

Taxonomic notes on *Centaurea* sect. *Acrocentron* (Asteraceae) in Iran, with the description of a new species

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Centaurea orumiehensis Ranjbar & Negaresh *sp. nova* (Asteraceae) is described and illustrated from western Azerbaijan Province, NW Iran. The characters that distinguish it from the morphologically closest species are given. In addition, *C. zangulensis* Ranjbar & Negaresh *stat. & nom. nov.* is proposed to replace *C. elegantissima* Bornm. var. *albiflora* Bornm.

Centaurea s. lato is a relatively large genus in the family Asteraceae. In Iran, it has 70 species in 28 sections (Wagenitz 1980). Most taxa are endemic to the country and much localized. After Wagenitz's (1980) treatment, five new species have been described from Iran (Wagenitz & Esfandiari 1983, Ranjbar & Negaresh 2012, Ranjbar *et al.* 2013b), and one subspecies has been added to the flora (Ranjbar *et al.* 2012a). The largest section of *Centaurea* in Iran is sect. *Acrocentron*, with ten species, of which *C. kandavanensis* and *C. luristanica* as well as *C. carduiiformis* subsp. *iranica* and *C. pseudoscabiosa* subsp. *armata* are endemic to Iran (Wagenitz 1980).

This article follows previous studies conducted on the Centaureinae in Iran (Ranjbar *et al.* 2011, 2012a, 2012b, 2013a, 2013b, Ranjbar & Negaresh 2012) and aims at increasing the knowledge of the taxonomy and geographical distribution of some species of section *Acrocentron* in Iran.

During our field excursions to different regions of W and NW Iran, we collected some orophilous plants belonging to *Centaurea* sect. *Acrocentron*. In addition, we examined several sheets from the herbaria BASU, B, E, G, JE, LD, P, VAN, W and WU. The collected *Centaurea* specimens were identified according to *Flora Iranica* (Wagenitz 1980). Our specimens resembled *C. pseudoscabiosa* subsp. *pseudoscabiosa*, but there were several differences that justify describing a new species.

***Centaurea orumiehensis* Ranjbar & Negaresh, *sp. nova* (Figs. 1 and 2)**

HOLOTYPE: Iran, West Azerbaijan: Oshnavieh to Orumieh, Ganj Abad, 1730 m a.s.l., 23 June 2012 Ranjbar & Negaresh 31681 (holotype BASU!; photo W!).

ETYMOLOGY: The specific epithet refers to Orumieh city, where the new species is found.

Biennial plants, usually all over green-grayish, with thickened rootstock, 25–42 cm tall.

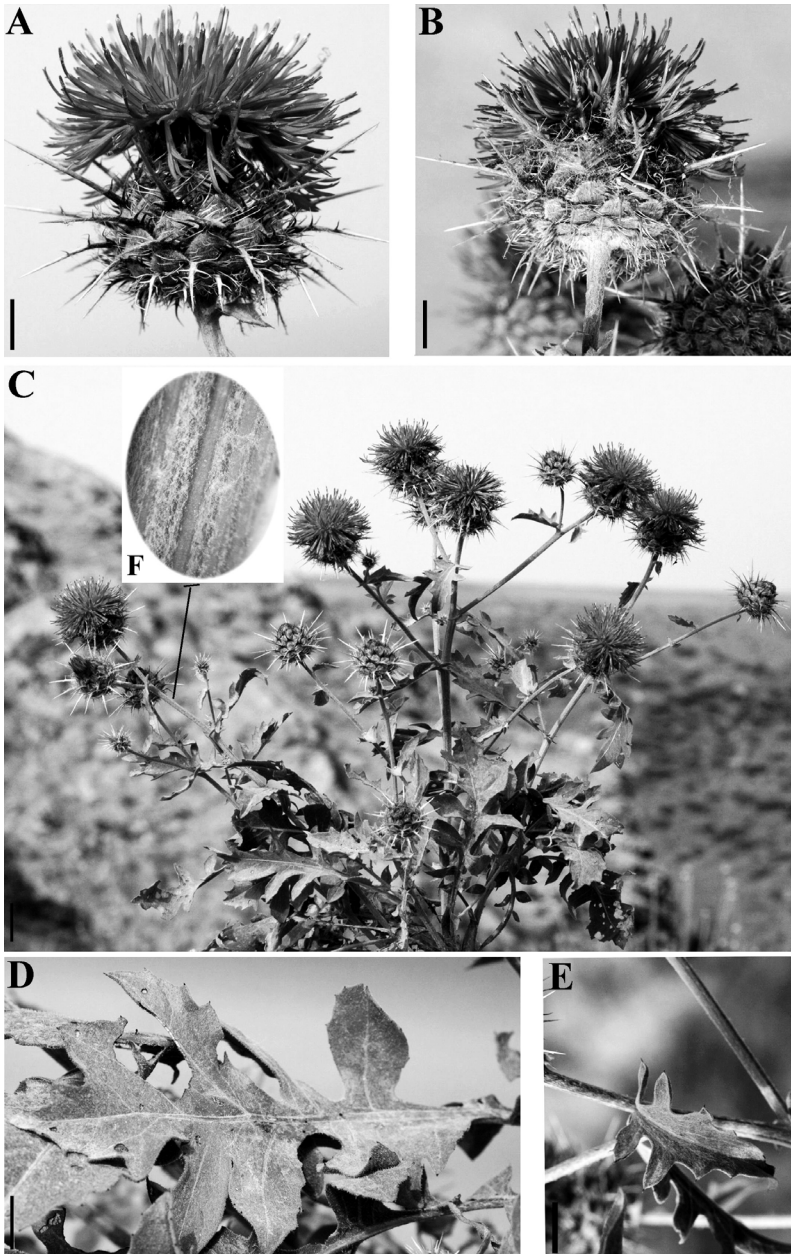


Fig. 1. *Centaurea orumiehensis* (from the holotype). — **A:** Capitule. — **B:** Indumentum of capitule. — **C:** Habit. — **D:** Lower surface of median cauline leaves. — **E:** Indumentum of upper surface of upper cauline leaves. — **F:** Indumentum of stem. Scale bars: **A, B** and **E** = 1 cm, **C** = 3 cm, **D** = 2 cm.

Stems ca. 4–5, base ascending, obtusely brown-ribbed, densely covered with floccose-tomentose hairs, ca. 6 mm in diam. at base, somewhat branched in lower to upper parts with 9–12 capitula, more densely branched in upper part. Leaves always divided, above grayish, densely covered with floccose-tomentose hairs, below green, loosely covered with floccose-tomentose hairs mixed with sparse hirsute-articulate,

sometimes with short scabrous hairs, margins strongly scabrous. Basal leaves 23–31 cm long, petioles up to 8 cm long, pinnatipartite to pinnatisect, segments in 5–10 pairs; terminal segments larger, broadly ovate or ovate-lanceolate, 4–5 × 3–4 cm, dentate; lateral segments ovate or ovate-lanceolate, 4–20 mm wide, remotely denticulate, acute at apex. Lower cauline leaves 15–25 cm long, petiole up to 6.3 cm long, pinna-

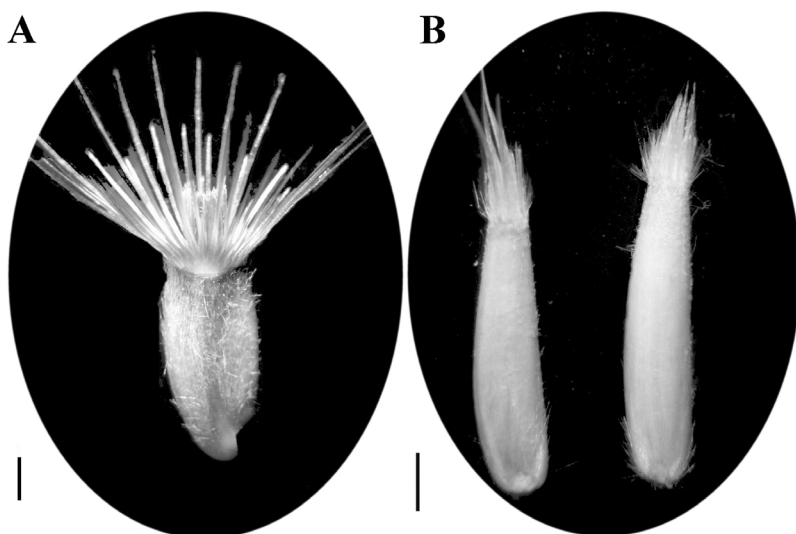


Fig. 2. *Centaurea orumiehensis* (from the holotype). — **A:** Fertile achene with pappus. — **B:** Sterile achenes with pappus. Scale bars: **A** and **B** = 1 mm.

tisect, segments in 4–6 pairs; terminal segments distinctly larger, broadly ovate or ovate, 4.5–6 × 4–5.5 cm, obsolete repand-denticulate; lateral segments ovate or ovate-lanceolate or lanceolate, 10–18 mm wide, entire, sometimes remotely denticulate, acuminate at apex. Median cauline leaves sessile, 10–18 × 4–6 cm, pinnatisect or pinnatilobed, segments in 5–8 pairs, lanceolate or oblong, sometimes lyrate, terminal segments repand-dentate and much larger, acute at apex. Upper cauline leaves successively smaller, sessile, 1–8.5 cm long, pinnatilobed or sublyrate or with 2–3 lobes in lower part, segments lanceolate or oblong-lanceolate, rarely simple with margin denticulate, acuminate or mucronate at apex. Capitula solitary at end of branches, peduncles 8–25 mm long; involucre cupuliform to ovoid, truncate-convex at base, 30–35 × (25)30–35 mm. Phyllaries multiseriate, coriaceous, green, densely covered with arachnoid-tomentose hairs. Outer phyllaries ovate, 6–8 × 6–8 mm; median phyllaries broadly oblong, 9–14 × 8–9 mm; inner phyllaries oblong, 16–20 × 6–8 mm, with a hyaline border. Appendages large, concealing part of phyllaries only, dark brown or blackish, triangular, strongly decurrent, innermost round and spineless, blackish-reddish, in base excluding cilia 3–4 mm wide; cilia blackish, numerous, 8–13 on each side, 3–7.5 mm long; spines triangular, brown-blackish, 8–18(22) mm long, much longer than closest cilia. Flowers purple; central

florets hermaphrodite, ca. 30–32 mm long, with 5 equal and acute lobes, with blackish nerves, tube yellow; anther tube equal to corolla, apical appendages acute; stigma deep purple, longer than corolla, up to 2.5 mm, symmetrically bifid, ca. 0.2 mm long, pubescent; peripheral floret sterile, 4-lobed, limb lobe narrowly lanceolate, 6.5–7 mm long, scarcely radiant. Achenes oblong, 5–5.2 mm long, 2–2.2 mm wide, blackish or yellowish, appressed white-hairy; hilum lateral, 0.8–1 mm long, glabrous. Pappus double, scabrous, pale brown; outer 6.5–7 mm long; inner shorter, 2–5 mm long. Flowering in May and June, fruit ripening in June and July.

DISTRIBUTION AND HABITAT. *Centaurea orumiehensis* occurs in the mountain region around Ganj Abad between Oshnavieh and Orumieh near Khalil Kuh in west Azerbaijan Province, NW Iran. It also grows on hills and roadsides or shrubland at 1600–1800 m a.s.l. Some other plants that occur in the area are *C. pseudoscabiosa* subsp. *pseudoscabiosa*, *C. pseudoscabiosa* subsp. *armata*, *C. imperialis*, *Fibigia macrocarpa*, and *Hordeum glaucum*.

Centaurea orumiehensis belongs to section *Acrocentron*, which includes taxa with stems that are usually branched in upper part, leaves lyrate or pinnatisect to bipinnate, not decurrent, few medium-sized or large capitula, oblong-ovoid to subglobose involucre, and decurrent appendages ending in a spine. *Centaurea orumiehensis*

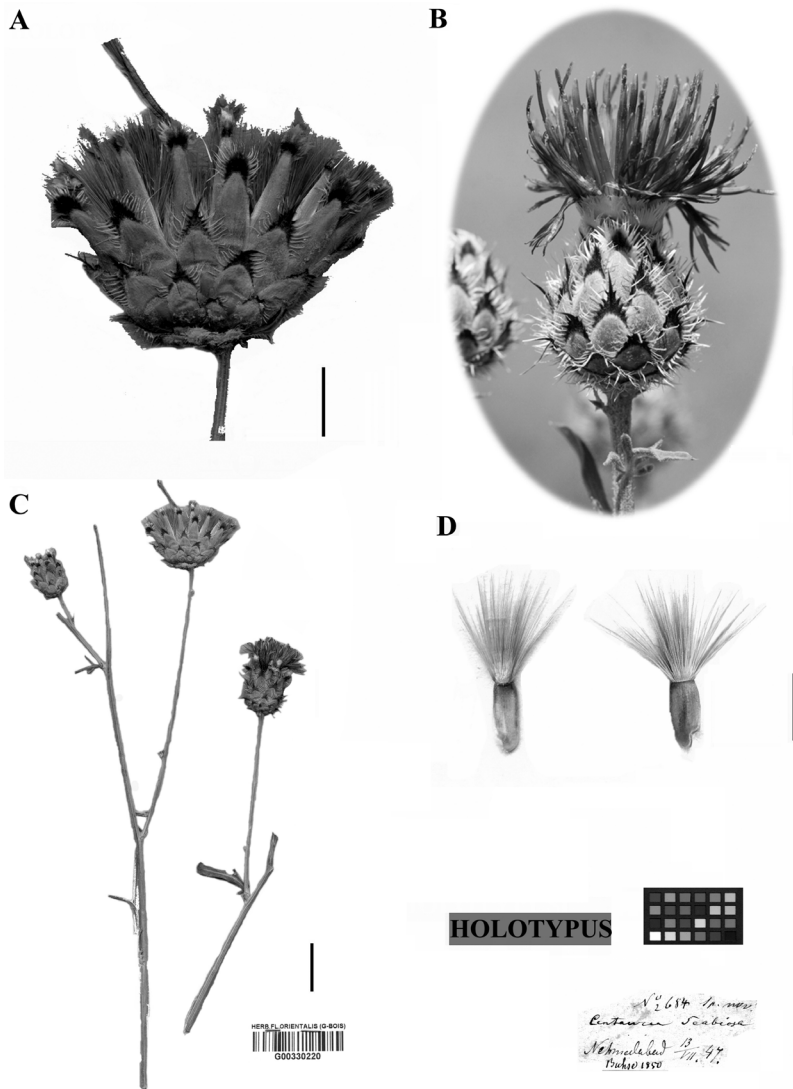


Fig. 3. *Centaurea pseudoscabiosa* (A, C and D from the holotype, photographs through the courtesy of G). — A: Capitulum. — B: Close up of capitulum. — C: Habit. — D: Achenes with pappus. Scale bars: A and B = 1 cm, C = 2 cm, D = 5 mm.

is similar to *C. pseudoscabiosa* subsp. *pseudoscabiosa* in some characters such as the color of appendages and flowers, and the length of achenes (Fig. 3). The latter taxon is native to NW, W and central Iran and it is also known from E Turkey and Transcaucasia (Wagenitz 1975, 1980). *Centaurea orumiehensis* differs from *C. pseudoscabiosa* subsp. *pseudoscabiosa* by some characters (Table 1).

Centaurea pseudoscabiosa is represented by two subspecies in Iran, distributed in W–NW and central parts of the country (Boissier 1875, Wagenitz 1980). Subsp. *pseudoscabiosa* has appendages with a spine (2)3–6(8) mm long and

cilia 2–4(5) mm long (Fig. 3). *Centaurea pseudoscabiosa* subsp. *armata* on the other hand has appendages with a distinct spine (8)10–15(20) mm long, and cilia usually 4–6 mm long.

In addition, *C. davisii* from SE Turkey and N Iraq (holotype E!) is another species that is somewhat similar to *C. orumiehensis* (Fig. 4), but there are differences (Table 1).

***Centaurea zangulensis* Ranjbar & Negaresh, stat. & nom. nov. (Fig. 5).**

Centaurea elegantissima Bornm. var. *albiflora* Bornm., Feddes Repert. Spec. Nov. 51: 289. 1942. — HOLOTYPE: Iran.

Table 1. Comparison of *Centaurea orumiehensis*, *C. pseudoscabiosa* subsp. *pseudoscabiosa* and *C. davisii*.

	<i>C. orumiehensis</i>	<i>C. pseudoscabiosa</i> subsp. <i>pseudoscabiosa</i>	<i>C. davisii</i>
Habit	biennial	perennial	perennial
Plant height	25–42 cm	40–90 cm	40–50 cm
Stem	almost branched in lower to upper parts	often branched in upper part	branched in median or upper parts
Stem indumentum	densely floccose-tomentose	lower part pilose-articulate ± densely hirsute, in upper part subglabrous	lower part subglabrous, upper part glabrous
Leaf indumentum	above densely floccose-tomentose, below loosely floccose-tomentose mixed with sparsely hirsute-articulate sometimes with short scabrous hairs	below sparsely short pilose-articulate or sparsely hirsute rarely subglabrous, above subglabrous or glabrous	glabrous or subglabrous
Basal leaves length	23–31 cm	10–17 cm	ca. 30 cm
Basal and lower leaves dissection	pinnatisect or pinnatifid, segments in 5–10 pairs	lyrate or pinnatisect, segments in 2–4(6) pairs, sometimes simple	interruptedly pinnatisect, segments in 8–10(15) pairs
Shape of terminal segments of basal and lower leaves	broadly ovate or ovate-lanceolate	lanceolate or narrowly lanceolate	in outline lanceolate
Terminal segments of basal and lower leaves	30–55 mm wide and larger than lateral segments	—	10–20 mm wide and equal than lateral segments
Lateral segments of basal and lower leaves	ovate or ovate-lanceolate, remotely denticulate sometimes entire	lanceolate or narrowly lanceolate or linear, entire	in outline lanceolate, coarsely serrate or pinnatilobed
Lateral-segment width of basal and lower leaves	4–20 mm	3–8(12) mm	5–15(20) mm
Median cauline leaves	10–18 × 4–6 cm, segments in 5–8 pairs	4–6(8) × 1–3(4) cm, segments in 2–5 pairs	11–15 × 1.5–2 cm, segments in 4–6 pairs
Heads	9–11-cephalous	2–5(6)-cephalous	2–4-cephalous
Involucre shape	cupuliform to ovoid	ovoid or subglobose	oblong-ovoid
Involucre size	30–35 × (25)30–35 mm	20–25 × 15–22 mm	25–27(30) × (18)20–22 mm
Phyllaries	smooth and densely arachnoid-tomentose	smooth and loosely arachnoid-tomentose	striate and mildly araneous
Cilia length	3–7.5 mm	2–4(5) mm	4–5 mm
Cilia color	blackish	whitish	whitish
Spine length	8–18(22) mm	(2)3–6(8) mm	15–20 mm
Hilum indumentum	glabrous	barbate	—
Pappus length	6.5–7 mm	6–9(10) mm	8–10 mm

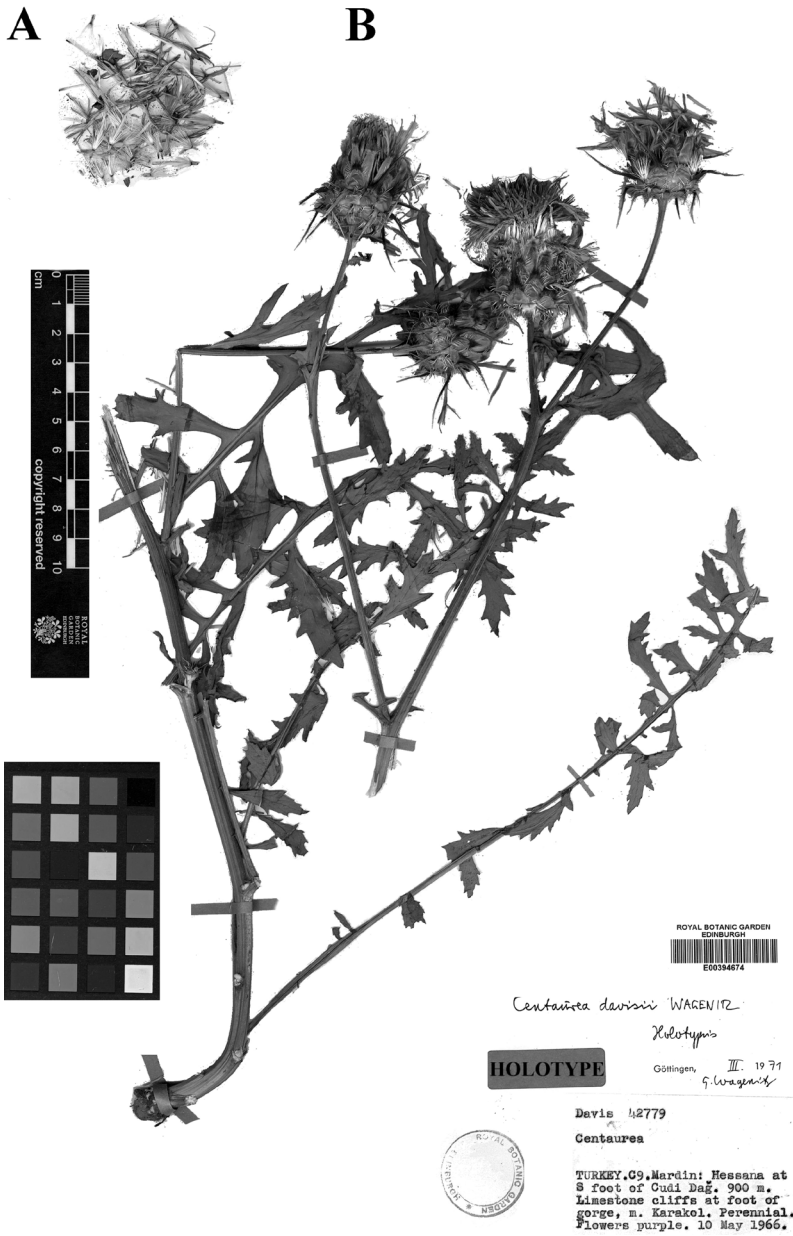


Fig. 4. *Centaurea davisii* (from the holotype, photographs through the courtesy of E). — **A:** Flowers and achenes. — **B:** Habit.

Mazandaran: Pol-e Zanguleh, 2500 m a.s.l., 20 August 1938 *Gauba 1580* (B1, photo BASU).

ETYMOLOGY: The specific epithet refers to Zanguleh village, where the taxon is found.

Biennial plants, with thickened rootstock, up to 25 cm tall; collum covered with many remains of brown fibers petiole of previous year present. Stem erect, monocephalous, nearly without leaves or with few small leaves along stem, ca. 3–4 mm in diam. at base, always simple and not

branched, in lower part pilose-articulate, upper part ± glabrous. Leaves always divided, bicolor, above green, below reddish-brownish, sparsely covered with pilose-articulate, margins scabrous. Basal leaves 13–18 × 4–5 cm, petioles up to 2 cm long, bipinnate, segments in 8–11 pairs; terminal segments smaller, ovate or obovate, 1.3–1.5 × 1–1.2 cm, entire or dentate; lateral segments pinnatifid, pinnatilobed or lyrate, 1–4 × 0.5–2 cm, in outline oblanceolate or obovate, dentate or

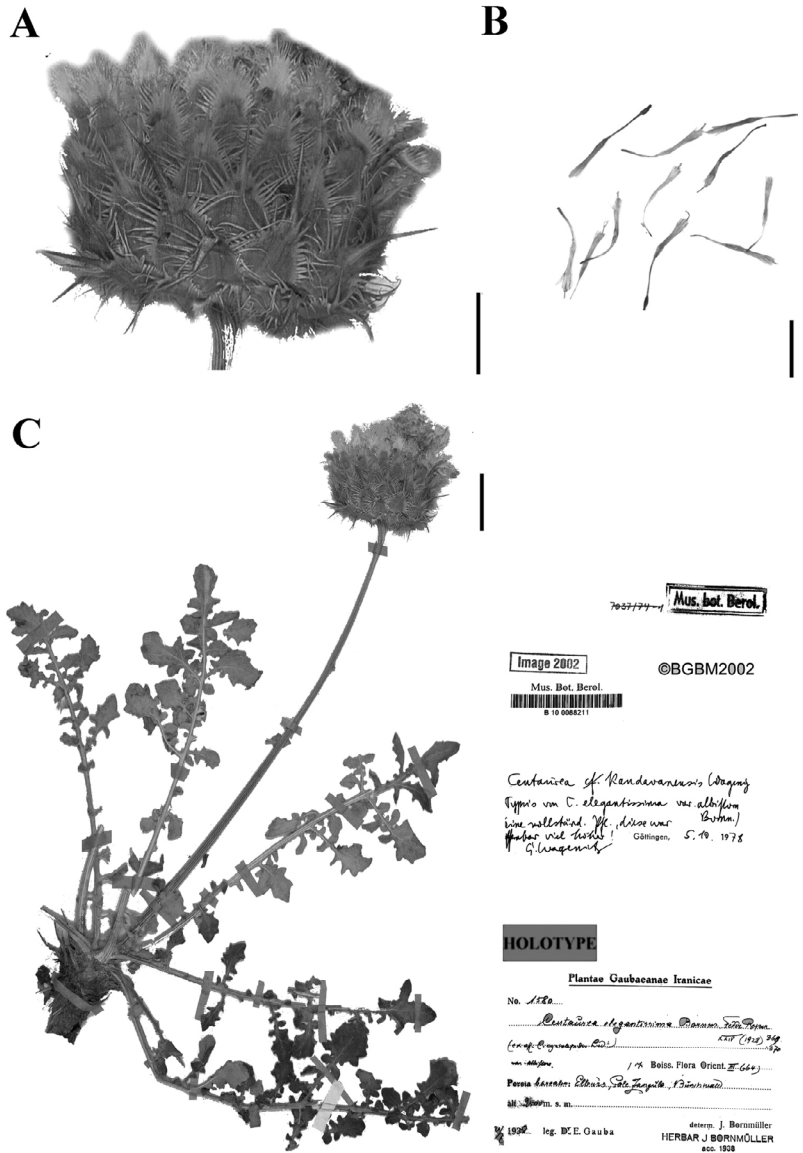


Fig. 5. *Centaurea zangulensis* (from the holotype, photographs through the courtesy of B). — **A:** Involucre. — **B:** Central florets. — **C:** Habit. Scale bars: **A** = 1 cm, **B** and **C** = 2 cm.

remotely denticulate or entire, rounded or obtuse at apex. Cauline leaves strongly reduced and few. Capitula solitary at end of stem, peduncle ca. 6 cm long; involucre cupuliform, truncate at base, 30–35 × 35–40 mm. Phyllaries multiseriate, coriaceous, dark green, striate, glabrous. Outer phyllaries ovate; median phyllaries broadly oblong, 10–12 × 7–8 mm; inner phyllaries oblong, 21–26 × 4–6 mm, with a hyaline border. Appendages medium-sized, concealing a major part of phyllaries, brown, triangular, strongly decurrent, innermost round and spine-

less and whitish, in base excluding cilia 3–5 mm wide; cilia brown or whitish, numerous, (9)10–15 on each side, 3–6 mm long, erect; spines triangular, brown, 4–13 mm long, strongly longer than the closest cilia. Flowers whitish, in dry state yellow-brownish; central florets hermaphrodite, 27–32 mm long, with 5 equal and acute lobes; anther tube slightly longer than corolla, apical appendages acute; stigma slightly longer than corolla, up to 1.5 mm. Achenes unknown. Flowering in June and July, fruit ripening in July and August.

DISTRIBUTION AND HABITAT. *Centaurea zangulensis* thrives on rocky mountain sides with clay stones, around Zanguleh village close to Kandavan in Mazandaran Province, N Iran. It can be expected to grow on roadsides or in forests at 2000–3000 m a.s.l. Some other plants that occur in the area are *Callicephalus nitens*, *Centaurea behen*, *C. kandavanensis*, *Dracocephalum kotschyi*, *Psephellus zuvandicus*, and *Steptorrhampus persicus*.

The taxon we treat as *C. zangulensis* was recognized as *C. elegantissima* var. *albiflora* by Bornmüller (1942). In *Flora Iranica*, it was included in *C. kandavanensis* (Wagenitz 1980). Our study indicated that there are many differences between this taxon and both *C. kandavanensis* and *C. elegantissima* (Table 2), so we recognize it at species level. However, the epithet *albiflora* is already in use in *Centaurea* (*C. albiflora* K. Koch, *Linnaea* 24: 430. 1851).

Centaurea zangulensis belongs to sect. *Acrocentron*. It resembles *C. kandavanensis* (Fig. 6) and *C. elegantissima*, but differs from them in several characters (Table 2).

ADDITIONAL SELECTED SPECIMENS EXAMINED. — *Centaurea pseudoscabiosa* subsp. *pseudoscabiosa*. Iran. Azerbaijan: Zonus, M. Ranjbar & K. Negaresh 29353 (BASU); between Rud-e Aland and Qeris NW Khoy, K. H. Rechinger 49486 (W); 30 km S Khoy toward Shahpur, K. H. Rechinger 41788 (W); in valley Qutor W Khvoy, K. H. Rechinger 41754 (W); Kuh-e Kani, K. H. Rechinger 49717 (W); Ghogeh Dagh mountains, K. H. Rechinger 43792 (W); between Shahpur and Rezaieh, K. H. Rechinger 49823 (W). Hamedan: Yalfan, M. Ranjbar & Z. Tolui 28530 (BASU); Hamedan to Avaj, M. Ranjbar & K. Negaresh 27414 (BASU); Sarab Ghorveh, A. Mohammadi 12342 (BASU). Zanjan: 40 km to Mahnesan, M. Ranjbar 22802 (BASU); Zanjan to Dandy, M. Ranjbar & K. Negaresh 29484 (BASU). Qazvin: 80 km to Moallem Kolayeh, M. Ranjbar & K. Negaresh 30052 (BASU). Kurdistan: 40 km to Divandarreh, M. Ranjbar 22764 (BASU); 50–60 km N Sanandaj, K. H. Rechinger 42729 (W); 25 km E Sanandaj near Salavat Abad, K. H. Rechinger 42791 (W);

Table 2. Comparison of *Centaurea zangulensis*, *C. kandavanensis* and *C. elegantissima*.

	<i>C. zangulensis</i>	<i>C. kandavanensis</i>	<i>C. elegantissima</i>
Plant height	up to 25 cm	50–90 cm	ca. 50 cm
Stem	simple, nearly without leafy or with very few small leaves along	median to upper parts branched, throughout leafy	upper part branched, throughout leafy
Stem indumentum	lower part pilose-articulate, upper part ± glabrous	lower part pilose-articulate, upper part ± glabrous	subglabrous
Basal leaves	at flowering time not withered, bipinnate and bicolor	at flowering time withered, interrupted pinnatisect	at flowering time withered, interrupted pinnatisect
Lateral segments	pinnatifid or pinnatilobed or	lyrate	dentate or lobed
dissection of basal leaves	lyrate		in base
Shape of lateral segments of basal leaves	outline oblanceolate or obovate	outline lanceolate	outline broadly lanceolate or oblong
Terminal segments of basal leaves	smaller than lateral segments	larger than lateral segments	larger than lateral segments
Cauline leaves	strongly reduced and very few	lyrate and distinct	interrupted pinnatisect or pinnatilobed and distinct
Heads	monocephalous	5–10-cephalous	ca. 2-cephalous
Involucre shape	cupuliform	subglobose	semi-spherical
Involucre size	30–35 × 35–40 mm	(20)25–35 × 20–35 mm	ca. 30 × 35
Phyllary color	dark green	purple-tinged	green
Phyllary indumentum	glabrous	sparsely to densely tomentose	glabrous
Outer and median appendages color	brown	dark brown to blackish	dark brown-purple
Inner appendages color	whitish	brown	pale brown
Flower color	whitish, in dry state yellow-brownish	deeply purple	rose-purple
Spine length	4–13 mm	(10)15–30 mm	6–11 mm



Fig. 6. *Centaurea kandavanensis*. — **A:** Habit (from the isotype, photograph through the courtesy of W). — **B:** Capitule. Scale bars: **A** = 2 cm, **B** = 1 cm.

33 km NW Divandarreh toward Saqqez, *K. H. Rechinger* 48603 (W). — *C. pseudoscabiosa* subsp. *armata*. **Iran**. Qazvin: Qazvin to Kuheyn, 28 June 2008 *M. Ranjbar* 16537 (BASU). Azerbaijan: 10 km from Agh-Bolagh to Orumieh, *M. Ranjbar & K. Negaresh* 31819 (BASU); Oshnavieh to Orumieh, *M. Ranjbar & K. Negaresh* 31681 (BASU); Chalil Kuh mountains near Pesan, *K. H. Rechinger* 48679 (W); N Sero, *K. H. Rechinger* 49765 (W); between Oshnavieh and Naqadeh, *K. H. Rechinger* 49034 (W). — *C. kandavanen-*

sis. **Iran**. Mazandaran: Karaj to Chalus, *M. Ranjbar & K. Negaresh* 29197 (BASU); Pol-e Zangueh in valley Chalus, *K. H. Rechinger* 6316 (W); Kojur, between Kinch and Dasht-e Nazir, *K. H. Rechinger* 6646 (W). — *C. davisii*. **Turkey**. C9 Mardin: Hessana at foot of Cudi Da., *P. H. Davis* 42779 (E). **Iraq**. Kurdistan: Mosul, to confine Turkey Province Hakari, *K. H. Rechinger* 10902-a (E). — *C. elegantissima*. **Iraq**. Kurdistan: Arbil, *J. F. N. Bornmüller* 1489 (B).

Acknowledgements

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