A revision of *Centaurea* sect. *Centaurea* (Asteraceae) from Iran

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Abstract: A taxonomic review of *Centaurea* L. sect. *Centaurea* (Asteraceae) in Iran was carried out. Seven taxa are recognized and 1 of them is described as a new species: *Centaurea joharchii* Ranjbar & Negaresh. This new species has been described and illustrated from Khorasan Province, SE Iran. A new combination is proposed: *C. kermanshahensis* (Wagenitz) Ranjbar & Negaresh. In addition, *C. aggregata* Fisch. & C.A.Mey. ex DC. subsp. *aggregata* is typified and *C. diffusa* Lam. is reported here as a new record for Iran. Finally, a key to all species of the section *Centaurea* in Iran is provided.

Key words: Identification key, lectotypification, new species revision, taxonomy

1. Introduction

Subtribe Centaureinae (Asteraceae-Cardueae), centered mainly in the Mediterranean region (Wagenitz, 1986; Meusel and Jäger, 1992), contains about 31 genera with around 800 species (Hellwig, 2004). A wide array of growth and life forms are known among Centaureinae, ranging from tall shrubs to small annuals, the majority being polycarpic perennial herbs or monocarpic biennials (Hellwig, 2004). Following the progression in taxonomy, numerous taxonomic changes and rearrangements have been proposed in the genera of the subtribe Centaureinae (García-Jacas et al., 2000; Wagenitz and Hellwig, 2000; Greuter, 2003; Hellwig, 2004; Martins and Hellwig, 2005; García-Jacas et al., 2006; Hidalgo et al., 2006; Martins, 2006; Wagenitz et al., 2006; Susanna and García-Jacas, 2007; Ranjbar et al., 2011, 2012a, 2012b; Ranjbar and Negaresh 2012). *Centaurea* L. is the largest genus of subtribe Centaureinae. *Flora Iranica* (Wagenitz, 1980) recognized 28 sections and 70 species for Iran.

The genus *Acrolophus* was described by Cassini (1827) to include species with small capitula, appendages squamous or coriaceous-scarious and decurrent, ciliate, and with short spines. Subsequently, de Candolle (1838) reduced this genus to a section of *Centaurea*, a position followed by subsequent workers (García-Jacas et al., 2000; García-Jacas et al., 2006; Wagenitz et al., 2006). Recently, *Centaurea* sect. *Centaurea* as a new name for the section and *C. paniculata* L. as a new type for the genus *Centaurea* were considered in Greuter’s typification system (Greuter et al., 2001), and they are treated by us here for the flora of Iran.

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Section *Centaurea* is centered mainly in the Mediterranean region, although several species grow outside this area. The basic chromosome number in sect. *Centaurea* is x = 9 (Bakhshi Khaniki, 1996; Garcia-Jacas et al., 1998a, 1998b; Romashchenko et al., 2004; López and Devesa, 2008; Trigas et al., 2008; Uysal, 2008; Martin, 2009).

Section *Centaurea* is still the subject of active research (e.g., Garcia-Jacas et al., 2006; Trigas et al., 2008) and new taxa in section are regularly described (e.g., Wagenitz et al., 2006; Trigas et al., 2008; Uysal, 2008; Strid and Tan, 2009; López et al., 2011). In his account of the section *Centaurea* (sensu sect. *Acrolophus*) for *Flora Iranica*, Wagenitz (1980) described 1 new subspecies (*C. intricata* subsp. *kermanshensis* Wagenitz) and recognized a total number of 5 species that occur in this area. Taking into account the 2 subspecies common between Iran and Turkey (*C. aggregata* Fisch. & C.A.Mey. ex DC. subsp. *aggregata*), and *C. diffusa* Lam. is reported here as a new record for Iran. Finally, a key to all species of the section *Centaurea* in Iran is provided.

As can be seen from recent
papers in this journal (e.g., Aydin et al., 2013; Aytaç and Duman, 2013; Öztürk and Çetin, 2013; Yıldız et al., 2013; Yüksel et al., 2013), there is considerable active taxonomic research on the family Asteraceae.

2. Materials and methods
The present study includes a total of 39 populations collected from the distributional range of section Centaurea in Iran and all vouchers are deposited in the herbarium of the Bu-Ali Sina University Herbarium (BASU). The study also includes 150 herbarium specimens from the herbaria FUMH, E, B, G, G-DC, GOET, H, P, W, and WU. From plants in the field, a preliminary list of the characters that had been or may be useful in delimiting Centaurea taxa was developed. A range of taxonomically important characters in the section was investigated. The characters included the life form; the shape and length of leaves; the segmentation and shape of leaves; the shape, size, and number of involucres and appendages; the number, length, and shape of cilia; the length of spines; the color of florets; the size, shape, and color of achenes; and the shape, length, and color of the pappus. The shape of leaves and their segmentation and the shape of involucres, appendages, and the pappus are also important characters (Klokov, 1963; Wagenitz, 1975, 1980). Measurements were obtained from at least 5 replicates of each specimen in BASU and the average value was evaluated. The maximum and minimum values of the measures are given in the descriptions of taxa.

3. Results and discussion
≡ Acrolophus Cass., Dict. Sciences Nat. 50: 253 (1827).

Type: C. paniculata L. (Greuter et al., 2001).
≡ Acosta Adans., Fam. 2: 117 (1763).

Biennials, perennials, spiny subshrubs, or suffrutescent, often covered with arachnoid or tomentose hairs; usually copiously branched with many small capitula. Lower cauleine leaves lyrate or more often pinnatifipartite to bipinnatifipartite, median cauleine leaves usually pinnatifid or pinnatifoliate, the upper ones usually smaller and simple. Involucres small, 7–13 × 2.5–8 mm, ovoid to fusiform; phyllaries usually herbaceous or herbaceous-coriaceous, often with elevated longitudinal nerves. Appendages ±triangular, scarious, or semicoriaceous, decurrent with a narrow denticulate margin or hyaline auricles, ciliate, ending in a mucro or short spinule. Flowers rose, rose-purple, purple, white, or more rarely yellow, marginal slightly radiant, without staminodes. Achenes small, usually oblong, brownish, 2.5–4 mm long; pappus double, scabrous, whitish, often shorter than achene and sometimes absent, inner row short.

Key to the Iranian species of Centaurea sect. Centaurea
1. Flowers white or rarely yellow.
   2. Habit suffrutescent; stem angular, usually subaphyllous in flowering; anther tube rose; pappus 1–1.5 mm long, rarely deficient.
   3. Basal and lower leaves pinnatifipartite; capitula deciduous; phyllaries glabrous; appendages purplish, the median ones with long mucro; cilia 5–8 on each side, (1.3–)1.5–2.5 mm ……………………………3. C. intricata
   3. Basal and lower leaves entire rarely pinnatifoliate; capitula persistent; phyllaries ±densely arachnoid-floccose; appendages pale brown to brown, the innermost ones with short mucro; cilia 3–5 on each side, 0.5–1.2 mm long .........................5. C. kermanshahensis
   2. Habit not suffrutescent; stem cylindrical, not aphyllous in flowering; anther tube white; pappus absent or 0.5–1 mm long.
   4. Plant >20 cm in height; stem upright or ascending at base; median cauleine leaves pinnately incised or pinnatisect; capitula solitary at end of branches; phyllaries glabrous; central florets 18–20, ±13 mm long............2. C. diffusa
   4. Plant <20 cm in height; stems diffused at base; median cauleine leaves simple or with 1–2 lobes in lower part; capitula single or sometimes 2–3 together at the end of branches or occasionally in clusters; phyllaries arachnoid-floccose; central florets 5–6, ca. 10 mm long........................................4. C. joharchii

1. Flowers rose, rose-purple or purple.
   5. Basal and lower leaves lyrate, terminal segment 8–20 mm wide; median cauleine leaves lyrate; capitula mostly aggregated at tips of primary branches, in dense clusters of 3–10; phyllaries glabrous...........1. C. aggregata subsp. aggregata
   5. Basal and lower leaves bipinnatifipartite or pinnatifipartite, terminal segment 0.8–2(–5) mm wide; median cauleine leaves pinnatifipartite; single or often 2 together at the end of branches; phyllaries tomentose, arachnoid-hairy, or glabrous.
   6. Capitula persistent after flowering; involucres oblong-ovoid, 5–8 mm wide; appendages pale brown or brown; spine short and ca. 0.5 mm long; 12–20 central florets ............6. C. ovina
6. Capitula deciduous after flowering; involucres fusiform, 3–4 mm wide; appendages often purple-maculate; spine hamate or squarrose, (1–)1.5–2 mm long; 5–8 central florets 

7. **C. virgata** subsp. **squarrosa**

1. **Centaurea aggregata** Fisch. & C.A.Mey. ex DC., Prodr. 6: 585 (1838).

   subsp. **aggregata** (Figures 1 and 2).


   Lectotype (designated here): Iran. Azerbaijan, 27.7.1828, Szowits s.n. (G-DC! isolectotypes: K! H!).

   = **C. chrysolopha** Boiss. & Kotschy in Diagn. Pl. Or. ser. 2, 3: 75 (1856).

   Holotype: Frequens in rupestribus calcareis aquiloni obversis in monte Gisyl Deppe. alt. 8000 ped., 6.1853, Kotschy 184 (G! duplicate: G!).


   Lectotype (designated here): Syria, Amanus, 8.1891, Post 95 (G! isolectotypes: G! B!).


   Lectotype (designated here): Iraq. Prov. Arbil: Rawandiz, Handren mountains, 1300 m, 21.6. 1893, Bornmüller 1472 (B!).

   = **C. pauciflora** C.Koch, Linnaea 24: 433 (1851).

   Ind. loc.: im Gebirgsgane Pertakrek auf Kalk und Prophyr, 5000–6000 hoch. (typus non vidi)


   Holotype: Iraq. Prov. Arbil: Rawandiz, Handren mountains, 1300 m, 21.6. 1893, Bornmüller 1472 (B!).

   Perennial plants, whole usually green, with long woody rhizome, with sterile leafy rosette, (20–)40–80(–100) cm tall; remains of stems and leaf bases of the previous year present. Stems 2 to 8(–13), erect or upright or almost
ascending, sometimes ascending from the base, ribbed-sulcate, almost branched in median to upper parts, 2–6 mm in diameter at the base; branches rigid, unequal in length, ± densely covered with floccose-arachnoid hairs. Leaves usually divided, ± loosely covered with arachnoid-tomentose mix of scabrous and densely minutely sessile glands, sometimes subglabrous. Basal and lower leaves petiolate, lyrate, segments in 2–5 pairs, terminal segment larger, lanceolate, 8–20 mm wide, lateral segments much smaller, narrowly lanceolate, acute or acuminate at apex. Median cauline leaves sessile, almost lyrate, segments in 1–3 pairs, terminal segments larger, 3–8(–10) mm wide, lateral segments much smaller, acuminate or acute at apex. Upper cauline leaves increasingly smaller, sessile, simple, smooth, oblong or lanceolate or oblanceolate, sometime with a pair of lobes near the base, mucronate at apex. Capitula numerous, persistent, mostly aggregated at tips of primary branches, in dense clusters of 3–10, and then sessile, sometimes with short peduncles. Involucres subcylindrical, narrowed at the base, 10–13 × 3–4(–5)
Phyllaries multiseriate, herbaceous, pale green, with 3–4 prominent longitudinal nerves or elevated, glabrous. Outer phyllaries ovate or ovate-oblong, 0.8–2 × 0.6–1.2 mm; appendages 1–2.6 × 2.5–3 mm (including cilia and spine). Median phyllaries oblong, 2.8–4.8 × 1.3–2 mm; appendages 2–2.3 × 3–3.5 mm (including cilia and spine). Inner phyllaries oblong-linear or linear, reddish above, with distinct nerves, 8.5–10 × 1–1.5 mm; appendages entire or laciniate, membranous, 1–1.5 × 0.8–1.1 mm. Appendages small, concealing a major part of phyllaries, with spreading tip, triangular, brown, ±patent; cilia numerous, 6–8(–9) on each side, 1.5–2.5 mm long; spine short, 0.5 mm long, shorter than the adjacent cilia. Flowers rose-purple or purple; central florets hermaphroditic (8–)10–13, (11–)14–15 mm long, corolla ca. 8 mm long; peripheral florets 14–16 mm long, rarely radiant. Achenes 2.5–3 mm long, 1.3–1.4 mm wide, light reddish-brown or brown, with whitish ribs. Pappus 2.5–3.5 mm long, scabrous, inner shorter.

Taxonomic and distribution remarks: *C. aggregata* subsp. *aggregata* is distributed in W and NW Iran (Figure 3), and also in Turkey, Iraq, and the Transcaucasia region. It occurs on dry rocky and stony slopes, forests, and meadows in the midmountain zone, at 700–2600 m elevation. *C. aggregata* subsp. *aggregata*, in most cases, can be easily recognized by the congested heads with small brownish appendages and very short terminal mucro, and the fresh green lyrate leaves (Wagenitz, 1975). The taxon is related to *C. austro-anatolica* Hub.-Mor. from Turkey in the arrangement of capitula (clusters), size of involucres, and length of achenes and pappus. However, *C. aggregata* subsp. *aggregata* differs from it by having basal and lower leaves lyrate (vs. pinnatipartite), median cauline leaves lyrate (vs. simple), capitula persistent (vs. easily deciduous), involucres subcylindrical, narrowed at the base (vs. ±fusiform), cilia 6–8(–9) (vs. 10–15) on each side, and also spine 0.5 mm (vs. 1–2 mm) long. *C. aggregata* subsp. *aggregata* grows at higher elevations (700–2600 m) than *C. austro-anatolica* (50–460 m).

**Specimens examined: Iran.** Prov. Azerbaijan: in valley Qutor W Khoy, 1600–1900 m, Rechinger 49535 (W); neck Zamziran S Mahabad, 1200 m, Rechinger 49081, 49093 (W); Chalil Kuh N Razhan, 1800–2000 m, Rechinger 48755 (W). Prov. Kurdestan: Paveh to Bayangan, 5 km to Bayangan, 1525 m, 30.5.2012, Ranjbar & Negaresh 29449, 32980 (BASU); Sanandaj to Marivan, 5 km to Sarv Abad, Langeriz village, 1350 m, 20.6.2012, Ranjbar & Negaresh 48755 (W); Marivan to Saqqez, Kani-Kan, 1970 m, 23.6.2012, Ranjbar & Negaresh 32963 (BASU); 5 km after Dezeli village, 20.6.2012, Ranjbar & Negaresh 32963 (BASU); 5 km after Dezeli village, 20.6.2012, Ranjbar & Negaresh 32963 (BASU);
32379 (BASU); mountains Chehel Chashmeh, 44 km NE Marivan (Dezh Shahpur), 2000 m, Rechinger 43044 (W). Prov. Hamedan: Hamedan to Avas, 20 km to Abgarm, Pole-e Arvan, 1835 m, 10.6.2012, Ranjbar & Negaresh 29929 (BASU). Prov. Kermanshah: Kermanshah to Paveh, 5 km before Shahu city, 1545 m, 30.5.2012, Ranjbar & Negaresh 29925 (BASU).


2. *Centaurea diffusa* Lam., Encycl. 1: 675 (1785) (Figure 4).


Type: Western Europe. [Turkey?] 'Carduus orientalis calcitrapae folio, flore minimo', Tournefort s.n. (P!).

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Figure 4. *Centaurea diffusa*. A- Close-up of capitulum, B- branches with capitula, C- indumentum of stem and leaves, D- habit (*Ranjbar & Negaresh 28925: BASU*). Scale bars: A = 5 mm, B = 2 cm, D = 8 cm.
Biennial plant, usually green all over, often 20–50 (–90) cm high. Stems upright or ascending at base, ribbed-sulcate, strongly branched from base to upper part, up to 5 mm in diameter at the base, branches numerous, divaricated, unequal in length, densely arachnoid mix of pilose hairs, and sessile glands. Leaves usually all divided, covered with slightly scabrous or with weakly arachnoid-hairy. Basal and lower leaves petiolate, 10–12 cm long, pinnatipartite or bipinnate, segments in 8–16 pairs, 2–4 mm wide, narrowly linear or narrowly lanceolate, acuminate at apex. Median cauline leaves pinnately incised or pinnatisect, 5–7 cm long, segments in 5–10 pairs, 1–6.5 mm wide, linear or narrowly lanceolate or narrowly oblong, acuminate or mucronate at apex. Inflorescence usually paniculate. Capitula persistent, solitary at tips of many branches, peduncles 1–3.5 cm long. Involucres ovoid-cylindrical, 8–10 × 2.5–5 mm. Phyllaries multiserial, herbaceous, imbricate, glabrous. Outer phyllaries oblong-ovate, 0.3–1.2 × 1–1.2 mm; appendages 3–3.3 × 3–4.5 mm (including cilia and spine). Median phyllaries oblong, 1.8–2.8 × 1.4–1.8 mm; appendages 4–4.2 × 4–4.2 mm (including cilia and spine). Inner phyllaries oblong-linear, 5.2–7.5 × 1–1.6 mm; appendages 2.5–4 × 0.8–4 mm (including cilia and spine). Appendages medium-sized, totally concealing phyllaries, spreading, straw-colored (rarely dark brown), triangular, with (4–)5–7 cilia (1.5–2 mm) on each side, ending in a spine of (1.5–)2.5–3.5 (–4) mm. Flowers whitish, rarely light purple; central florets hermaphroditic 18–20, ±13 mm long, corolla around 7 mm long. Achenes 2.5–3.0 mm long, or consisting of fewer hairs.

Taxonomic and distribution remarks: *Centaurea diffusa* (Figure 4) is cited here as a new record for Iran. It occurs on clay mountains and hills around Bazaran of W Azerbaijan Province (Figure 3). *C. diffusa* can be expected to grow in open places and on stony slopes, coastal sands, and roadsides at 900–1700 mm. This homogeneous and easily recognizable Mediterranean element (Wagenitz, 1975) is widespread in the Mediterranean area. According to Klokov (1963), *C. diffusa* has been introduced to many regions of southern and central Europe, and is also native to Asia Minor. It is similar to *C. sivasica* Wagenitz by ramification of stem, single and persistent capitula, and the length of the cilia and spine. *C. sivasica* is endemic to Turkey and is an Irano-Turanian element. However, *C. diffusa* differs from it by some important characters, such as plant 20–50 (–90) cm (vs. 15–25 cm) in height, basal and lower leaves pinnatifid or bipinnate, segments in 8–16 pairs, narrowly linear or narrowly lanceolate (vs. pinnatisect, segments in ca. 5 pairs, lanceolate-ovate), appendages straw-colored (vs. straw-colored and usually with purple spots), flowers white, rarely light purple (vs. rose-purple), and central florets 18–20 (vs. 5–6) in number.

In addition, *C. diffusa* shares some characters such as ramification of stem, dissection of basal and lower leaves, and size of involucres with *C. calolepis* Boiss., but differs from it by having (4–)5–7 (vs. 9–13) cilia on each side, flowers white, rarely light purple (vs. rose-purple), central florets 18–20 (vs. 4–6) in number, and achenes 2.5–3.0 mm (vs. 3.5–4 mm) long.


Holotype: Iran. Esfahan, Aucher-Eloy 4853 (G; isotypes: P, K) (Figure 5).

Perennial plant, suffrutescent, many stemmed, usually green or gray all over, 20–30 cm tall. Stems erect, branched from base to upper part; branches intricate, with weak structure, densely covered with canescent-tomentose hairs, angular. Basal and lower leaves withering in flowering, evanescent, in juvenile ± densely covered with arachnoid-tomentose hairs, later glabrescent, pinnatifid, segments in 2–4 pairs, linear or linear-lanceolate, segments entire or dentate, terminal segments rarely wider or lanceolate, acuminate or acute at apex. Median cauline leaves sessile, simple, rarely lyrate, 10–15 × 1–15 mm, narrowly linear or linear to linear-lanceolate, acuminate or mucronate at apex. Upper cauline leaves increasingly smaller, sessile, simple, small filiform. Capitula numerous, very deciduous, solitary at tips of many branches, 0.3–1.3 (–1.5) cm long leafy to capitula. Involucres subcylindrical, 8–10 × 2.5–3.5 mm. Phyllaries multiserial, green, imbricate, glabrous. Outer phyllaries oblong-oblong, 0.8–1 × 0.8–1 mm; median phyllaries oblong, sometimes with prominent longitudinal or elevated nerves, 2.5–3 (–4) × 1–1.2 mm; inner phyllaries oblong-linear or linear, almost with prominent longitudinal or elevated nerves, 4.5–6 (–7)
Appendages small, concealing pro part of phyllaries, narrowly triangular, purplish, rarely brown, in base 0.6–0.8 mm wide (excluding cilia), the median ones almost with long mucro (mucronate); cilia numerous, scabrous, 5–8 on each side, (1.3–)1.5–2.5 mm long; spine arcuate-patent or recurved, 2–3(–4) mm long. Flowers white; central florets hermaphroditic 7–8, ±11 mm long, anther tube rose; peripheral florets not radiant, shorter than central floret. Achenes oblong-lanceolate, brownish, shiny and smooth, glabrous, approximately 3 mm long. Pappus 1–1.5 mm long, rarely deficient.

Taxonomic and distributional remarks: C. intricata generally occurs in S and SE Iran, and also Iraq (Figure 3). It is a Zagrosian element known only from the dry-steppe zone. C. intricata can be expected to grow on clay hills and calcareous land in midmountain zones, at 700–1800 m.
Wagenitz (1980) recognized 2 subspecies of *C. intricata* in Iran. The study of the type specimen, fresh material, and field observations indicated that both subspecies (subsp. *intricata* and subsp. *kermanshahensis*) have many morphological differences, which are reported in Table 1. With this consideration, we recognize them as separate species.


### Table 1. Diagnostic morphological characters of *Centaurea kermanshahensis* and *C. intricata*.

<table>
<thead>
<tr>
<th>Characters</th>
<th><em>C. kermanshahensis</em></th>
<th><em>C. intricata</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Branches</td>
<td>Slightly intricate</td>
<td>Intricate</td>
</tr>
<tr>
<td>Basal and lower leaves:</td>
<td>Entire rarely pinnatifoliate</td>
<td>Pinnatipartite</td>
</tr>
<tr>
<td>dissection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basal and lowers leaves:</td>
<td>Glabrous or subglabrous</td>
<td>In juvenile ± densely covered</td>
</tr>
<tr>
<td>indumentums</td>
<td></td>
<td>with arachnoid-tomentose, later</td>
</tr>
<tr>
<td></td>
<td></td>
<td>glabrescent</td>
</tr>
<tr>
<td>Capitula</td>
<td>Persistent</td>
<td>Deciduous</td>
</tr>
<tr>
<td>Involucres: shape</td>
<td>Ovoid-oblong</td>
<td>Subcylindrical</td>
</tr>
<tr>
<td>Phyllaries: indumentums</td>
<td>± Densely arachnoid-floccose</td>
<td>Glabrous</td>
</tr>
<tr>
<td>Appendages: width (mm)</td>
<td>0.2–0.6</td>
<td>0.6–0.8</td>
</tr>
<tr>
<td>Appendages: color</td>
<td>Pale brown to brown</td>
<td>Purplish</td>
</tr>
<tr>
<td>Appendages</td>
<td>Innermost ones with short mucro</td>
<td>Median ones with long mucro</td>
</tr>
<tr>
<td>Cilia</td>
<td>3–5 on each side, 0.5–1.2 mm long</td>
<td>5–8 on each side, (1.3–)1.5–2.5 mm</td>
</tr>
<tr>
<td>Central florets: number</td>
<td>5–7</td>
<td>7–8</td>
</tr>
</tbody>
</table>

4. **Centaurea joharchii** Ranjbar & Negaresh sp. nov. (Figure 6).

Diagnosis: *C. joharchii* is similar to *C. virgata* subsp. *squarrosa* in the size of involucres, number and length of cilia, and number of central florets, but differs from it by having some important characters such as plant up to 17 cm (vs. 30–70 cm) tall, stems diffuse (vs. erect), basal and lower leaves pinnatipartite with 2–4 pair segments, sometimes pinnatifid or with a few coarse teeth (vs. pinnatipartite or pro part bipinnatipartite, segments in 4–10(–12) pairs), median cauline leaves simple or with 1–2 lobes in lower part (vs. pinnatipartite), appendages pale brown (vs. purplish-maculate, sometimes straw-colored), flowers white (vs. rose or rose-purple), anther tube white (vs. rose-purple), achenes ovate or ovate-oblong, striate-costate, sparsely hairy (vs. oblong, striate, glabrous), and pappus deciduous and 0.5–0.8 mm long (vs. persistent and 1–2 mm) long (see Table 2).


Perennial with woody base, many-stemmed, whole usually grayish, with many heads, 10–17 cm tall; remains of leaf base of the previous year present. Stems diffuse, densely covered with arachnoid-tomentose and sessile glands hairs, branched at the base and often from median to upper parts, upward with spreading rigid branches, ca. 2 mm in diameter at the base branches often short, almost
branched, unequal in length, cylindrical, loosely leafy. Leaves very small, coriaceous, without venation, densely covered with tomentose hairs, margins entire. Basal and lower leaves at flowering time evanescent, sometimes withered, sessile, pinnatipartite, segments in 2–4 pairs, linear or narrowly lanceolate-linear, ca. 1.5 cm long, 0.1–0.2 cm wide, sometimes pinnatifid or with coarse teeth, acute at apex. Median cauline leaves sessile, 10–15 × 1–12 mm, simple or with 1–2 lobes in lower part, linear or narrowly lanceolate-linear, acute at apex. Upper cauline leaves small, sessile, 3–10 × 0.8–1 mm, simple or with 1–2 lobes in lower part, short linear or filiform, acute at apex. Capitula small, single, or sometimes 2–3 together at the end of branches, occasionally in clusters, mostly persistent after flowering. Involucres fusiform-oblong, 7–8 × 3–4 mm. Phyllaries multiseriate, herbaceous, pale green, with prominent longitudinal nerves or elevated, loosely covered with arachnoid-floccose and sessile glands hairs. Outer
phyllaries elliptic, ca. 2 × ca. 1.5 mm; appendages ca. 2 × ca. 3 mm (including cilia and spine). Median phyllaries elliptic, 2.5–3 × 1.2–1.3 mm; appendages 2.5–3 × 3.2–3.5 mm (including cilia and spine). Inner phyllaries oblong-linear or linear, 3–3.5 × 1–1.6 mm; appendages 1.5–2.2 × 1.8–2.8 mm (including cilia and spine). Appendages small, concealing a major part of phyllaries, rigid, pale brown, not decurrent; cilia scabrous, slightly whitish, mostly spreading or reflexed, numerous 3–8 on each side, 0.5–1.5 mm long; spines subsquarrose, 1–1.8 mm long, whitish, ±equal to or longer than the adjacent cilia. Flowers white, in dry state yellow; central florets hermaphroditic 5–6, ca. 10 mm long, corolla ca. 6 mm long, 5-lobed, lobes ±2.5 mm long, anther tube white; peripheral florets not radiant, 4-lobed, limb lobes lanceolate-linear. Achenes ovate or ovate-oblong, 2.8–3.5 mm long, ca. 1.5 mm wide, dark brown or blackish, striate-costate (with 6–10 yellowish line), round at the apex, sparsely hairy; hilum ca. 0.5 mm long, whitish. Pappus scabrous, whitish, 0.5–0.8 mm long, deciduous.

Etymology: Named in honor of the Iranian botanist Dr Joharchi, who is director of the herbarium of Ferdowsi University of Mashhad.


Taxonomic and distribution remarks: *Centaurea joharchii* is a rare endemic to NE Iran and is known only from the dry-steppe zone of the Babakamar mountains around Kalat-e Naderi in Khorasan Province, NE Iran (Figure 3). The new species can be expected to grow on stony residual, at elevations of 1100–1400 m. *C. joharchii* shares some characters such as height of stem, shape of appendages, and color of flowers with *C. intricata*, but differs from it by having habit perennial (vs. perennial and suffrutescent), stems diffuse and cylindrical (vs. intricate and angular), capitula single sometimes 2–3 together at end of branches or occasionally in clusters (vs. solitary at end of branches), involucres 7–8 mm (vs. 8–10 mm) long, spine 1–1.8 mm (vs. 2–4 mm) long, cilia 0.5–1.5 mm (vs. (1.3–)1.5–2.5 mm) long, anther tube white (vs. rose-violet), and pappus 0.5–0.8 mm (vs. 1–1.5 mm) long.

This species is also related to *C. aggregata* subsp. *aggregata*, especially because of the indumentum, habit, and number of cilia. However, *C. joharchii* differs from it by having plants up to 17 cm (vs. 40–75 cm) tall, capitula single or sometimes 2–3 together at the end of branches or occasionally in clusters (vs. mostly aggregated at tips of primary branches, in dense clusters of 3–10), involucres 7–8 × 3–4 mm (vs. 10–13 × 3.5–5 mm), appendages pale brown (vs. brown), cilia 0.5–1.5 mm (vs. 1.5–2.5 mm) long, spine subsquarrose, 1–1.8 mm long (vs. short, ca. 0.5 mm long), flowers white (vs. rose-purple), central florets 5–6 (vs. (8–)10–13 mm) number, and pappus 0.5–0.8 mm (vs. 2.5–3.5 mm) long.

Suggested conservation status: The new species is endemic to the Babakamar mountains in Kalat-e Naderi, Iran. The specimens were collected in Khorasan Province, where the species is apparently very rare and local. *Centaurea joharchii* is known only from 1 population in the type locality occupying an area of 50 m². The population

**Table 2.** Diagnostic morphological characters of *Centaurea joharchii* and *C. virgata* subsp. *squarrosa*.

<table>
<thead>
<tr>
<th>Characters</th>
<th><em>C. joharchii</em></th>
<th><em>C. virgata</em> subsp. <em>squarrosa</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Habit tall (cm)</td>
<td>up to 17</td>
<td>30–70</td>
</tr>
<tr>
<td>Lower cauline leaves</td>
<td>Pinnatifid with 2–4-pair segments, or pinnatifid or with few coarse teeth</td>
<td>Pinnatifid or pro part bipinnatifid, segments in 4–10(–12) pairs</td>
</tr>
<tr>
<td>Median cauline leaves</td>
<td>Simple or with 1–2 lobes in lower part</td>
<td>Pinnatifid</td>
</tr>
<tr>
<td>Capitula</td>
<td>Persistent</td>
<td>Deciduous</td>
</tr>
<tr>
<td>Appendages: color</td>
<td>Pale brown</td>
<td>Purple-maculate, sometimes straw-colored</td>
</tr>
<tr>
<td>Flowers: color</td>
<td>White, in dry state yellow</td>
<td>Rose or rose-purple</td>
</tr>
<tr>
<td>Anther tube: color</td>
<td>White</td>
<td>Rose-purple</td>
</tr>
<tr>
<td>Achenes</td>
<td>Ovate or ovate-oblong, striate-costate, sparsely hairy</td>
<td>Oblong, striate, glabrous</td>
</tr>
<tr>
<td>Pappus</td>
<td>Deciduous and 0.5–0.8 mm long</td>
<td>Persistent and 1–2 mm long</td>
</tr>
</tbody>
</table>
was not in good condition at the time of our fieldwork, numbering approximately 50 to 100 plants. According to IUCN Red List criteria (IUCN, 2001), it should be assigned to the Critically Endangered (CR) category because of its local distribution and small population size.

5. **Centaurea kermanshahensis** (Wagenitz) Ranjbar & Negarestan, comb. & stat. nov. (Figure 7).


Type: Iran. Prov. Kermanshah: between Qasr Shirin and Kermanshah, 50 km E Qasr Shirin toward Karand, 28.8.1957, Rechinger 14611 (holotype W! isotypes: E! G! B!) (Figure 7).

Perennial plant, suffrutescent, many-stemmed, usually grayish all over, with long woody rhizome, 10–30 cm tall; many remains of leaf and stems base of the previous year present. Stems erect, woody, branched from base to upper part; branches slightly intricate, loosely covered with canescent hairs, angular. Basal and lower leaves withering in flowering, evanescent, glabrous or subglabrous, entire rarely pinnatifid, narrowly lanceolate or lanceolate to oblanceolate, 40–60(-70) × 5–8 mm, long-petiolate.
Median cauline leaves sessile, entire, sometimes lyrate, 10–30 × 1–1.5 mm, narrowly linear or linear to linear-lanceolate, acuminate or mucronate at apex. Upper cauline leaves increasingly smaller, sessile, simple, short filiform. Capitula numerous, persistent, solitary at tips of many branches, peduncles 0.5–2(–4) cm long (0.5–2(–4) cm long leafy to capitula). Involucres ovoid-oblong, 8–10 × 3–4.5 mm. Phyllaries multiseriate, yellowish or yellow-greenish, imbricate, ± densely covered with arachnoid-floccose hairs. Outer phyllaries ovate-oblong, 1.5–2 × 1–1.6 mm; median phyllaries oblong, 3–4 × 1.2–1.8 mm; inner phyllaries oblong-linear or linear, 5–6 × 0.5–1 mm. Appendages small, concealing pro part of phyllaries, narrowly triangular, pale brown to brown, in base 0.2–0.6 mm wide, the innermost ones with short micro, cilia 3–5 (0.5–1.2 mm long) on each side; spine recurved, (1.5–)2–3 mm long. Flowers white; central florets hermaphroditic 5–7, ±12 mm long, anther tube rose; peripheral florets not radiant, shorter than central floret. Achenes oblong-lanceolate, brownish, shiny and smooth, glabrous, ca. 2.5 mm long; pappus ca. 1.5 mm long, rarely deficient.

Taxonomic and distribution remarks: C. kermanshahensis is distributed exclusively in Kermanshah and Hamedan provinces, W Iran (Figure 3). It possesses a narrower distribution than other species of the section Centaurea in Iran. It is a Zagrosian element and known only from the dry-steppe zone. C. kermanshahensis can be expected to grow on clay hills and in calcareous areas of the midmountain zone, at elevations of 900–1700 m. It seems that the assignment of it as a subspecies of C. intricata may be wrong, because there are many distinct differences between C. kermanshahensis and C. intricata (Table 1). C. kermanshahensis is far from the main distribution area of C. intricata (Figure 3). Both species have different geological ranges in Iran. C. kermanshahensis is only distributed in W Iran, while C. intricata is mainly distributed in S Iran (Figure 3).

Specimens examined: Iran. Prov. Kermanshah: 5 km after Rijab, 920 m, 27.5.2012, Ranjbar & Negaresh 30134 (BASU); between Khanaqin and Kermanshah, Davis 701 (E). Prov. Hamedan: Hamedan to West Eslam Abad, 15 km to West Eslam Abad, 1682 m, 24.6.2011, Ranjbar & Negaresh 27360 (BASU).


Lectotype: Habitat ad Caucasum, B-Willd. 16563/3 (B!)

= Centaurea intacta Ledeb., Fl. Ross. 2: 705 (1845) fide Fl. URSS.

Type: Caucasus, Kachetia, Hehn s.n. (LE!).


Type: in saxosis Georgiae Caucas, Hohenaker s.n. (K!).

Perennial plant, whole usually green, 30–70(–80) cm tall; remains of leaf base of the previous year present. Stems to 5, upright, sharply ribbed, deeply sulcate, lower parts densely covered with tomentose-arachnoid gray hairs, other parts loosely to sparsely tomentose or subglabrous mix of short scabrous hairs, branched at the base to upper part; branches numerous, upward with divaricated branches, almost branched, unequal, and cylindrical. Leaves loosely to sparsely covered with arachnoid-tomentose hairs or subglabrous, usually divided. Basal and lower leaves with short-petiolate, bipinnatifid, segments in 5–10 pairs, terminal segments oblong-linear to oblong-ovate, up to 3 × 1.0–2.0 mm, acuminate at apex. Median cauline leaves sessile, pinnatifid, segments in 2–6 pairs, terminal segments shortly linear or narrowly oblong, 3–4 mm wide, lateral segments 1–2 mm wide, acuminate or mucronate at apex. Upper cauline leaves increasingly smaller, sessile, undivided, linear, up to ca. 20 × 1 mm wide. Floriferous branches 2–14 cm long. Capitula persistent, solitary at tips of branches. Involucres oblong-ovoid, 9–11 × 5–8 mm. Phyllaries multiseriate, greenish, imbricate, in immature state densely tomentose, later glabrescent, with longitudinal nerves. Outer and median phyllaries ovate or oblong, 3–7 × 1.5–2.5 mm, with 3–5 veins; appendages 2–3 × 2.5–4 mm (including cilia and spine). Inner phyllaries linear or narrowly linear, 7.5–9 × 0.7–1.7 mm; appendages 1.5–2 × 1–1.5 mm, entire or lacerate. Appendages small, concealing a major part of phyllaries, triangular, pale brown or brown, ciliate; cilia numerous, 5–7 on each side, 1–2 mm long, with auricles hyaline in base; spine short, ca. 0.5 mm long, shorter than the adjacent cilia. Flowers rose; 12–20 hermaphroditic central florets ca. 12 mm long; peripheral florets few radiant, ca. 15 mm long. Achenes oblong, dark brown, (2.5–)3.0–3.5 mm long, 1–1.3 mm wide, sparsely hairy; hilum lateral, yellowish, ca. 0.8 mm long. Pappus persistent, whitish, (0.5–)1–2 mm long.

Taxonomic and distributional remarks: C. ovina is distributed in N Iran and the Transcaucasia region (Figure 3). It occurs on stony and rocky mountain slopes at 250–1500 m. Little is known about the species as related to C. virgata subsp. virgata in color of flowers, number and length of cilia, or length of achenes and pappus. However, C. ovina differs from it by having basal and lower leaves bipinnatifid (vs. pinnatifid, pro part bipinnatifid), capitula persistent, solitary at tips of branches (vs. deciduous, single or often 2 together at end of branches), involucres oblong-ovoid, 9–11 × 5–8 mm (vs. fusiform, 7–9 × 3–4 mm), appendages pale brown or brown (vs. purple-maculate, sometimes straw-colored), spine short, ca. 0.5 mm long (vs. hamate or squarrose, 1(–)1.5–2 mm long), and 12–20 (vs. 5–8) central florets.

Centaurea virgata var. squarrosa Boissier [family Compositae], Fl. Orient., 3: 651 (1875), based on C. squarrosa Willd., Sp. Pl. 3: 2319 (1803), not Roth 1800. 
≡ C. virgata Lam. var. squarrosa Boiss., Fl. Or. 3: 651 (1875).
Type: In Oriente, Tournefort & Gundelsheimer ? 16635 (B-Willd!).

= C. squarrosa Willd. var. colensis C.Koch, in Linnaea 24: 434 (1851).
Type: Unknown country, C.Koch s.n. (GOET!).

Type: Iraq. Prov: Mosul: Chiya-e Gara, Kotschy 303 (GOET!).

Holotype: Turkey, Pontisches Gebirge. 1843-1845, K. Koch s.n. (B!).

Perennial plants, with woody base, whole usually greenish, many-stemmed, 30–70 cm tall; sometimes remains of leaf base of the previous year present. Stems 1 to 12, erect, ribbed-sulcate, branched in upper part or often near base or from base; branches cylindrical, almost divaricately branched, rigid, densely to loosely covered with arachnoid-tomentose hairs. Leaves usually divided, loosely covered with arachnoid to thin tomentose hairs. Basal and lower leaves petiolate, sometimes withered at flowering time, pinnatifid or pro part bipinnatifid, segments in 4–10(–12) pairs, linear rarely narrowly lanceolate, terminal segment 0.8–2(–5) mm wide, acute at apex. Median cauline leaves sessile, pinnatifid.
segments in 1–5 pairs, linear to oblong-lanceolate, 2–18 mm long, 0.05–0.22(–0.3) mm wide, acuminate or cuspidate at apex. Upper cauline leaves increasingly smaller, sessile, undivided, narrowly oblong-linear to linear or narrowly linear, 5–22 × 1–3.7 mm, acuminate or mucronate at apex. Capitula numerous, single or often 2 of them together at end of branches, mostly deciduous after flowering, at tips of short branches to 1.5–4 cm long or partly often sessile and crowded at tips of branches. Involucres small, fusiform, 7–9 × 3–4 mm. Phyllaries multiseriate, herbaceous, imbricate, arachnoid-hairy or glabrous, greenish or yellowish or purplish, with prominent longitudinal nerves or elevated. Outer phyllaries shortly ovate, 1–3 × 0.5–1 mm; median phyllaries oblong-linear, 3–5 × 1–1.5 mm; inner phyllaries linear or narrowly linear, 6–8 × 0.5–1 mm, often purplish. Appendages concealing pro part of phyllaries, patent or reflexed, triangular, in base excluding cilia 0.5–1 mm wide, often purple-maculate, sometimes straw-colored, ciliate, the innermost ones often entire; cilia numerous, 5–8(–10) on each side, 1–1.5 mm long; spine hamate or squarrose, (1–)1.5–2 mm long, nearly equal the adjacent cilia. Flowers rose or rose-

Figure 10. Centaurea virgata subsp squarrosa. A and B- Capitula, C- branches with capitula, D- habit (Ranjbar & Negaresh 31832 BASU). Scale bars: A and B = 5 mm, C and D = 3 cm.
purple; 5–8 hermaphroditic central florets ca. 13–14 mm long; peripheral florets scarcely radiant. Achenes oblong, glabrous, 3–4 mm long, 1.3–1.5 mm wide, striate with yellowish stripes on ribs. Pappus persistent, whitish, 1–2 mm long, rarely absent.

Taxonomic and distribution remarks: *C. virgata* subsp. *squarrosa* is a widespread element. It is widely distributed in Iran (Figure 3), and also in Bulgaria, Turkey, Lebanon, N Iraq, the Transcaucasia region, Afghanistan, Pakistan, and Turkmenistan. *C. virgata* subsp. *squarrosa* is widely distributed in comparison to other species of the section *Centaurea*. It occurs on dry hills, dry waste ground, stony slopes, weedy places, and roadsides, at elevations of 100–3000 m. *C. virgata* subsp. *squarrosa* is similar to *C. calolepis* in dissection of leaves and color of flowers, but differs from it by having some important characters such as capitula single or often 2 of them together at the end of branches, mostly deciduous after flowering (vs. often 2–3 together, persistent), appendages small, patent or reflexed, often purple-maculate, sometimes straw-colored (vs. large, spreading, straw-colored (usually with purple spots)), cilia 5–8(–10) on each side, 1–1.5 mm long (vs. cilia 9–13 on each side, 1.5–2(–2.5) mm long), spine hamate or squarrose (vs. erect or spreading), 5–8 (vs. 4–6) central florets, and pappus 1–2 mm long, rarely absent (vs. absent) (Figure 6a).

**Specimens examined:** Iran. Prov. Azerbaijan: Maku, Dashtak, 1555 m, 24.6.2012, Ranjbar & Negares 31832 (BASU); Zonus, 1630 m, 25.6.2012, Ranjbar & Negares 29284 (BASU); Khoy, 3 km after Balajock, 2100 m, 23.6.2012, Ranjbar & Negares 29847 (BASU); Oshnavieh, 1700 m, 23.6.2012, Ranjbar & Negares 32685 (BASU); Goja Bel, 1800 m, Rechinger 14863 (W); 5–17 km S Maku, 1500 m, Rechinger 14592 (W); 13–19 km SW Mianeh to Qezel Owzan, 1200 m, Rechinger 42265 (W); 20–30 km NE Tabriz, 1600 m, Rechinger 43591 (W); 94 km N Khoy, 1000 m, Rechinger 32726 (W); between Oshnavieh and Naqadeh, 1500 m, Rechinger 49028, 49029 (W); 38 km NW Bonab, 1550 m, Rechinger 43170 (W); between Balanaj and Rashkan, 1350 m, Rechinger 42112 (W); SW Rezaiyeh, 1500 m, Rechinger 49113 (W); Khanian, Rechinger 14811 (W). Prov. Ardebil: Meshkinshahr to Ardbil, 6 km after Shahryari, 52 km to Ardbil, 1260 m, 25.6.2012, Ranjbar & Negares 30469 (BASU); Prov. Hamedan: neck Asad Abad, 19.6.2012, Ranjbar & Negares 32981 (BASU); Nahavand, Gamasbi, Garin mountain, 15 km from Nahavand, 1840 m, 14.6.2012, Ranjbar & Negares 29088, 29115 (BASU); mountains Karaghan, 2000–2200 m, Rechinger 2121 (W). Prov. Kurdistan: 8 km to Tekab, above the neck, 1750 m, 13.6.2012, Ranjbar & Negares 30215 (BASU); Sanandaj to Kamaryan, 32 km to Kamaryan, 1405 m, 30.5.2012, Ranjbar & Negares 29681 (BASU); Sanandaj to Marivan, 105 km to Marivan, before Darmala village, 2057 m, 20.6.2012, Ranjbar & Negares 29223 (BASU); 14 km N Sazqez, 1550 m, Rechinger 43098 (W); 15 km E Dez Shahpur (Marivan), 1400 m, Rechinger 42986 (W). Prov. Arak: Komejian to Arak, 1830 m, 14.6.2012, Ranjbar & Negares 29108 (BASU); Gargan to Tafresh, 16 km to Tafresh, 2120 m, 14.6.2012, Ranjbar & Negares 29145 (BASU). Prov. Zanjan: Bijar to Zanjan, 115 km to Zanjan, 1630 m, 14.6.2012, Ranjbar & Negares 29451 (BASU); 10 km to Lowshan, 620 m, 14.6.2012, Ranjbar & Negares 29732 (BASU). Prov. Qazvin: ca. 80 km to Moalleem Kalayeh, 1620 m, 10.6.2012, Ranjbar & Negares 30064 (BASU); Kuh-e Dasteh, 2400–2500 m, Rechinger 57295 (W); Kuh-e Sefid near Karaj, 1500 m, Rechinger 620 (W); between Qazvin and Takestan, 1200 m, Rechinger 42314 (W). Prov. Kermanshah: Kamyaran-Ravansar road, 5 km after Alak village, 1428 m, 14.6.2012, Ranjbar & Negares 30556 (BASU); 76 km N’Taq-i Bustan, Rechinger 14681 (W). Prov. Lorestan: Bisheh, 1200–1400 m, Rechinger 5725 (W). Prov. Khorasan: SE Soltan Abad, Sabzavar, Emamzadeh Asghar, 1950 m, 11.7.1989, Faghiniha & Zangu 17935 (FUMH); 10 km road Kashmir, Ghaleh Ghogh village, 1300 m, 27.5.1981, Zokaei 970 (FUMH); Ghochan, first entry to Khosravieh, 1550 m, 18.6.1981, Ghorashialhosseini 1059G (FUMH); Shirvan, Malakanlu, 1600 m, 8.7.1990, Faghiniha & Zangu 18844 (FUMH); 19 km to Ghochan, after Zobaran, 1600 m, 17.6.1981, Ghorashialhosseini 913G (FUMH); Shirvan, Ghenat between Khanlagh and Shirvan, 1000 m, 30.6.1981, Ghorashialhosseini 1096G (FUMH); Baigiran, 1600 m, 17.6.1981, Ghorashialhosseini 783G (FUMH); Norozi 9 km to S Ghochan, mountains of Norozi valley, 1500–1600 m, 17.6.1981, Ghorashialhosseini 938G (FUMH); Chehelmir, 25 km SW Dargaz, 1000–1200 m, 4.6.1981, Ghorashialhosseini 632G (FUMH); neck Badranlu, 900 m, 19.8.1984, Ayatolahai & Zangu 11653 (FUMH); Dargaz, 500 m, 3.6.1984, Ghorashialhosseini 597G (FUMH); 6 km to W Dargaz, 1050–1200 m, 1.7.1987, Ayatolahai & Zangu 15501 (FUMH); mountains Kopet Dagh infra Alam Ali, 1600 m, Rechinger 1684 (W); NE Mozduran, 900–1000 m, Rechinger 55630 (W), 55631 (W); near Torbat-e Heydarieh, 1300 m, Rechinger 4334 (W); Sepid between Bojnord and Maraveh Tappeh, Rechinger 32451 (W); Kuh-e Neyshahpur above Akhamad, 1600–1800 m, Rechinger 4589 (W); 20 km N Sabzvar, 1750 m, Rechinger 53651 (W); Jawzak, 74 km W Bojnord toward Gorgan, 1100 m, Rechinger 53771 (W); Sepid, between Bojnord and Maraveh Tappeh, 1350 m, Rechinger 32541 (B). Prov. Tehran: mountains Tuchal near Darband, 1500–2000 m, Rechinger 1080 (W). Prov. Isfahan: mountains Qandil, Pushtashan, 1100 m, Rechinger 11033 (W); Haji Omran, 1700 m, Rechinger 11298 (W). Prov. Suleymanieh: 18 km W Penjwin, Rechinger 10400 (W); near Tavilla, 1300 m, Rechinger 10203 (W). Prov. Mosul: above Suwara Tuka, 1500 m, Rechinger 11561 (W). Pakistan. Prov. Kurram:
between Amal Kot and Sadda, 1400 m, Rechinger 30965 (W). Afghanistan. Prov. Farah: 32 km N Gulestan to Viam toward Parjuman, Podlech 21726 (W). Prov. Ghorat: Qala Shahruk, 2000 m, Rechinger 19136 (W); infra Parjuman, 1850 m, Rechinger 19020 (W); Qala-i Ghor (Taiwara), 2100 m, Rechinger 19125 (W). Kabul: Kabul, 1800 m, Rechinger 17052-a (W); between Kabul and Charrikar, Podlech 11628, 12868 (W); Baba Qashqar, 2000 m, Rechinger 15881 (W); Band-e Kharghak, 2000 m, Rechinger 19293-a (W); Sar-i Chashme, 3000 m, Rechinger 18855 (W). Prov. Panjshir: Band-e Kharghak, 2000 m, Rechinger 19293-a (W); Sar-i Masha, 2500–2700 m, Rechinger 17289 (W); between Kabul and Ghazni, 1900 m, Rechinger 17052-a (W); Sang-i Masha, 2500–2700 m, Rechinger 17220 (W); above Safed Jir, 2800 m, Podlech 12522 (W). Prov. Logar: 3 km S Pul-i Alam, 1955 m, Podlech 18484 (W). Prov. Maidan: Shibar, 2200–2500 m, Rechinger 36909 (W). Prov. Ghazni: between Kabul and Ghazni, 1900 m, Rechinger 17022 (W); Bozghalak 24 km NE Ghazni, 2400 m, Rechinger 17289 (W); Sang-i Masha, 2500–2700 m, Rechinger 17486 (W); 9 km ENE Malestan, 2850 m, Rechinger 17486 (W); Jare sare Nil, 2850 m, Podlech 18979 (W). Deh Kundi: in saxosis et arenosis graniticis 3–30 km NE Shahrestan, 2200 m. 1–2.7.1967, Rechinger 36732 (B). Turkey. C5 Niğde: Aladağar, 2000 m, 7.8.1999, Döring & Tolimir 1358 (B); 1700 m, 12.8.1999, Döring, Parolly & Tolimir 1526 (B); d. Ulukişla, Bolkar Dağları above Meydan, 2350 m, 29.7.1999, Döring, Parolly & Tolimir 1067 (B); d. Ulukişla, Bolkar Dağları, upper Arpalik (Maden) Deresi, slopes along the road from Darboğaz to Meydan, 2350 m, 30.7.1999, Döring, Parolly & Tolimir 1058 (B); d. Ulukişla, Bolkar Dağları, upper Arpalik (Maden) Deresi, slopes along the road from Darboğaz to tArn Karagöl, 2360 m, 29.7.1999, Döring, Parolly & Tolimir 936 (B). B9 Van: Bendimahi, 1700 m, 15.7.1981, Raus 4050 (B). Ad Angora Galatiae, 1892, Bornmüller 3056 (B); 1600 m, 17.8.1938, Ellenberg 77 (B). Turkey. Szandschak Gümüschkhane, Freyn 7407 (B).

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References


