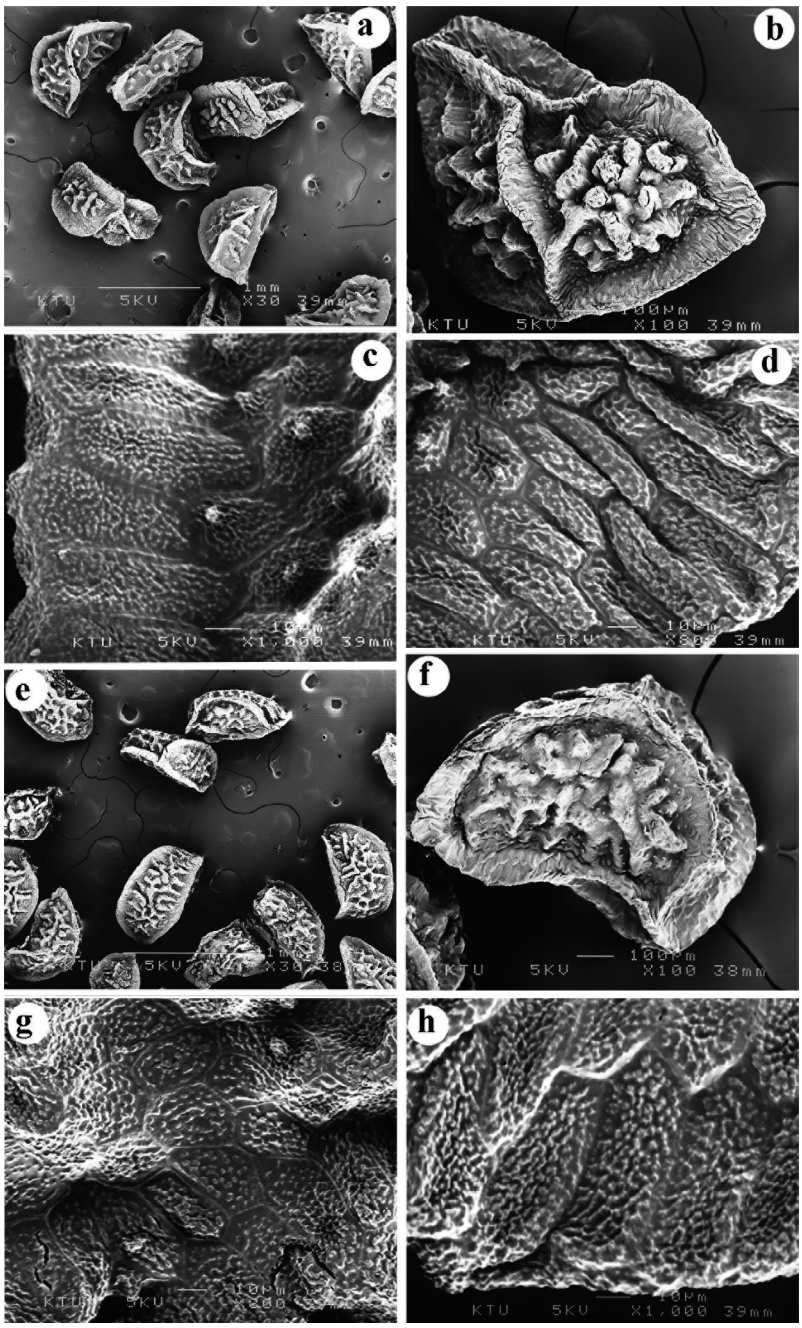

Fig. 2. Scanning electron micrographs of seeds. — **a**–**d**: *Linaria turcica* (from the holotype). **a** and **b**: Overview. **c**: Testa cells of seed corpus. **d**: Wing cells. — **e**–**h**: *Linaria genistifolia* (*Hamzaoğlu 1634*). **e** and **f**: Overview. **g**: Testa cells of seed corpus. **h**: Wing cells.

characterized by discoid seeds. *Linaria turcica*, having non-discoid seeds and an undivided style, is placed in the section *Diffusae*.

Representative specimens examined of *Linaria genistifolia*: **Turkey**. A8 Artvin: Yusufeli, Yüncüler village, *Hamzaoğlu 5243* (BOZOK); A8 Artvin: Şavşat, Meydancık to Gümüşler, *Hamzaoğlu 5627* (BOZOK); B4 Kırıkkale: Dinek Mountain, around Kavlak village, *S.A. Demır 1180* (BOZOK); B5 Kırşehir: Kervansaray Mountain, Hasanpaşa Hill, *Hamzaoğlu 1634* (BOZOK).

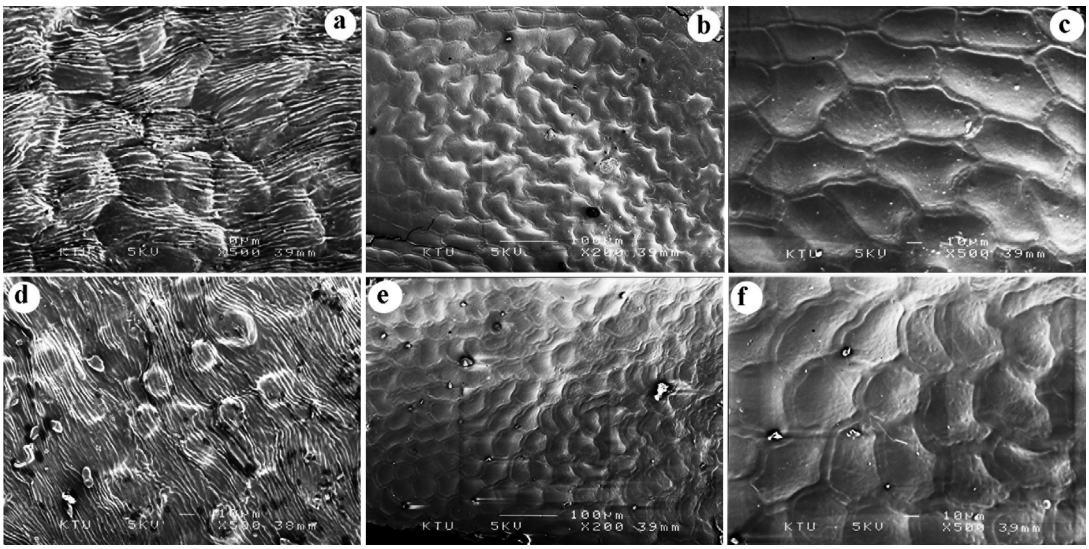

Fig. 3. Surface of outer and inner wall at the base of valve of dehiscent capsules. — **a–c**: *Linaria turcica* (from the holotype). **a**: Outer surface. **b** and **c**: Inner surface. — **d–f**: *Linaria genistifolia* (*Hamzaoğlu 1634*). **d**: Outer surface. **e** and **f**: Inner surface.

Table 1. Morphological comparison of *Linaria turcica* and *L. genistifolia*.

Characters	*L. turcica*	*L. genistifolia*
Stem height (cm)	25–90	20–130
Leaves (mm)	1–18 × 5–40	0.3–2 × 15–60
Pedicel (mm)	3–70	1.5–4(6)
Inflorescence (cm)	15–65	25–40
Bracts (mm)	1–12 × 4–25	0.5–1 × 2–3
Calyx lobes (mm)	2–5 (6)	1–2.5
Corolla (mm)	6–8 (10)	(6)8–12(14)
Corolla color	reddish and purple with yellowish cream parts	bright or sulphur yellow
Spur (mm)	5–7	(3)5–8(10)
Spur/rest of corolla	equal	equal
Sinus to apex of abaxial lip (mm)	4–5	2–3
Long stamens (mm)	7	5
Short stamens (mm)	5	3
Staminode (mm)	4	2
Capsule (mm)	5 × 6	3 × 4
Stigma	undivided	undivided
Style (mm)	5–6	3.5–4.5
Seed (mm)	0.3–0.6 × 1–1.03	1–1.2
Seed shape	trihedral	tetrahedral
Seed wing diameter (μm)	70–75	89–93
Cell shape inseed corpus	pentagonal & hexagonal	hexagonal
Cell shape in seed wing	oval cells pentagonal & hexagonal	angular cells pentagonal & hexagonal
Surface of seed coat	deeply convex granular	slightly convex granular
Length of corpus cell (μm)	50–55	32–35
Width of corpus cell (μm)	17–20	17–20
Length of wing cell (μm)	48–52	34–38
Width of wing cell (μm)	13–16	23–26
Length of inner surface cell of fruit (μm)	63–68	50–55
Width of inner surface cell of fruit (μm)	32–36	29–33

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