

Allium serpentanicum and *A. kandemirii* (Alliaceae), two new species from East Anatolia, Turkey

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Allium serpentanicum İ. Genç & N. Özhatay and *A. kandemirii* İ. Genç & N. Özhatay (sect. *Melanocrommyum*) are described and illustrated as new species from East Anatolia, Turkey. The morphological characters of these taxa are discussed and the distributions of the taxa are mapped. The diploid chromosome numbers are: *A. serpentanicum* $2n = 16, 32$; *A. kandemirii* $2n = 16$.

Allium is probably one of the largest genera of the petaloid monocotyledons, comprising approximately 850 species worldwide (Friesen *et al.* 2006, Keusgen *et al.* 2011).

Allium subg. *Melanocrommyum* comprises about 160 accepted species (Fritsch *et al.* 2010). They are adapted to arid conditions and distributed in the Mediterranean region to the Near and Middle East, reaching NW China and Pakistan in the east, and southern Siberia in the north. In Turkey, the subgenus is represented by 31 taxa in the sections *Acanthoprason* (2 taxa), *Melanocrommyum* (28 taxa) and *Kaloprasum* (1 taxon) (Kollmann 1984, Davis *et al.* 1988, Özhatay & Tzanoudakis 2000, Deniz & Sümbül 2004, Eker & Koyuncu 2011, Behçet *et al.* 2012, Behçet & Rüstemoğlu 2012, Genç *et al.* 2012, Özhatay & Genç 2013). Twenty-four of these species are distributed in eastern and southeastern Anatolia.

During a revision of the section *Melanocrommyum* in Turkey, many field trips were made and numerous *Allium* (sect. *Melanocrommyum*) specimens were collected by the first author. At the herbarium, we found that some dried specimens

had earlier been collected from East Anatolia and they were determined as *A. decipiens*. We compared those specimens with the comprehensive description of *A. decipiens* by Seregin (2007) and concluded that *A. decipiens* should be excluded from Turkish flora.

We also studied the specimens in their natural habitats. Their bulbs were collected in the field and planted in the research garden. All this resulted in the description of two new species in the section *Melanocrommyum*.

***Allium serpentanicum* İ. Genç & N. Özhatay, sp. nova** (Figs. 1–2 and 4a and b)

TYPE: Turkey. Gümüşhane, Vauk Mountain pass, rocky slopes, 1900 m, 3 July 1984 N. & E. Özhatay (holotype ISTE 54638).

Bulb globose-ovoid, 1–2 cm in diameter, outer tunics blackish grey, bark-like and disintegrating, inner tunic white. Scape above ground 12–25(–30) cm long, cylindrical, 2–3 mm diameter, glaucous or slightly carmine flushed and

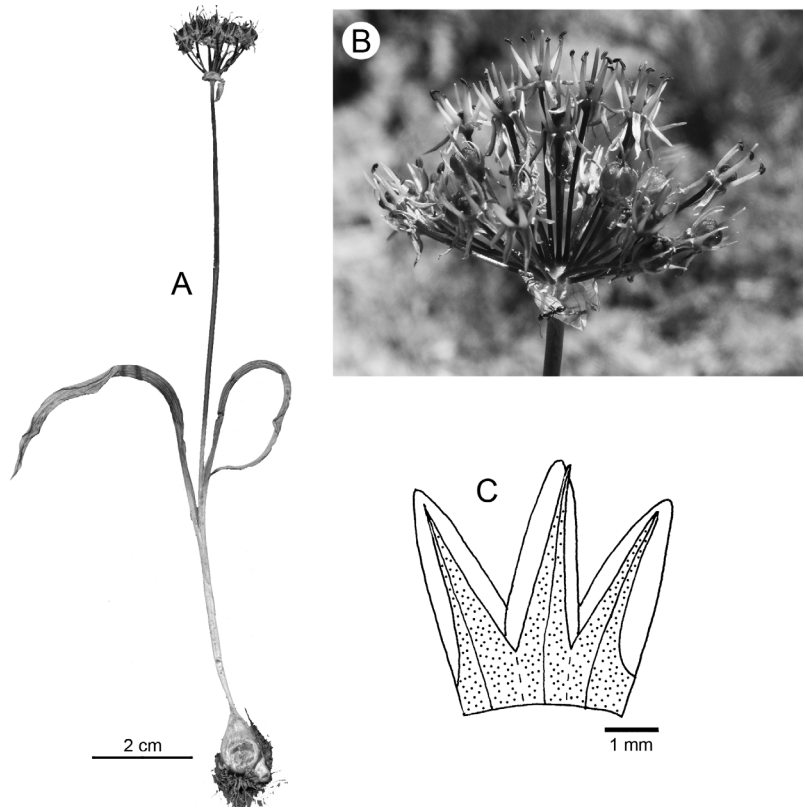


Fig. 1. *Allium serpentinum* (ISTE 91516, paratype). — **A:** Plant habit. — **B:** Inflorescence. — **C:** Perianth segments and filaments.

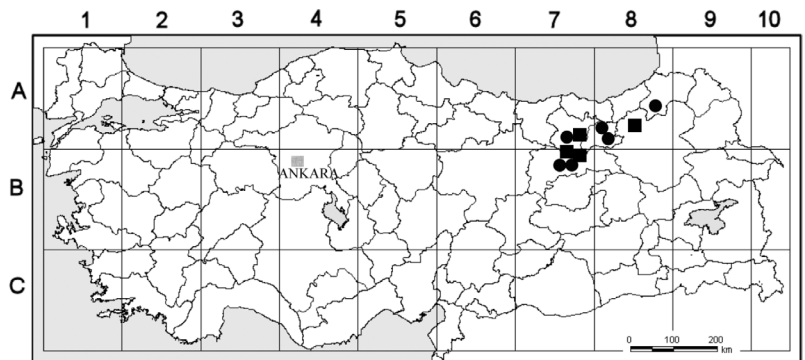


Fig. 2. Distribution map of *Allium serpentinum* (■) and *A. kandemirii* (●).

glossy. Leaves 1–2(–3), linear, generally arcuate, margin slightly undulate, 3–7 mm wide and 5–10(–15) cm long, green. Spathes most often completely split in 2–3 triangular parts, initially adpressed to the pedicels and later deflexed. Inflorescence fasciculate in flowering time, semi-spherical in fruit, lax, ca. 1.5–2.5 cm diameter in flowering time, 4 cm in fruit. Pedicels cylindrical, 2–3 × perianth segments, almost equal, glaucous or slightly carmine flushed. Tepals initially reflexed and later twisted and

curving inwards, linear-elliptic, with an subacute tip, 4.5–5 mm long and 1–1.5 mm wide, purplish pink or white with dark purple or green median vein. Filaments as long as tepals, fleshy, triangular, basally united, dark pink or white (if tepals white). Anthers yellow or purple. Ovary purple or dark green. Capsule globose-ovoid, with three longitudinal furrows, 4–6 mm wide. Flowering in June, fruiting in July. $2n = 16$ (ISTE 91516, 91517), 32 (ISTE 91516).

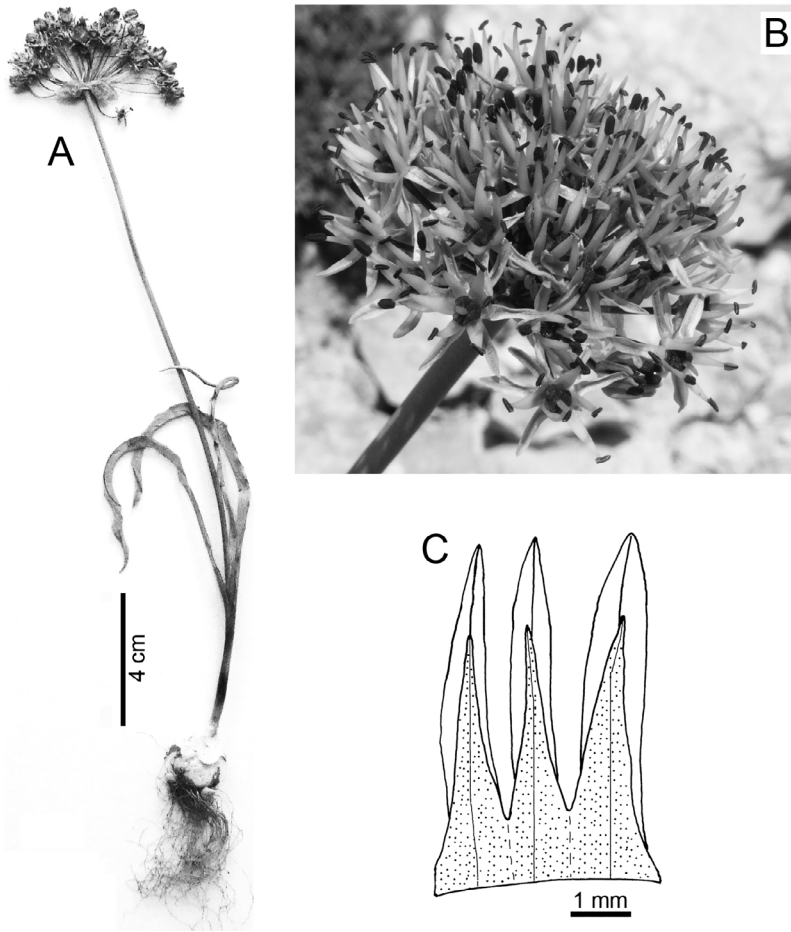


Fig. 3. *Allium kandemirii* (ISTE 91525, paratype). — **A:** Plant habit. — **B:** Inflorescence. — **C:** Perianth segments and filaments.

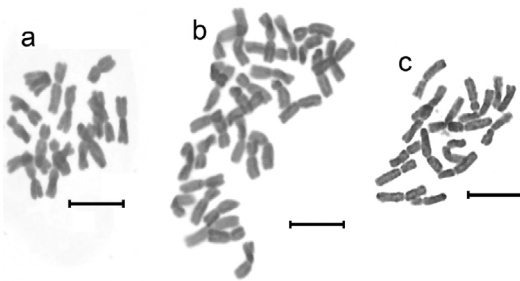


Fig. 4. Karyology. — *Allium serpentinicum*: (a) $2n = 16$ (ISTE 91516), (b) $2n = 32$ (ISTE 91516). — *A. kandemirii*: (c) $2n = 16$ (ISTE 91525). Scale bars = $10 \mu\text{m}$.

ADDITIONAL SPECIMENS EXEMINED (paratypes). — **Turkey.** A7 Gümüşhane: Vauk Mountain pass, rocky slopes, 1880 m, 25 June 2008 *A. Kandemir & İ. Genç 1300* (ISTE 91522). A8 Erzurum: İspir, 1.5 km south of Moryayla village, 2532 m, 19 June 2011 *S. Aslan 4320* (DUOF 3084). B7 Gümüşhane: Sipikor Mountain, serpentine rocks, 2220 m, 24 June 2008 *A. Kandemir & İ. Genç 1288* (ISTE 91516); Kelkit, between

Belenli and Karacaören villages, 1763 m, 24 June 2008 *A. Kandemir & İ. Genç 1292* (ISTE91518); Kelkit, between Belenli and Karacaören villages, 1768 m, 8 June 2009 *A. Kandemir & İ. Genç 1407* (ISTE 91620). Erzincan: Erzincan-Çayırılı, 2190 m, 24 June 2008 *A. Kandemir & İ. Genç 1290* (ISTE 91517).

***Allium kandemirii* İ. Genç & N. Özhatay, sp. nova** (Figs. 2–3 and 4c)

TYPE: Turkey. A8 Bayburt, Aşkale–Bayburt, Pınakapanı village, Köp Mountain, slopes, 2060–2100 m, 13 June 1981 *T. Baytop, R. Çetik & M. Koyuncu 4436* (holotype ISTE 54414; isotype AEF 10037).

Bulb ovoid, 1–2 cm in diameter, with bulblets, outer tunics blackish grey, bark-like and disintegrating, inner tunic white. Scape above ground 15–40(–50) cm long, cylindrical, glaucous or slightly carmine. Leaves 2–4(–7), linear, margin

slightly undulate, 4–20 mm wide, as long as 1/2 of scape or longer, glaucous. Spathe most often completely split in 2–4 triangular parts. Inflorescence fasciculate to semi-spherical, lax, ca. 2.5–5 cm diameter. Pedicels cylindrical, 2–3 × perianth segments, almost equal, green or slightly carmine flushed. Tepals initially stellate later reflexed, linear, with an acute tip, 5–6(–6.5) mm long and 0.8–1(–1.5) mm wide, bright pink with purple or green median vein. Filaments as long as 3/4 of tepals, triangular, basally united, white or whitish pink. Anthers purple. Ovary purple or dark green. Capsule ovoid, with three longitudinal furrows, 4–6 mm wide. Flowering in June, fruiting in July. $2n = 16$ (ISTE 91519, 91525).

ADDITIONAL SPECIMENS EXAMINED (paratypes). — **Turkey.** A7 Gümüşhane: Köse-Gümüşhane, Köse pass, 2000 m, 9 July 1982 *N. & E. Özhatay* (ISTE 49361); Köse-Gümüşhane, Köse pass, 2000 m, 8 August 1983 *N. & E. Özhatay, G. Sarıyar* (ISTE 52115); Köse-Gümüşhane, 7 km from Köse pass, 1480 m, 28 May 1985 *N. Özhatay* (ISTE 55387); 5 km from Köse pass, 1577 m, 25 June 2008 *İ. Genç 1296 & A. Kandemir* (ISTE 91520). A8 Artvin: Yusufeli, Körahmed road, rocky slopes, 2150 m, 21 June 2011 *S. Aslan 4444* (DUOF 3085). Bayburt: Aşkale-Bayburt, Pirnakapanı village, Kop Mountain, slopes, 2060–2100 m, 13 June 1981 *T. Baytop, R. Çetik & M. Koyuncu 4436* (AEF 10037, ISTE 54414); Bayburt-Aşkale, Kop pass, 2400 m, 4 July 1984 *N. & E. Özhatay* (ISTE 54658); Araklı-Bayburt road, 65 km, 1850 m, 9 July 1987 *M. Coşkun, S. Kurucu, B. Konuklugil & C. Kezikoglu* (AEF 19251). Aşkale-Bayburt, Kop pass, 2410 m, 25 June 2008 *A. Kandemir & İ. Genç 1303* (ISTE 91525). B7 Gümüşhane: Erzincan Kelkit road, between Balkaya and Karacaören, 1750 m, 28 May 2005 *N. & E. Özhatay, A. Kandemir* (ISTE 88018); Sipikor Mountain, Erzincan Kelkit road, Güzyurdu village, 1739 m, 28 May 2005 *N. & E. Özhatay, A. Kandemir* (ISTE 88025); Erzincan: Akdağ, 2226 m, 17 June 2004 *A. Kandemir 6107* (ISTE 91641); Pöske Mountain, Erzincan-Kelkit road, 2100 m, 28 May 2005 *N. & E. Özhatay, A. Kandemir* (ISTE 88011); Sipikor Mountain, Sipikor-Akdağ, rocky slopes, 2220 m, 24 June 2008 *İ. Genç 1294 & A. Kandemir* (ISTE 91519).

The new taxa are morphologically close to *A. cyrilli* and *A. elmaliense*. However, *A. kandemirii* can be distinguished by the bark being like outer tunica (*vs.* membranous or papery), the leaves as long as 1/2 of scape or longer (*vs.* 1/2 of scape) and the bright pink tepals (*vs.* white, purplish pink or purple). *Allium serpentinicum* differs from *A. cyrilli* and *A. elmaliense* by having a similar bark as *A. kandemirii*, narrower (3–7 mm) and generally arcuate leaves (*vs.* 10–36 mm and straight as in *A. cyrilli*), the

lax inflorescence (*vs.* dense), and the filaments and tepals that are of nearly equal length (*vs.* filaments shorter than tepals).

There are several differences between *A. decipiens* and the two species described here (*see* Appendix).

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Appendix. Morphological comparison of *Allium serpentanicum*, *A. kandemirii* and *A. decipiens*.

Characters	<i>A. serpentanicum</i>	<i>A. kandemirii</i>	<i>A. decipiens</i> (from Seregin 2007)
Bulb	globose-ovoid	ovoid	globose
Tunic	bark-like, disintegrating	bark-like, disintegrating	coriaceo-papyraceous
Scape length	12–25(–30) cm	15–40(–50) cm	40–100 cm
Leaves	1–2(–3), up to 1/2 of scape, linear	2–4(–7), at least 1/2 of scape, linear	2–4, up to 1/2 of scape, linear to linear-lanceolate
Inflorescence	fasciculate	fasciculate, hemispherical	hemispherical
Perianth segments	initially reflexed, later twisted and curving inwards; 4.5–5 × 1–1.5 mm, purplish pink or white with dark purple or green median vein, subacute tip	initially stellate, after reflexed; 5–6(–6.5) × 0.8–1(–1.5) mm, bright pink with purple or green median vein, acute tip	initially stellate, after reflexed and twisted outwards; (3.5–)4–5(–5.5) × 1(–1.5) mm, usually whitish (greenish), occasionally rose when dry, with darker (green or purple) midvein, shortly acute tip
Filaments	fleshy, as long as tepals, triangular, basally united, dark pink or white (if tepals white), gradually narrowed above	fleshy, as long as 3/4 of tepals, triangular, basally united, white or whitish pink, gradually narrowed above	non-fleshy, up to 3.5(4) mm long, whitish, triangular at base and subulate above
Ovary	purple or dark green	purple or dark green	green
Capsule	globose-ovoid	ovoid	globose
Habitat	serpentine rocky slopes	calcareous slopes	hardwood deciduous forests
2n	16, 32	16	16